MAST30028 Numerical and Symbolic Mathematics

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus. Lectures and computer laboratory classes.
Time Commitment:	Contact Hours: 2 x one hour lectures and 1 x two hour computer laboratory class per week for the first 6 weeks of semester. 1 x one hour lecture, 1 x two hour computer laboratory class and 1 x one hour computer laboratory class per week for the last 6 weeks of semester. Total Time Commitment: Estimated total time commitment of 120 hours
Prerequisites:	One of # **620-295 Real Analysis with Applications (/view/2010/620-295)** # **620-158 Accelerated Mathematics 2 (/view/2010/620-158)** And any other second year level subject from the Department of Mathematics and Statistics.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of # 620-333 Numerical and Symbolic Mathematics # 620-381 Computational Mathematics (prior to 2010).
Core Participation Requirements:	It is University policy to take all reasonable steps to minimise the impact of disability upon academic study and reasonable steps will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact upon their active and safe participation in a subject are encouraged to discuss this with the relevant subject coordinator and the Disability Liaison Unit.
Coordinator:	Assoc Prof Jan De Gier, Dr Steven Carnie
Contact:	Third Year Coordinator **Email: tycoord@ms.unimelb.edu.au (mailto:tycoord@ms.unimelb.edu.au)**
Subject Overview:	Computer packages, such as Matlab, Maple and Mathematica, are indispensable tools for many scientists and engineers in simulating complex systems or studying analytically intractable or computationally intensive problems. This subject introduces such numerical and symbolic techniques with an emphasis on the development and implementation of mathematical algorithms including aspects of their efficiency, accuracy and stability. The different strategies and style of programming methodologies required when tackling problems either numerically or symbolically are highlighted. Examples used to illustrate numerical mathematics include the direct solution of linear systems and time-stepping methods for initial value problems. Symbolic methods will be demonstrated with a wide range of examples.
Objectives:	On completion of this subject, students should: # Understand the significance and role of both roundoff error and truncation error in some standard problems in scientific computing; # Be able to write simple numerical programs that utilize a numerical Problem-Solving Environment such as Matlab; # Learn how to use a symbolic software system such as Mathematica to tackle certain mathematical problems exactly;

	# Be able to use both numerical and symbolic techniques, with the appropriate programming idioms, as required when undertaking a mathematical or modeling investigation.
Assessment:	Three computational assignments due at regular intervals during semester (60%), and a 3-hour computer laboratory examination in the examination period (40%).
Prescribed Texts:	None
Recommended Texts:	C. Moler, Numerical Computing with Matlab, SIAM, 2004.
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2010/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2010/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2010/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:	In addition to learning specific skills that will assist students in their future careers in science, they will have the opportunity to develop generic skills that will assist them in any future career path. These include: # problem-solving skills: the ability to engage with unfamiliar problems and identify relevant solution strategies; # analytical skills: the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of analysis; # collaborative skills: the ability to work in a team; # time-management skills: the ability to meet regular deadlines while balancing competing commitments; # computer skills: the ability to use mathematical computing packages.
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.
Related Course(s):	Bachelor of Science
Related Majors/Minors/ Specialisations:	Applied Mathematics Mathematical Physics Mathematics and Statistics (Applied Mathematics specialisation) Mathematics and Statistics (Discrete Mathematics specialisation) Mathematics and Statistics (Financial Mathematics specialisation)