MATH 4530 · Introduction to Topology · Fall 2019

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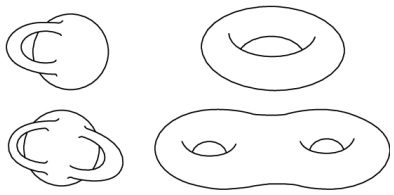
Topology is the qualitative study of shapes and spaces. Unlike geometry, which concerns metric concepts like distances and angles, in topology we talk about properties of shapes that persist under deformation.



Learning outcomes

We will work though many of the basic examples and concepts in general topology, and see how mathematicians use these concepts. Most of all, you will develop your problem-solving skills, abstract reasoning, ability to explore and discover, and skill at writing clear, precise mathematical proofs and explanations. Mathematics is equal parts exploration, understanding, and communication skills. We will work on all three!

Recommended books

There is no required textbook for this course. I will be following the topics in the book *Topology* by Klaus Jänich. It is available in the bookstore. If you find it helpful to have a reference to read which covers topics in the order that we do them, I recommend that you buy it. I also recommend Munkres' book *Topology* (any edition) as an alternative general reference. It contains more material on more topics than we will cover, but also has many exercises for additional practice and a more traditional textbook style of exposition.

However, the best way to learn is to pay attention in class, think about examples, ask questions, and work on solving lots and lots of problems.

Homework

Homework sets will be assigned weekly, on Tuesdays, and due at the beginning of class the following Tuesday. Please arrive on time for class, entering late is disruptive to the other students. Late homework will not be accepted. (However, your lowest homework score will be dropped.) Please talk to me during the first week of class if you require an accommodation. In the event of extended illness or absence during the semester, contact me as soon as possible.

I believe that the best way to learn math is by doing it, so will assign a lot of homework problems! You will not be required to hand in all of them to be graded every week. All assignments will be posted on the course Canvas site.

Please write clearly. There are resources on the course Canvas site and a homework template you can use (optionally) if you wish to type your homework using LaTeX.

Do your own work

I encourage you to discuss problems in groups and to work with your peers. However, you must write up your own solutions! One way I recommend to do this, so as to ensure you do not accidentally plagarize, is to work at a blackboard together, then leave and go to different rooms to individually write. Plagiarism, copying, taking answers or parts of answers from books, notes, the internet, other people, etc, etc. is not tolerated and will result in a score of 0 for all people involved. You are expected to follow Cornell's code of academic conduct.

This course is very much in the spirit of "learn by doing". If you are not interested in this approach, consider taking another class!

Tests

- 20-minute quiz: October 1, beginning of class.
- In-class prelim: October 22, full class period
- Final exam: December 15, as scheduled by the college

Grading scheme

Homework 25% (lowest score dropped) Quiz 5% Prelim 30% Final exam 40%

Resources

- Instructor office hours: Friday 2:30-4:30, 511 Malott
- TA office hours: Monday 2-4, Malott 218

You are welcome to visit the Math Support Center (Malott 256) but please *indicate on your homework if you were helped by a tutor.* It is not permitted to ask tutors to do the problems for you!

Accommodations If you have an SDS accommodation (or are in the process of talking to them) please let me know as soon as possible so we can make sure your needs are met.

Topics Below is a rough outline of topics that I plan to cover. This will be adjusted a bit as we go along, with a week-by-week summary posted on canvas. The course will be about 60 or 70% point-set topology (we'll learn what that is) with the remainder an introduction to algebraic topology.

1. Intro: topological spaces, metric spaces, basic concepts
2. Key notions: continuity, compactness, connectedness. The separation axioms
3. Examples: products, familiar examples, crazy counterexamples, topological vector spaces
4. Quotient spaces and examples
5. Complete metric spaces
6. Tychonoff's Theorem
7. An introduction to algebraic topology: homotopy, covering spaces, CW complexes.