MAST30028 Numerical and Symbolic Mathematics

Credit Points:	12.5
Level:	3 (Undergraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
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 170 hours
Prerequisites:	One of **Subject** / **Study Period Commencement:** / **Credit Points:** MAST20026 Real Analysis / Semester 1, Semester 2 / 12.50 MAST10009 Accelerated Mathematics 2 / Semester 2 / 12.50 And any other second year level subject from the Department of Mathematics and Statistics.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
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 Steven Carnie, Dr Michael Wheeler
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, such as applications to chaos theory and perturbative solutions to differential equations.
Learning Outcomes:	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:	Two computational assignments due mid-semester and late in semester (40%), and two 90-minute computer laboratory examinations, one after mid-semester and one in the examination period (60%)
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/2015/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2015/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2015/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 Majors/Minors/ Specialisations:	Applied Mathematics Applied Mathematics Applied Mathematics Applied Mathematics Applied Mathematics (specialisation of Mathematics and Statistics major) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED