

## 433-296 Engineering Computation

<b>Credit Points:</b>	12.50
<b>Level:</b>	2 (Undergraduate)
<b>Dates &amp; Locations:</b>	2009, This subject commences in the following study period/s: Semester 1, - Taught on campus. On campus only
<b>Time Commitment:</b>	Contact Hours: 2 one-hour lectures; 1 two-hour workshop (per week). Total Time Commitment: 120 hours
<b>Prerequisites:</b>	* 620-154 Calculus 1  <i>*Note: These requisites will be hard-coded on the Student Management System for all students and will prevent enrolment for students who do not meet the specified requirements. Students seeking to enrol in these subjects on the basis of equivalent knowledge and/or experience will need to apply for a formal requisite waiver. Additionally, subjects with 'other requisites' require special permission from an authorised staff member. Enrolment into these subjects will require manual staff intervention.</i>
<b>Corequisites:</b>	*620-156 Linear Algebra  <i>*see Requisite Note</i>
<b>Recommended Background Knowledge:</b>	800-002 Engineering Systems Design 2
<b>Non Allowed Subjects:</b>	(i.e.non-allowed subject combinations)  *433-171 Introduction to Programming, 433-151 Introduction to Programming (Advanced)  <i>*see Requisite Note:</i>
<b>Core Participation Requirements:</b>	<p>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.</p> <p>It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and 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>Coordinator:</b>	Prof Alistair Moffat
<b>Subject Overview:</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. Topics include: algorithmic problem solving; fundamental data types: numbers and characters; approximation and errors in numerical computation; fundamental program structures: sequencing, selection, repetition, functions; number representation, and accuracy in numerical computations; simple data storage structures, variables, arrays, and structures. Topics in numerical computation will be selected from among: roots of equations; numerical solution of linear algebraic equations; curve fitting and splines; interpolation and extrapolation; numerical differentiation and integration; numerical solution of ordinary differential equations; pre- and post-computational analysis; and graphical representation of results.
<b>Objectives:</b>	On successful completion of the subject, students should be able to: - implement numerical algorithms as programs in a high-level programming language (such as C); - test and debug such programs;

	<ul style="list-style-type: none"> <li>- argue for the correctness of such programs, from both a logical point of view and a numeric-soundness point of view;</li> <li>- 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;</li> <li>- describe and employ the general concepts that apply when computers are used to solve mathematical problems;</li> <li>- demonstrate familiarity with the underlying theory behind a range of numerical algorithms used in commercial engineering software packages.</li> </ul>
<b>Assessment:</b>	Project work during semester, expected to take about 36 hours (30%); a mid-semester test (10%); and a 2-hour end-of-semester written examination (60%). To pass the subject, students must obtain at least 50% overall, 15/30 in project work, and 35/70 in the mid-semester test and end-of-semester written examination combined.
<b>Prescribed Texts:</b>	None
<b>Breadth Options:</b>	<p>This subject potentially can be taken as a breadth subject component for the following courses:</p> <ul style="list-style-type: none"> <li># <b>Bachelor of Arts</b> (<a href="https://handbook.unimelb.edu.au/view/2009/D09">https://handbook.unimelb.edu.au/view/2009/D09</a>)</li> <li># <b>Bachelor of Commerce</b> (<a href="https://handbook.unimelb.edu.au/view/2009/F04">https://handbook.unimelb.edu.au/view/2009/F04</a>)</li> <li># <b>Bachelor of Environments</b> (<a href="https://handbook.unimelb.edu.au/view/2009/A04">https://handbook.unimelb.edu.au/view/2009/A04</a>)</li> <li># <b>Bachelor of Music</b> (<a href="https://handbook.unimelb.edu.au/view/2009/M05">https://handbook.unimelb.edu.au/view/2009/M05</a>)</li> </ul> <p>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.</p>
<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>	<p>On completion of this subject students should have developed the:</p> <ul style="list-style-type: none"> <li># ability to undertake problem identification, formulation and solution;</li> <li># ability to apply knowledge of basic science and engineering fundamentals;</li> <li># ability to use a systems approach to design and operational performance; and</li> <li># expectation of the need to undertake lifelong learning, and capacity to do so.</li> </ul>
<b>Notes:</b>	<p>This subject is available as Breadth in the following Bachelor courses; Arts, Commerce, Environments and Music.</p> <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.</p> <p>Students undertaking this subject will be expected to regularly access an internet-enabled computer.</p>
<b>Related Course(s):</b>	Bachelor of Engineering
<b>Related Majors/Minors/Specialisations:</b>	Bioengineering Systems