

# COMP20005 Engineering Computation

<b>Credit Points:</b>	12.50																													
<b>Level:</b>	2 (Undergraduate)																													
<b>Dates &amp; Locations:</b>	This subject is not offered in 2014. On campus only																													
<b>Time Commitment:</b>	Contact Hours: 60 hours, comprising of three 1-hour lectures and one 2-hour workshop per week Total Time Commitment: 170 hours																													
<b>Prerequisites:</b>	<p><b>One of the following:</b></p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST10005 Calculus 1</td> <td>Semester 1, Semester 2</td> <td>12.50</td> </tr> <tr> <td>MAST10006 Calculus 2</td> <td>Semester 1, Semester 2</td> <td>12.50</td> </tr> <tr> <td>MAST10008 Accelerated Mathematics 1</td> <td>Semester 1</td> <td>12.50</td> </tr> <tr> <td>MAST10009 Accelerated Mathematics 2</td> <td>Semester 2</td> <td>12.50</td> </tr> </tbody> </table> <p>Plus one of: (these may be taken concurrently)</p> <p>620 156 Linear Algebra 620 157 Accelerated Mathematics 1 620 158 Accelerated Mathematics 2</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST10007 Linear Algebra</td> <td>Summer Term, Semester 1, Semester 2</td> <td>12.50</td> </tr> <tr> <td>MAST10008 Accelerated Mathematics 1</td> <td>Semester 1</td> <td>12.50</td> </tr> <tr> <td>MAST10009 Accelerated Mathematics 2</td> <td>Semester 2</td> <td>12.50</td> </tr> </tbody> </table> <p><b>OR</b></p> <p>Admission to the <b>MC-ENG Master of Engineering</b> (<a href="#">../view/current/MC-ENG</a>)</p>			Subject	Study Period Commencement:	Credit Points:	MAST10005 Calculus 1	Semester 1, Semester 2	12.50	MAST10006 Calculus 2	Semester 1, Semester 2	12.50	MAST10008 Accelerated Mathematics 1	Semester 1	12.50	MAST10009 Accelerated Mathematics 2	Semester 2	12.50	Subject	Study Period Commencement:	Credit Points:	MAST10007 Linear Algebra	Summer Term, Semester 1, Semester 2	12.50	MAST10008 Accelerated Mathematics 1	Semester 1	12.50	MAST10009 Accelerated Mathematics 2	Semester 2	12.50
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<b>Corequisites:</b>	None																													
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<b>Non Allowed Subjects:</b>	<p>433 171 Introduction to Programming 433 151 Introduction to Programming (Advanced)</p>																													
<b>Core Participation Requirements:</b>	<p>&lt;p&gt;For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry.&lt;/p&gt; &lt;p&gt;It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and</p>																													

	reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: <a href="http://services.unimelb.edu.au/disability">http://services.unimelb.edu.au/disability</a></p>
<b>Contact:</b>	Semester 1: Professor Alistair Moffat email: <a href="mailto:ammoffat@unimelb.edu.au">ammoffat@unimelb.edu.au</a> ( <a href="mailto:ammoffat@unimelb.edu.au">mailto:ammoffat@unimelb.edu.au</a> ) Semester 2: Dr Michael Kirley email: <a href="mailto:mkirley@unimelb.edu.au">mkirley@unimelb.edu.au</a> ( <a href="mailto:mkirley@unimelb.edu.au">mailto:mkirley@unimelb.edu.au</a> )
<b>Subject Overview:</b>	<b>AIMS</b> Many engineering disciplines make use of numerical solutions to computational problems. In this subject students will be introduced to the key elements of programming in a high level language, and will then use that skill to explore methods for solving numerical problems in a range of discipline areas. <b>INDICATIVE CONTENT</b> # Algorithmic problem solving # Fundamental data types: numbers and characters # Approximation and errors in numerical computation # Fundamental program structures: sequencing, selection, repetition, functions # Simple data storage structures, variables, arrays, and structures # Roots of equations and of linear algebraic equations # Curve fitting and splines # Interpolation and extrapolation # Numerical differentiation and integration
<b>Learning Outcomes:</b>	<b>INTENDED LEARNING OUTCOMES (ILO)</b> On completion of this subject the student is expected to: 1 Read, write and debug typical small-scale numerical programs in a high-level programming language such as C 2 Test and debug such programs 3 Argue for the correctness of such programs, from both a logical point of view and a numeric-soundness point of view 4 Be aware of the range of tools available for creating computational solutions to engineering problems, and be able to evaluate and choose between alternative approaches 5 Describe and employ the general concepts that apply when computers are used to solve mathematical problems 6 Demonstrate familiarity with the underlying theory behind a range of numerical algorithms used in commercial engineering software packages
<b>Assessment:</b>	Project work during semester, expected to take about 36 hours (30%), due in approximately Week 8 and Week 11 One mid-semester test (10%), held in Week 5 or Week 6 One two-hour end-of-semester examination, including a practical programming component (60%) Hurdle requirement: To pass the subject, students must obtain at least: 50% overall 12/30 in project work 28/70 in the mid-semester test and end-of-semester written examination combined Intended Learning Outcome (ILO) 1 is addressed in all components of assessment. ILO 2 is assessed in the programming assignments. ILO 3 is assessed in the programming assignments and in the examination. ILOs 4-6 are assessed in the examination.
<b>Prescribed Texts:</b>	None
<b>Breadth Options:</b>	This subject potentially can be taken as a breadth subject component for the following courses: # <b>Bachelor of Arts</b> ( <a href="https://handbook.unimelb.edu.au/view/2014/B-ARTS">https://handbook.unimelb.edu.au/view/2014/B-ARTS</a> ) # <b>Bachelor of Commerce</b> ( <a href="https://handbook.unimelb.edu.au/view/2014/B-COM">https://handbook.unimelb.edu.au/view/2014/B-COM</a> ) # <b>Bachelor of Environments</b> ( <a href="https://handbook.unimelb.edu.au/view/2014/B-ENVS">https://handbook.unimelb.edu.au/view/2014/B-ENVS</a> ) # <b>Bachelor of Music</b> ( <a href="https://handbook.unimelb.edu.au/view/2014/B-MUS">https://handbook.unimelb.edu.au/view/2014/B-MUS</a> )

	You should visit <b>learn more about breadth subjects</b> ( <a href="http://breadth.unimelb.edu.au/breadth/info/index.html">http://breadth.unimelb.edu.au/breadth/info/index.html</a> ) and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.
<b>Fees Information:</b>	Subject EFTSL, Level, Discipline & Census Date, <a href="http://enrolment.unimelb.edu.au/fees">http://enrolment.unimelb.edu.au/fees</a>
<b>Generic Skills:</b>	On completion of this subject students should have developed the following skills: <ul style="list-style-type: none"> <li># The ability to undertake problem identification, formulation and solution</li> <li># Capacity for independent critical thought, rational inquiry and self-directed learning</li> <li># Profound respect for truth and intellectual integrity, and for the ethics of scholarship</li> <li># An ability to apply knowledge of basic science and engineering fundamentals</li> </ul>
<b>Notes:</b>	<p>This subject is available for science credit to students enrolled in the BSc (both pre-2008 and new degrees), BAsC or a combined BSc course. Students undertaking this subject will be expected to regularly access an internet-enabled computer.</p> <p><b>LEARNING AND TEACHING METHODS</b></p> <p>The subject will be delivered through a combination of lectures, programming workshops, and programming exercises and assessed programming assignments. Students will also be expected to develop and submit for assessment programming assignments.</p> <p><b>INDICATIVE KEY LEARNING RESOURCES</b></p> <p>Students will have access to lecture notes and lecture slides, and will be expected to own a copy of the textbook. Other guidance will be provided via the LMS.</p> <p><b>CAREERS / INDUSTRY LINKS</b></p> <p>Programming competencies are a critical part of a range of engineering career pathways, especially electrical and mechanical engineering. Being familiar with computational thinking and problem solving techniques is important to the development of new devices and technologies in these disciplines.</p>
<b>Related Majors/Minors/ Specialisations:</b>	<p>B-ENG Electrical Engineering stream  B-ENG Mechanical Engineering stream  Computer Science  Environments Discipline subjects  Geomatics (Geomatic Engineering) major  Master of Engineering (Biomedical)  Master of Engineering (Electrical with Business)  Master of Engineering (Electrical)  Master of Engineering (Geomatics)  Master of Engineering (Mechanical with Business)  Master of Engineering (Mechanical)  Master of Engineering (Mechatronics)  Master of Engineering (Software with Business)  Master of Engineering (Software)  Science credit subjects* for pre-2008 BSc, BAsC and combined degree science courses  Science-credited subjects - new generation B-SCI and B-ENG.  Selective subjects for B-BMED</p>