Department of Mathematics
MATHS750: Topology
Study Guide
Semester 1, 2006

Lecturers & Contacts. The lecturers involved in teaching this course are:

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Times & Room. There will be 3 lectures each week scheduled at 1:00pm on Mondays, Wednesdays and Fridays in room B10, Science Centre building.

Course Description. This is a one-semester 15 point paper. The aim of this course is to extend the notions encountered in analysis, such as continuity, convergence and compactness, to the more general framework of point set topology. The course will also introduce algebraic topology which attempts to answer topological questions by converting them to algebraic questions. The course will include most of the following topics:

Topological spaces, basic concepts. Operations of topological spaces. Separation axioms. Tychonoff's embedding theorem, Uryshon's lemma and the Tietze extension theorem. Countability axioms. Metrizability, Urysohn's metrization theorem, the Nagata-Smirnov metrization theorem. Filters and ultrafilters, compactness and local compactness, the Tychonoff product theorem, compactness in metric spaces. Alexandorff's one-point compactification, the Stone-Čech compactification, Paracompact spaces. Čech complete spaces and the Baire category theorem. Connectedness, local connectedness, path connectedness.

Homotopy of maps, homotopy of spaces. Contractible spaces, rectracts, deformation, the homotopy extension property. The fundamental group, the Seifert-van Kampen theorem. Covering spaces, the lifting theorems. Homopoty groups. Singular homology. Axioms of homology, reduced homology. Homology groups of spheres, degrees of spherical maps. Topology of Euclidean space, the Jordan curve theorem, the Brouwer fixed point theorem, antipodal maps, the Borsuk-Ulam theorem. CW-complexes, Euler's characteristic.

Prerequisites. Students should be familiar with basic analysis and algebra such as is contained in the mathematics papers 332/3 or 330/5 or 331 or 353 and some aspects of 320.

References & Resources. There is no prescribed text. However the following books are relevant to the course:
1. R. Brown, Elements of Modern Topology
2. J. Dugundji, Topology
3. R. Engelking, General Topology
4. M. Greenberg and J. Harper, Algebraic Topology, a first course
5. J. Hocking and G. Young, Topology
6. S.T. Hu, Introduction to General Topology
7. W. Massey, Algebraic Topology: an Introduction
8. W. Massey, Singular Homology Theory
9. J. Munkres, Topology
10. J. Roitman, Introduction to Modern Set Theory
11. A. Sieradski, An Introduction to Topology and Homotopy
12. S. Willard, General Topology

Lecture notes are available and will be distributed in the class.

Coursework. There will be five assignments and one term test:
Assignment 1: Due at 1pm (before lecture) on 17 March (Friday)
Assignment 2: Due at 1pm (before lecture) on 31 March (Friday)
Assignment 3: Due at 1pm on 13 April (Thursday)
Assignment 4: Due at 1pm (before lecture) on 12 May (Friday)
Assignment 5: Due at 1pm (before lecture) on 26 May (Friday)

The term test will last 90 minutes, and is scheduled on 5 May. The precise time and venue will be announced in the class.

Assessment. Your final grade will be determined by taking the better of your final examination result and the combination of your final examination result counting 70% and your coursework counting 30% (Assignments counting 15% and test counting 15%). The coursework is made up of assignments and test. You are strongly encouraged to attempt and hand in all of the assignments which will be marked and returned to you.

Other. You are encouraged to discuss problems with one another and to work together on assignments. Also, you are encouraged to contact lecturers and get help in understanding from them. But, you must not copy another person's assignment, or allow someone else to do all or part of your assignment for you, or allow someone else copy all or part of your assignment. Assignment marks contribute to the final grade you receive in this course. We view cheating on assignment work as seriously as cheating in an examination.
