

Syllabus for MATH 5345H Honors: Introduction to Topology (Fall 2013)

September 6, 2017

Schedule: 11:15 – 12:05 Monday, Wednesday, Friday, Vincent Hall 20.

Office hours: 2:15 – 3:45 Monday and 9:30 – 11 Thursday, Vincent Hall 459, and by appointment.

Instructor: Craig Westerland

- Vincent Hall 459
- cwesterl@umn.edu
- <http://www.math.umn.edu/~cwesterl>
- 612.625.0523

Course webpage: <http://www.math.umn.edu/~cwesterl/docs/5345Fall2017.html>

Text: *Topology*, 2nd edition, James R. Munkres.

Prerequisites: One of [2263 or 2374 or 2573] and one of [2283 or 2574 or 3283]. Some background with mathematical proofs is required (and will be used in homework).

Goals and Objectives: We'll learn to work with abstract topological spaces, both the concrete and the very formal, the non-intuitive and the geometric. We will develop qualitative tools to characterize them (e.g., connectedness, compactness, second countable, Hausdorff...), and develop tools to identify when two are equivalent (homeomorphic). Several important results will be proved, notably the Tychonoff theorem on products, but an equal focus will be placed on understanding examples coming from geometry, algebra, and number theory. Towards the end of the class, we will study the fundamental group and if time permits, covering spaces.

Through this course, students will learn to develop formal proofs and careful mathematical arguments, and will be able to communicate them effectively in writing. They will have mastered the basics of point-set topology and have a good understanding of the examples and counterexamples that inform the development of the subject.

Topics: Here is a loose plan of the subject, keyed to the relevant chapters of Munkres' text.

Week 1-2 Set theory and Logic (ch. 1)

Week 3-5 Topological spaces and continuous functions (ch. 2)

Week 6-7 Connectedness and Compactness (ch. 3)

Week 8-9 Countability and Separation axioms (ch. 4)

Week 10 The Tychonoff Theorem (ch. 5)

Week 11 Complete Metric Spaces and Function Spaces (ch. 7)

Week 12-14 The fundamental group (ch. 9, 11, 13)

Assessment: Has three components:

40% Weekly homework assignments.

25% Midterm takehome exam (16-23 October).

35% Final exam (Wednesday, December 20 1:30-3:30 pm)

Extra credit is not intended to be part of this course. Late homework will not be accepted, but your two lowest grades will be dropped.

Policy Statements: on grade definitions, scholastic dishonesty, student conduct, sexual harassment, equity, diversity, equal employment, affirmative action, mental health and stress management services, and academic freedom and responsibility are available via links in part B of the document:

<http://policy.umn.edu/Policies/Education/Education/SYLLABUSREQUIREMENTS.html>