

MC-ENG Master of Engineering

Year and Campus:	2010 - Parkville
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Level:	Graduate/Postgraduate
Duration & Credit Points:	300 credit points taken over 36 months full time. This course is available as full or part time.
Coordinator:	Professor Alistair Moffat
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Course Overview:	<p>The professional Master of Engineering is a three-year full time program (300 credit points) (may also be taken part-time), offered in eleven specialisations: Biomedical, Biomolecular, Chemical, Civil, Electrical, Environmental, Geomatics, Mechanical, Mechatronics, Software, and Structural. Students will be able to enter the Master of Engineering via a number of pathways:</p> <ul style="list-style-type: none"> # Based on prior study of (suitable) Mathematics and (suitable) Science subjects at the first-year university level, plus a completed undergraduate degree, to then complete 300 credit points of Master of Engineering study. # Based on the prior completion of a designated "Engineering Systems" major in the New Generation/Melbourne Model Bachelor of Biomedicine, Bachelor of Environments, Bachelor of Science to enter with 100 points of designated credit, to then complete 200 credit points of Master of Engineering study. # Based on prior completion of a designated sequence of Breadth subjects in the New Generation/Melbourne Model Bachelor of Commerce, to enter with either 50 points of designated credit (Biomedical, Chemical specialisations), to complete 250 points of Master of Engineering study, or with 100 points of designated credit (Civil, Electrical, Environmental, Mechanical, Software, Structural specialisations), to then complete 200 points of Master of Engineering study. # Based on an undergraduate Bachelor of Engineering or equivalent, with up to 150 points of designated credit to be awarded based on individual evaluation, to then complete (never less than) 150 credit points of Master of Engineering study. <p>The Master of Engineering program is the School of Engineering's professional-entry degree.</p>
Objectives:	<p>This course has as its objectives that graduates should:</p> <ul style="list-style-type: none"> # have a sound fundamental understanding of the scientific principles underlying technology; # have acquired the educational and professional standards of the professional institutions and boards with which the School's courses are accredited; # possess a broad knowledge base of their chosen discipline, and of other disciplines so as to facilitate effective communication with those other professionals with whom engineers routinely communicate; # understand the basic principles underlying the management of physical, human and financial resources; # have acquired the mathematical and computational skills necessary for the solution of theoretical and practical problems for further professional development and for meeting future changes in technology; # possess analytical, problem-solving and, where relevant, design skills, including those appropriate for sustainable development; # have verbal and written communication skills that enable them to make a meaningful contribution to the changes facing our society;

	<ul style="list-style-type: none"> # have developed professional ethics and responsibility towards the profession and the community; # have an appreciation of the interpersonal and management skills required by engineers in undertaking professional activities; and # understand the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development. 				
<p>Course Structure & Available Subjects:</p>	<p>The Master of Engineering consists of 300 points of study, typically across six semesters. This includes:</p> <ul style="list-style-type: none"> # 100 points of foundation study tailored to individual students who enter from non-Engineering backgrounds; and # 200 points of mainly engineering discipline specific study at the level of depth required to practice as a professional engineer upon graduation, including a 25-point capstone project completed in the final year of study. <p>From 2011, students entering with appropriate engineering background may be granted up to 150 point of credit. For example, students entering from the University of Melbourne new generation Bachelor of Science, Bachelor of Environments or Bachelor of Biomedicine with an 'Engineering Systems', 'Computer Science' or 'Geomatics' major will be granted 100 points of credit for the foundation year. Credit will also be granted to students who have completed a specified breadth sequence in the new generation Bachelor of Commerce or appropriate electives as part of any major in the new generation Bachelor of Science. Students entering from another institution may also be awarded credit in this way.</p>				
<p>Majors/Minors/ Specialisations</p>	<p>Specialisations within the Master of Engineering</p> <p>Specialisations are available in the following particular fields of engineering studies:</p> <ul style="list-style-type: none"> # Biomedical # Biomolecular # Chemical # Civil # Electrical # Environmental # Geomatics # Mechanical # Mechatronics # Software # Structural <p>Master of Engineering (Biomedical)</p> <p>Biomedical engineers bridge the gap between technology, medicine and biology. In this specialisation, students choose to focus on areas including biomechanical engineering, bioengineering, bioinformatics, biocellular engineering, biosignals, neural engineering or clinical engineering. Graduates can expect to work in the biotechnology, biomedical or pharmaceutical industries, in research and innovation, in the health services or in government and consulting.</p> <table border="1" data-bbox="389 1603 1485 1720"> <tr> <th>Major/Minor/Specialisation</th> </tr> <tr> <td>Master of Engineering (Biomolecular)</td> </tr> </table> <p>Master of Engineering (Biomolecular)</p> <p>Biomolecular engineers explore the development of large scale processes using microbial, plant or animal cells. Career opportunities for biomolecular engineers exist in specialized biomolecular industries such as the pharmaceutical and food industries but also encompass more traditional chemical engineering fields including petrochemical, minerals and energy, and food and pharmaceutical manufacture.</p> <table border="1" data-bbox="389 1897 1485 2013"> <tr> <th>Major/Minor/Specialisation</th> </tr> <tr> <td>Master of Engineering (Biomedical)</td> </tr> </table> <p>Master of Engineering (Chemical)</p>	Major/Minor/Specialisation	Master of Engineering (Biomolecular)	Major/Minor/Specialisation	Master of Engineering (Biomedical)
Major/Minor/Specialisation					
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Major/Minor/Specialisation					
Master of Engineering (Biomedical)					

