Math 544 **Topology and Geometry of Manifolds** **Autumn 2001**

SUGGESTIONS FOR FURTHER READING

[1] Glen E. Bredon, *Topology and Geometry*, Springer-Verlag, New York, 1993. This beautiful book, intended as a first-year graduate text in algebraic topology, is unique among algebraic topology texts in its focus on manifolds (both the topological kind and the smooth kind) as the main objects of study throughout. Chapters I and III correspond to the material in Math 544.

[2] William Fulton, *Algebraic Topology: A First Course*, New York, Springer-Verlag, 1995. This is a fairly new book, and I'm not very familiar with it. General topology is only summarized in an appendix, but most of the material on the fundamental group, covering spaces, and the classification of compact surfaces is treated here in detail, together with a lot of material that we will discuss in the winter quarter.

[3] Marving J. Greenberg, *Lectures on Algebraic Topology*, New York, W. A. Benjamin, 1967. A good introduction to homotopy and homology theories, including a treatment of the higher homotopy groups.

[4] Edwin E. Moise, *Geometric topology in dimensions 2 and 3*, New York, Springer-Verlag, 1977. The main point of this book is to prove the triangulability theorems for 2- and 3-dimensional manifolds. In the process, he gives an excellent introduction to simplicial complexes and the concept of triangulation.

[5] James R. Munkres, *Topology*, Upper Saddle River, NJ, Prentice Hall, 2000. This contains an extremely complete introduction to general topology, going into much more detail on some topics that we skip or barely touch on, such as infinite product spaces, separation axioms, and metrization theorems. It also includes a thorough treatment of the fundamental group, covering spaces, and the classification of compact surfaces.

[6] James R. Munkres, *Topology, A First Course*, Englewood Cliffs, NJ, Prentice-Hall, 1975. This is an earlier edition of [5]. It contains all the same material on general topology, but it omits the classification of surfaces, and the treatment of the fundamental group and covering spaces is much less complete.

[7] James R. Munkres, *Elements of Algebraic Topology*, Menlo Park, CA, Addison-Wesley, 1984. A very accessible introduction to homology theory, which is another way of attaching groups to topological spaces that complements the fundamental group and higher homotopy groups. Begins with a very thorough discussion of simplicial complexes.

[8] Allan J. Sieradski, *An Introduction to Topology and Homotopy*, Boston, PWS-Kent, 1992. An impressively complete treatment of general topology and homotopy theory,

beginning with set theory and metric spaces, and progressing through the fundamental group and covering space theory. An excellent reference, with lots of good exercises.

[9] I. M. Singer and J. A. Thorpe, *Lecture Notes on Elementary Topology and Geometry*, New York, Springer-Verlag, 1967. A nice exposition of the fundamental group and covering spaces, followed by rather cursory treatments of smooth manifold theory, de Rham cohomology, simplicial homology, and Riemannian geometry.

[10] John Stillwell, *Classical Topology and Combinatorial Group Theory*, Second Edition, New York, Springer-Verlag, 1993. This gives a nice treatment of the fundamental group and homology theory, concentrating on relationships with group theory and questions of computability. It includes a proof that there is no algorithm for solving the general homeomorphism problem for manifolds.

[11] William S. Massey, *Algebraic Topology: An Introduction*, New York, Springer-Verlag, 1967. This book doesn't discuss general topology, but it contains a very complete treatment of the classification of surfaces, the fundamental group, and covering spaces. This book has long been the "standard" reference for the suface classification theorem.

[12] William S. Massey, *A basic course in algebraic topology*, New York, Springer-Verlag, 1991. Basically an extension of [11], this contains all the same material as *Algebraic Topology: An Introduction*, together with a nice treatment of homology theory.