MAST90023 Algebraic Topology

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2012, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours comprising two 1-hour lectures per week and one 1-hour practical class per week. Total Time Commitment: 3 contact hours and 7 hours private study per week
Prerequisites:	Both of the following, or equivalent:

Subject	Study Period Commencement:	Credit Points:
MAST30005 Algebra	Semester 1	12.50
MAST30026 Metric and Hilbert Spaces	Semester 2	12.50

Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering requests 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 for 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/
Contact:	Dr Alex Ghitza Email: **aghitza@unimelb.edu.au (mailto:aghitza@unimelb.edu.au)**
Subject Overview:	This subject studies topological spaces and continuous maps between them. It demonstrates the power of topological methods in dealing with problems involving shape and position of objects and continuous mappings, and shows how topology can be applied to many areas, including geometry, analysis, group theory and physics. The aim is to reduce questions in topology to problems in algebra by introducing algebraic invariants associated to spaces and continuous maps. Important classes of spaces studied are manifolds (locally Euclidean spaces) and CW complexes (built by gluing together cells of various dimensions). Topics include: homotopy of maps and homotopy equivalence of spaces, homotopy groups of spaces, the fundamental group, covering spaces; homology theory, including singular homology theory, the axiomatic approach of Eilenberg and Steenrod, and cellular homology.
Objectives:	After completing this subject, students should gain: # an understanding of the concepts of homotopy and homotopy equivalence of topological spaces; # an understanding of the fundamental group, homology groups, and covering spaces; # the ability to calculate fundamental groups and homology of spaces; # the ability to solve problems involving topological spaces and continuous maps by converting them into problems in algebra; # the ability to pursue further studies in this and related areas.

Assessment:	Up to 60 pages of assignments (60%: three assignments worth 20% each, due early, mid and late in semester), a 2-hour written examination (40%, in the examination period).
Prescribed Texts:	None
Recommended Texts:	A. Hatcher. Algebraic Topology, Cambridge University Press (2002), available online at **http://www.math.cornell.edu/~hatcher/AT/ATpage.html (http://www.math.cornell.edu/~hatcher/AT/ATpage.html)** . W. S. Massey. A Basic Course in Algebraic Topology, Springer (1997).
Breadth Options:	This subject is not available as a breadth subject.
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.
Related Course(s):	Master of Science (Mathematics and Statistics)
Related Majors/Minors/ Specialisations:	Mathematics and Statistics