

## Algebraic Topology

Math 875, Fall 2006

**Instructor:** Julie Bergner

**Class:** TTh 8:05-9:20 am, Cardwell 122

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**Textbook:** *Algebraic Topology*, by Allen Hatcher. Note that the textbook can be downloaded from the author's web page:

<http://www.math.cornell.edu/~hatcher/AT/ATpage.html>

**Course Objectives:** In this course we will be covering the main basic topics in algebraic topology: the fundamental group, covering spaces, singular homology, and cohomology. So, we will be covering much of chapters 0, 1, 2, and 3 of Hatcher's book (not including the "Additional Topics"). The (ambitious) goal for the course is to cover the material for the algebraic topology portion of the topology/geometry qualifying exam, but it is unlikely we will actually get to all of these topics. Some of the material we do not cover may be addressed at the beginning of the topics course offered in the spring semester.

**Grades:** Grades will be based on (more or less weekly) homework, one paper summary, a midterm exam, and a final exam. Details will be given on each as they come up.

**Other texts:** While Hatcher's book is the main source I will be following, I've listed some other references you might find useful.

Marcelo Aguilar, Samuel Gitler, and Carlos Prieto, *Algebraic Topology from a Homotopical Viewpoint*, Springer, 2002.

(This book is probably a bit advanced for this course, but it does introduce many of the ideas we will cover before moving on to other topics.)

M.A. Armstrong, *Basic Topology*, Undergraduate Lectures in Mathematics, Springer, 1983.

(As an undergraduate text, this book does not go into the depth that we will in this course, but it has a nice introduction to fundamental groups and homology.)

William Fulton, *Algebraic Topology: A First Course*, Graduate Texts in Mathematics 153, Springer, 1995.

(The approach here is fairly different than the one we will be taking.)

Marvin J. Greenberg and John R. Harper, *Algebraic Topology: A First Course*, The Benjamin/Cummings Publishing Company, 1981.

(This book was probably most often used for a basic algebraic topology course before Hatcher's book was written.)

William S. Massey, *A Basic Course in Algebraic Topology*, Graduate Texts in Mathematics 127, Springer, 1991.

(This book combines material from two of the author's earlier books, *Algebraic Topology: An Introduction* and *Singular Homology Theory*.)

Sergey V. Matveev, *Lectures on Algebraic Topology*, EMS Series of Lectures in Mathematics, European Mathematical Society, 2006.

(I just found this one, so I don't know much about it. It has some nice pictures.)

J.P. May, *A Concise Course in Algebraic Topology*, Chicago Lectures in Mathematics, University of Chicago Press, 1999.

(I've heard that this book is better for instructors than students of the subject, but I include it anyway. I have the Hale Library copy, so if you are interested in looking at it, please see me.)

James R. Munkres, *Elements of Algebraic Topology*, Addison-Wesley, 1984.

(You are probably more familiar with his point-set book, but this book has material on homology and cohomology. Again, I have the Hale Library copy checked out.)

Hajime Sato, *Algebraic Topology: An Intuitive Approach*, Translations of Mathematical Monographs Volume 183, AMS, 1996.

(As the title suggests, this short book is not designed to go into all the details but gives an introduction to the basic ideas.)

Edwin H. Spanier, *Algebraic Topology*, Springer, 1966.

(This book was considered a standard text for many years. It is very thorough but not particularly easy to read.)

**Notices:** Plagiarism and cheating are serious offenses and may be punished by failure on the exam, paper, or project, failure in the course, and/or expulsion from the University.

If you have any condition, such as a physical or learning disability, which will make it difficult for you to carry out the work as outlined above or which will require academic accommodations, please notify me in the first two weeks of the course.