

Math 215A - Fall 2016

Subject matter: The course will constitute an introduction to elementary algebraic topology, including the fundamental group, homology, cohomology, and duality theorems for manifolds. There will be emphasis on computation and examples.

Instructor: Gunnar Carlsson (room 383L, building 380), carlsson@stanford.edu

Course Assistant: Cédric de Groot (room 381H, building 380), cedricd@stanford.edu

Office Hours: Carlsson Tu-Th 12:30-1:30, de Groot MWF 10:25-11:25.

Course requirements: There will be four homework sets, to be submitted in class. Homeworks not turned in in class should be submitted to Cédric's mailbox. Their due dates are included in the schedule below. In addition, there will be a final examination, which will be take home. It will be made available on 12/6.

Course Schedule

1. Week of 9/25: Fundamental group, definitions, examples. 1.1 of Hatcher.
2. Week of 10/2: Van Kampen theorem, cell complexes. 1.2 of Hatcher.
3. Week of 10/9: Covering spaces. 1.3 of Hatcher. Homework 1 due 10/13
4. Week of 10/16: Homology of simplicial complexes, singular homology. 2.1 of Hatcher.
5. Week of 10/23: More on homology, computational techniques, Mayer Vietoris. 2.1, 2.2 of Hatcher. Homework 2 due 10/27.
6. Week of 10/30: Homology and fundamental group, applications. 2.2, 2.3, of Hatcher.
7. Week of 11/6: Cohomology, universal coefficient theorem. 3.1 of Hatcher. Homework 3 due 11/10.
8. Week of 11/13: Cup products, Künneth formula, 3.2 of Hatcher.
9. Week of 11/20: Thanksgiving Break
10. Week of 11/27: Orientations and duality. 3.3 of Hatcher. Homework 4 due 12/6.
11. Week of 12/4: More duality, examples. 3.3 of Hatcher. Final distributed 12/6.

Homework assignments

1. (Due October 13) pp. 38-39, 1, 2, 10, 12, 16, 17, pp. 52-55, 6, 8, 9, 14
2. (Due October 27) pp 79-82, 1, 3, 10, 17, 21, pp. 131-133, 1, 2, 3,4
3. (Due November 10), obtain problems at <http://math.stanford.edu/~gunnar/Prob3.pdf>
4. (Due December 6) pp. 204-206, 2, 3, 4, 5, 6, 8, 10