Chemical engineers invent, design and implement processes through which raw materials are converted into valuable products such as petrol, foodstuffs and cosmetics. Career opportunities in the field are extensive and include the petrochemical, mining, food, pharmaceutical and chemical industries.

Major/Minor/Specialisation
Master of Engineering (Chemical)

Master of Engineering (Civil)

Civil engineers design and create the infrastructure that supports our society. Career opportunities abound in government, construction, property, infrastructure, consulting, mining, land, water, and waste.

Major/Minor/Specialisation
Master of Engineering (Civil)

Master of Engineering (Electrical)

Electrical engineers play a key role in the design, implementation and management of systems that exploit electrical phenomena to meet practical needs. These include systems for the distribution of power, telecommunications and information processing, on both very large and very small scales. Graduates are sought-after for their strong analytical skills, and they find employment in a variety of industries in roles ranging from research-and-development to project management and finance.

Major/Minor/Specialisation
Master of Engineering (Electrical)

Master of Engineering (Environmental)

Environmental engineers create sustainable solutions to environmental challenges. Students in this specialisation learn from staff active in research areas specialisations such as hydrology, irrigation and water management. The course has a strong focus on sustainability and project management. Career opportunities exist in consulting firms, conservation and natural resource management agencies, environmental protection agencies, catchment management authorities, local, state and federal government and mining companies.

Major/Minor/Specialisation
Master of Engineering (Environmental)

Master of Engineering (Geomatics)

Geomatic engineers study the science and technologies of measurement, mapping and visualisation. For example, they work on satellite and photographic image processing, three dimensional computer visualisations and global positioning systems. Through the course, students gain practical skills and highly sought after technical knowledge to prepare them for careers in land and/or asset management for government, banks or property firms, or as surveyors in mining, construction and land agencies, among others.

Major/Minor/Specialisation
Master of Engineering (Geomatics)

Master of Engineering (Mechanical)

Mechanical engineers focus on turning energy into power and motion. More specifically, this specialisation looks at the generation, conversion and use of energy, as well as the design, construction and operation of devices and systems. Graduates undertake careers in fields from automotive design and manufacturing and in non-engineering roles in organisations such as banks and consulting firms.

Major/Minor/Specialisation
Master of Engineering (Mechanical)

Master of Engineering (Mechatronics)

Mechatronics engineering blends the disciplines of mechanical, electrical and software engineering around the principles of control systems and automation. Mechatronic engineers create and work with systems that have various degrees of automation, which is increasingly a factor of everyday life with examples including robots, automobiles and CNC machines all featuring levels of computer control.

Major/Minor/Specialisation
Master of Engineering (Mechatronics)

Master of Engineering (Software)

Software engineers combine an understanding of computer science, design, engineering management, mathematics and psychology to manage the development, maintenance and production of large scale software systems. Two year-long industry projects provide the opportunity for students to work closely with ICT professionals and many graduates find roles in this field, in addition to those in other service-oriented and software development areas.

Major/Minor/Specialisation
Master of Engineering (Software)

Master of Engineering (Structural)

Structural engineers apply mathematical and scientific principles to the design, development and evaluation of materials and systems used in building load-bearing structures like roads, buildings, rail lines, dams and offshore platforms. Career opportunities exist in a variety of roles related to the design of structures, their longevity, and their ability to withstand extremes such as earthquake, high winds, blast or fire.

