MAST90023 Algebraic Topology

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours comprising 2 one-hour lectures per week and 1 one-hour practical class per week. Total Time Commitment: Not available
Prerequisites:	None.
Corequisites:	None.
Recommended Background Knowledge:	It is recommended that students have completed third year subjects in algebra and topology (equivalent to 620-321 [2008] Algebra and 620-322 [2008] Topology).
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/
Coordinator:	Dr Craig Westerland
Contact:	Email: **craigdh@unimelb.edu.au (mailto:craigdh@unimelb.edu.au)**
Subject Overview:	In this subject we study some of the fundamental questions in topology: classification of topological spaces and continuous maps between them. The aim is to reduce problems in topology to problems in algebra by introducing algebraic invariants associated to spaces and continuous maps. This is most successful for special classes of spaces including manifolds (locally Euclidean spaces) and CW complexes (built up by gluing together cells of various dimensions). We first study homology theory introducing singular homology theory and the axiomatic approach of Eilenberg and Steenrod. We also show how homology calculations can be done efficiently for CW complexes. Next we study cohomology theory which is a kind of dual to homology theory. A new feature here is the existence of product operations which give important additional information about spaces and continuous maps. Finally we examine the very special properties of the homology and cohomology of manifolds including the key Poincare duality theorems.
Objectives:	After completing this subject, students should gain: • an understanding of the concepts of homology and cohomology of topological spaces; • an understanding of cup products and their properties; • an understanding of the special properties of homology and cohomology of manifolds; • the ability to calculate homology and cohomology 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 written assignments (75%: three assignments worth 25% each, due early, mid and late in semester), a two-hour written examination (25%, in the examination period).
Prescribed Texts:	To be advised.
Recommended Texts:	To be advised.
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:	Upon completion of this subject, students should gain the following generic skills: • problem-solving skills including the ability to engage with unfamiliar problems and identify relevant solution strategies; • analytical skills through the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of analysis; • time management skills: the ability to meet regular deadlines while balancing competing commitments.
Related Course(s):	Master of Science (Mathematics and Statistics)