620-311 Metric Spaces

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 1, - Taught on campus. Lectures and practice classes.
Time Commitment:	Contact Hours: 36 one-hour lectures (three per week) and up to 12 one-hour practice classes (one per week) Total Time Commitment: 120 hours total time commitment.
Prerequisites:	620-221 (prior to 2009) Students who have achieved a grade of H1 in *Analysis* will be permitted to enrol in this subject on completion of specified reading over summer.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
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:	Prof Joachim Hyam Rubinstein
Subject Overview:	This subject introduces the generalised distance between elements of an abstract set, including sets of functions. It also introduces the notion of a general topological space, and the generation of such space from a metric space and from other structures. It emphasises the significance of completeness of a metric space and of the concepts of compactness and connectedness. Students should develop the ability to apply abstract methods of topology to obtain deeper results about real and complex numbers and Euclidean spaces, and to apply metric space methods to the approximate solution of linear equations, and differential equations by Picard's method. They learn to distinguish between pointwise and uniform convergence from the viewpoint of topology, and to understand the difference between topological and metric properties of topological spaces. This subject demonstrates the power of abstract topological concepts as applied to Euclidean spaces, to concrete spaces of functions, and to the approximate solution of equations. It also develops an appreciation of the rigorously presented concepts of convergence and continuity, the use of topology in the modern treatment of numerical mathematics, differential and integral equations, optimisation, logic and computing. Topics include the concept of a metric and of the induced topology; open and closed sets; convergence and completeness; the contraction mapping theorem; continuity, uniform continuity and homeomorphism; compactness; connectedness; and applications.
Objectives:	.
Assessment:	Up to 24 pages of written assignments due during the semester (20%); a 3-hour written examination in the examination period (80%).
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/2009/D09)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2009/F04)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2009/A04)**

	# **Bachelor of Music (https://handbook.unimelb.edu.au/view/2009/M05)** 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
Notes:	This subject is available for science credit to students enrolled in the BSc (pre-2008 degree only), BASc or a combined BSc course.
Related Majors/Minors/ Specialisations:	Mathematics & Statistics Major Mathematics and Statistics (Pure Mathematics specialisation)