MATH 263, SPRING 2008

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Texts (and where they are available on the web):
Hatcher: Algebraic Topology (to be used selectively);
`http://www.math.cornell.edu/~hatcher//AT/ATpage.html`
Massey: A basic course in algebraic topology (optional)
`https://www.scribd.com/document/198733488/18-905-Massey-W-S-a-Basic-Course-in-Algebraic-Topo`
May: A concise course in algebraic topology
`http://www.math.uchicago.edu/~may/CONCISE/ConciseRevised.pdf`

Massey's book is easiest and his first chapter includes the classification of surfaces, which is not in the other two. Hatcher's book is mainly meant as a graduate text, but a graduate text at Cornell may well serve as an undergraduate text here. The book has a nice choice of material and strives to avoid theory in favor of geometric intuition, in so far as possible. It does not define categories until page 162, which kind of misses the point. It is less scrupulous than I would like about using material that you are unlikely to know and is less rigorous than I would like. When I last tried out Hatcher in 263, as an experiment, the more theoretically inclined students were none too pleased. My own book is unquestionably graduate level, more conceptual and sophisticated, and certainly too concise, but some will like it (or so I hope!).

Homework: An assignment will be given every week. Problems are to be turned in one week from the time they are handed out. Problems may be handed in later, but then will not be given full credit. Problems may not be handed in after solution sets are posted, which will be one week after the assignment is due. You are encouraged to work together, but you are required to write up your work independently. Many problems are taken from Hatcher. If any seem unreasonable, please let Jia or me know right away.

Grading: Homework accounts for 60% of the grade (roughly 7.5% for each of the 8 assignments). The mid-term, which is take-home and thus like a homework assignment with more emphasis, accounts for 15%. The final accounts for 25%. These may have a novel format (that I learned from Cliff Taubes at Harvard)

Miscellaneous: No make up exams will be given, and incompletes will only be given in cases of serious personal difficulty.

Material: The first four weeks will be concerned primarily with the fundamental group, van Kampen's theorem, covering space theory, and perhaps graphs, but will introduce some more advanced topics in homotopy theory along the way. This old man likes to digress! The rest of the course, some of which will be less rigorous, will introduce homology and cohomology theory, both abstractly and cellularly, via the chains of CW complexes.

Approximate outline by week (unless you let me get too ambitious):

Week 1 The fundamental group and its applications
Week 2 van Kampen's theorem; classification of surfaces
Week 3 Covering spaces: Definitions and fundamental theorems
Week 4 The universal cover; graphs and free groups
Week 5 Review; introduction to higher homotopy groups
Week 6 Eilenberg-Steenrod axioms
Week 7 CW complexes and their homology; coefficients
Week 8 Cohomology of CW complexes; coefficients
Week 9 Cup products and the cohomology ring