MAST20026 Real Analysis with Applications

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus. Semester 2, Parkville - Taught on campus. Lectures, practice classes and computer laboratory classes.
Time Commitment:	Contact Hours: 3 x one hour lectures per week, 1 x one hour practice class per week, 4 x one-hour computer laboratory classes during semester Total Time Commitment: Estimated total time commitment of 120 hours
Prerequisites:	One of # **620-155 Calculus 2 (/view/2010/620-155)** # 620-143 Applied Mathematics (prior to 2009) Plus one of # **620-156 Linear Algebra (/view/2010/620-156)** # **620-157 Accelerated Mathematics 1 (/view/2010/620-157)** # 620-122 Mathematics B Advanced (prior to 2008) # 620-142 Mathematics B (prior to 2009) # 620-190 UMEP Maths for High Achieving Students # 620-192 Mathematics B (prior to 2006) # 620-194 Mathematics B Advanced (prior to 2006) # 620-211 Mathematics 2 Advanced (prior to 2008)
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students who gain credit for 620-295 Real Analysis with Applications may not also gain credit for any of # **620-158 Accelerated Mathematics 2 (/view/2010/620-158)** # 620-113 Applied Mathematics Advanced Plus (prior to 2008) # 620-123 Applied Mathematics Advanced (prior to 2008) # 620-121 Mathematics A Advanced (prior to 2008) # 620-120 UMEP Maths for High Achieving Students (prior to 2008)
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 participation are encouraged to discuss this with the subject coordinator and the Disability Liaison Unit.
Coordinator:	Prof Arun Ram
Contact:	Second Year Coordinator **Email: sycoord@ms.unimelb.edu.au (mailto:sycoord@ms.unimelb.edu.au)**
Subject Overview:	This subject introduces the field of mathematical analysis both with a careful theoretical framework and its application in numerical approximation. A review of number systems; the fundamentals of topology of the real line; continuity and differentiability of functions of one variable; definition and properties of the Riemann integral; sequences and series including the concepts of convergence and divergence, absolute and conditional, and tests for convergence;

	Taylor's theorem and series representation of elementary functions with application to Fourier series. The subject will introduce methods of proof such as induction and also introduce the use of rigorous numerical approximations.
Objectives:	On completion of this subject students should # Acquire an appreciation of rigour in mathematics, be able to use proof by induction, proof by contradiction, and to use epsilon-delta proofs both as a theoretical tool and a tool of approximation; # Understand the theory and applications of the Riemann integral; # Be able to determine the convergence and divergence of infinite series; # Have a good knowledge of the theory and practice of power series expansions and Taylor polynomial approximations; # Understand the power of analysis to explain the behaviour of simple numerical methods for integration and solution of equations.
Assessment:	Six written assignments due at regular intervals during semester amounting to a total of up to 50 pages (20%), and a 3-hour written examination in the examination period (80%).
Prescribed Texts:	None
Recommended Texts:	
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/2010/B-ARTS)** # **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.
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 are required to regularly use computers with the numerical software Matlab installed.
Related Course(s):	Bachelor of Science