Major/Minor/Specialisation
Master of Engineering (Structural)

Entry Requirements:

1. The Selection Committee will evaluate the applicant's ability to pursue successfully the course using the following criteria:

- # an undergraduate degree with an average grade of H3 (65%) or more in the final two years;
- # With average grades weighted to reflect the points carried by subjects;
- # University of Melbourne graduates will have average grades computed following any policy for the computation of average grades or grade-point averages that the Academic Board prescribes.
- # completion of at least 25 points of relevant tertiary-level Mathematics* and at least 25 points of relevant tertiary-level Science as specified below**.

2. The Selection Committee may conduct interviews and tests and may call for referee reports or employer references to elucidate any of the matters referred to above

*Relevant tertiary mathematics prerequisites for Master of Engineering Streams

For the Master of Engineering (Geomatics) and Master of Engineering (Software) streams, any first year mathematics subjects that assume prior knowledge of VCE Mathematical Methods 3/4 or equivalent may be counted towards the required 25 points of mathematics. For all other streams, a more prescriptive requirement applies: the 25 points of mathematics must include both linear algebra and calculus at an appropriate level.

Note. The 2010 Handbook University of Melbourne subjects 620-156 Linear Algebra and 620-155 Calculus 2 are considered to be linear algebra and calculus at an appropriate level.

**Relevant tertiary science prerequisites for Master of Engineering Streams

In addition to the tertiary mathematics prerequisites, the following science prerequisites apply to specific streams.

Master of Engineering (ME) (Biomedical)

Either 25 points of first year Biology or 25 points of first year Chemistry (or equivalent).

Master of Engineering (ME) (Biomolecular)

25 points of first year Chemistry (or equivalent).

Master of Engineering (ME) (Chemical)

25 points of first year Chemistry (or equivalent).

	<p><i>Master of Engineering (ME) (Civil)</i> 25 points of first year Science (any).</p> <p><i>Master of Engineering (ME) (Electrical)</i> 25 points of first year Physics (or equivalent).</p> <p><i>Master of Engineering (ME) (Environmental)</i> 25 points of first year Science (any).</p> <p><i>Master of Engineering (ME) (Geomatics)</i> 25 points of Science (a broad interpretation of the Sciences which may include geography, psychology, environments subjects and archaeology or other equivalent subjects).</p> <p><i>Master of Engineering (ME) (Mechanical)</i> 25 points of first year Physics (or equivalent).</p> <p><i>Master of Engineering (ME) (Mechatronics)</i> 25 points of first year Physics (or equivalent).</p> <p><i>Master of Engineering (ME) (Software)</i> 25 points of first year computing, computer science, or programming (or equivalent).</p> <p><i>Master of Engineering (ME) (Structural)</i> 25 points of first year Science (any).</p> <p>Available credit Up to 150 points of credit may be granted to students admitted to the Master of Engineering with appropriate prior studies in relevant disciplines:</p> <ol style="list-style-type: none"> 1 Graduates of Melbourne Model undergraduate degrees who complete one of a set of prescribed Engineering Systems majors will receive 100 points of credit. 2 Graduates of the Melbourne Model Bachelor of Commerce who complete a prescribed sequence of subjects including specified Engineering and Engineering-relevant subjects will receive either 50 or 100 points of credit, depending on the stream of the Master of Engineering chosen. 3 Available credit for other University of Melbourne graduates and graduates of other universities is normally evaluated on a case by case basis, but the Academic Board may approve standard credit arrangements for specified entry pathways.
<p>Core Participation Requirements:</p>	<p>For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/</p>
<p>Further Study:</p>	<p>Completion of the Master of Engineering can be used as the basis to apply for entry to research Masters or PhD programs. We expect the arrangements that currently apply to Bachelor of Engineering students in terms of eligibility and scholarship scoring, to apply to Master of Engineering graduates.</p> <p>Students who complete the Master of Engineering with a minimum overall mark of 75 (H2A) or above will meet the minimum entrance requirements in relation to minimum qualifications, academic achievement and evidence of research ability. Note that all Master of Engineering specialisations include a 25-or-more credit point research or design project, or both, and that the Master of Engineering is deemed to be a suitable research-preparation degree.</p> <p>Students who complete the Master of Engineering will of necessity meet the University's English language entry requirements for PhD admission. All other criteria for selection into the University's PhD program will equally be satisfied.</p>
<p>Graduate Attributes:</p>	<p>Engineers Australia Elements of Competency</p> <ol style="list-style-type: none"> 1.1 Knowledge of science and engineering fundamentals 1.2 In-depth technical competence in at least one engineering discipline 1.3 Techniques and resources 1.4 General knowledge 2.1 Ability to undertake problem identification, formulation and solution 2.2 Understanding of social, cultural, global and environmental responsibilities and the need to employ principles of sustainable development 2.3 Ability to utilise a systems approach to complex problems and to design design and operational performance 2.4 Proficiency in engineering design 2.5 Ability to conduct an engineering project 2.6 Understanding of the business environment 3.1 Ability to communicate effectively, with the engineering team and the community at large 3.2 Ability to manage information and documentation 3.3 Capacity for creativity and innovation 3.4 Understanding of professional

	<p>and ethical responsibilities and committed to them3.5 Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member3.6 Capacity for lifelong learning and professional development3.7 Professional attitudesEngineering Faculty Graduate AttributesStrong analytical skillsDepth of understandingPractical ingenuity creativityUnderstanding of global issuesCommunicationBusiness and managementCreativityLeadershipLifelong learnersHigh ethical standards and professionalismUniversity of Melbourne Graduate AttributesAcademically excellentKnowledgeable across disciplinesAttuned to cultural diversityActive global citizensLeaders in communities</p>
Professional Accreditation:	<p>Provisional accreditation has been sought from or already received from:</p> <p>Engineers Australia (all specialisations) Australian Computer Society (Software specialisation) IChemE (Chemical and Biomolecular specialisations) Royal Institution of Chartered Surveyors (Geomatics specialisation)</p>
Generic Skills:	<p>Master of Engineering graduates to have the following qualities and skills:</p> <ul style="list-style-type: none"> • an advanced understanding of the changing knowledge base in their specialist area of engineering; • an ability to evaluate and synthesise the research and professional literature in their specialised area of engineering; • advanced skills and techniques applicable to their specialist area of engineering; • well-developed problem-solving abilities in the specialist area of engineering, characterised by flexibility of approach; • advanced competencies in engineering professional expertise and scholarship; • a capacity to articulate their knowledge and understanding in oral and written presentations; • an advanced understanding of the international context and sensitivities of their specialist area within engineering; • an appreciation of the design, conduct and reporting of original research; • a capacity to manage competing demands on time, including self-directed project work; • a profound respect for truth and intellectual integrity, and for the ethics of scholarship; • an appreciation of the ways in which advanced knowledge equips the student to offer leadership in the specialist area; • the capacity to value and participate in projects which require team-work; • an understanding of the significance and value of their knowledge to the wider community (including business and industry); • a capacity to engage where appropriate with issues in contemporary society; and • advanced working skills in the application of computer systems and software and a receptiveness to the opportunities offered by new technologies.
Links to further information:	<p>http://www.eng.unimelb.edu.au/ME/</p>
Notes:	<p>Guaranteed Entry Pathways</p> <p>For a Commonwealth supported place (including for students who complete specified sequences of engineering subjects within the breadth component of the Bachelor of Commerce):</p> <ul style="list-style-type: none"> # achieve an ENTER (or equivalent) of 95.0 (achieved in the final year of schooling in Australia); # commence an appropriate undergraduate degree at the University of Melbourne following completion of schooling; and # complete the undergraduate course with a H3 (65%) weighted average in the final two years. <p>Other local applicants, including those who do not meet the ENTER hurdle for a guaranteed place, and those with undergraduate degrees other than the NG Engineering Systems majors or the Commerce pathway, will also be considered for Commonwealth Supported Places, based on academic merit.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1 Applications by Australian students for a graduate professional entry degree using these pathways will be made in the final year of undergraduate study. It is not necessary for students to nominate an intention to pursue ME enrolment before then.

- 2 Undergraduate students who undertake and satisfactorily complete an approved Exchange or Study Abroad program will not be disadvantaged in the calculation of the GPA for further University of Melbourne study. Applicants will still be required to complete specific majors and prerequisite subjects as part of their undergraduate course. In some cases, applicants who have completed a suitable major, but who have not completed all required prerequisite subjects, will be required to complete those subjects using elective slots within the ME, or by being granted less than the standard 100 points of designated credit granted to students who have completed approved NG degree majors or subject sequences, and thus completing more than 200 points of ME study.