# 620-311 Metric Spaces

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| **Credit Points:** | 12.500 |
| **Level:** | Undergraduate |
| **Dates & Locations:** | 2008,<br>This subject commences in the following study period/s:<br>Semester 1, - Taught on campus. |
| **Time Commitment:** | Contact Hours: 36 lectures (three per week) and up to 12 practice classes (one per week) Total Time Commitment: 120 hours. |
| **Prerequisites:** | 620-221. Students who have achieved a grade of H1 in 620-252 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 H 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.<br>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. |
| **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 is a level 2 or level 3 subject and is not available to new generation degree students as a breadth option in 2008.<br>This subject or an equivalent will be available as breadth in the future.<br>Breadth subjects are currently being developed and these existing subject details can be used as guide to the type of options that might be available.<br>2009 subjects to be offered as breadth will be finalised before re-enrolment for 2009 starts in early October. |
| **Fees Information:** | Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees |

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| **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 Course(s):** | Bachelor of Arts<br>Bachelor of Arts and Bachelor of Science<br>Bachelor of Arts and Sciences<br>Bachelor of Science |