COMP20005 Engineering Computation

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	2012, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus. Semester 2, Parkville - Taught on campus. On campus only
Time Commitment:	Contact Hours: 3 one-hour lectures; 1 two-hour workshop (per week). Total Time Commitment: 120 hours
Prerequisites:	**One of:** 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 Plus one of: (these may be taken concurrently) 620 156 Linear Algebra 620 157 Accelerated Mathematics 1 620 158 Accelerated Mathematics 2 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 OR Admission to the **MC-ENG Master of Engineering (../../view/current/MC-ENG)**
Corequisites:	None
Recommended Background Knowledge:	ENGR10003 Engineering Systems Design 2 — Summer Term, Semester 2 — 12.50
Non Allowed Subjects:	433 171 Introduction to Programming 433 151 Introduction to Programming (Advanced)

Core Participation Requirements:	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/
Coordinator:	Assoc Prof Lars Kulik, Dr Michael Kirley, Prof Alistair Moffat
Contact:	Associate Professor Tim Baldwin email:**tbaldwin@unimelb.edu.au (mailto:TBALDWIN@UNIMELB.EDU.AU)**
Subject Overview:	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.
Objectives:	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 # Argue for the correctness of such programs, from both a logical point of view and a numeric-soundness point of view # 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 # Describe and employ the general concepts that apply when computers are used to solve mathematical problems # Demonstrate familiarity with the underlying theory behind a range of numerical algorithms used in commercial engineering software packages.
Assessment:	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
Prescribed Texts:	None
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2012/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2012/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2012/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2012/B-MUS)** You should visit **learn more about breadth subjects (http://breadth.unimelb.edu.au/breadth/info/index.html)** and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	On completion of this subject students should have the: # Ability to undertake problem identification, formulation and solution

	# Ability to apply knowledge of basic science and engineering fundamentals # Ability to use a systems approach to design and operational performance; and # Expectation of the need to undertake lifelong learning, and capacity to do so
Notes:	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.
Related Course(s):	Bachelor of Engineering
Related Majors/Minors/ Specialisations:	B-ENG Electrical Engineering stream B-ENG Mechanical Engineering stream Environments Discipline subjects Geomatics (Geomatic Engineering) major Master of Engineering (Biomedical) Master of Engineering (Electrical) Master of Engineering (Geomatics) Master of Engineering (Mechanical) Master of Engineering (Mechatronics) Science credit subjects* for pre-2008 BSc, BASc and combined degree science courses Science-credited subjects - new generation B-SCI and B-ENG. Core selective subjects for B-BMED.