

## Homotopy Theory I (Math 546a), Winter 2004, Reading Material

The following is a list of books that you might like to refer to to supplement the lectures. A few of them will be available in the bookstore, and most will be on reserve in the library. You do not have to buy any of them. They are listed roughly in order of difficulty.

\*\*\* Munkres, J., *Elements of algebraic topology*. This is a thorough introduction to homology and cohomology, from the ground up, with careful attention to all details. It contains all of the necessary background for this course. Not available at the bookstore, but it is on reserve, and can also be purchased at amazon.com.

\*\*\* Greenberg, M., and Harper, J., *Algebraic topology: A first course*. This is an excellent book with a pleasant, flowing style. It assumes slightly more maturity of the reader than Munkres' book, but the result is that it is more compact. It also covers some homotopy theory, but not enough for this course. Note that older printings of this book are well-known for their typographical errors. The thirteenth printing is a great improvement.

Massey, W., *A basic course in algebraic topology*, Graduate Texts in Math. 127. This book is a nice introduction to topology which begins with the classification of surfaces. It is a combination of two earlier books, which were GTM volumes 56 and 70, but doesn't cover much homotopy theory.

Rotman, J., *An introduction to algebraic topology*, GTM 119. A very nice book covering homology and cohomology in a slick way. There is a sheet of errata. (You can photocopy mine, for example.)

Fomenko, A.T., Fuchs, D.B., Gutenmacher, V.L., *Homotopic Topology*. A very interesting book with striking artwork. Covers a lot of what we'll be doing in an efficient and geometrical way, and I will base many lectures on it. Unfortunately, it is very pricey and hard to find.

\*\*\* Hatcher, Allen, *Algebraic Topology*, Cambridge University Press. An excellent book containing both the background for the course and most of what we'll cover. Can be downloaded from <http://www.math.cornell.edu/~hatcher/> or be purchased for a reasonable fee.

\*\*\* Hatcher, Allen, *Spectral Sequences in Algebraic Topology*, not yet published. The first chapter contains the rest of what we'll cover in the course. Can be downloaded for free from <http://www.math.cornell.edu/~hatcher/>.

Spanier, E.H., *Algebraic topology*. This is a classic encyclopedic treatment of homology and cohomology, which goes further than any of the others books on this list. It also covers much of what we will talk about in this course and therefore is an excellent reference, but doesn't give much in the way of intuition.

Whitehead, G.W., *Elements of Homotopy Theory*. Another encyclopedic treatment which covers most of the material for this course but which can be a little awkward and inefficient at times.

Adams, J.F., *Algebraic topology—a student's guide*. Use this gem to find out what to learn once you've finished the introductory sequence of courses, or what it is we're building a base for. It begins with a discussion of the various areas of algebraic topology, and then reprints many of the original papers. Keep in mind that it was written in the early 70's and that lots has happened since then. Excellent.

There are lots more . . .