

Mathematics 411: Topology

Fall 2017

Tuesdays, Thursdays 1:25–2:40pm

Physics building 205

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Course web site: You can check <https://services.math.duke.edu/~ng/math411/> for assignments, office hours, and other information. We will probably also use Sakai, <https://sakai.duke.edu/>.

Textbook: *Topology* by James R. Munkres, 2nd edition.

Munkres' book is very detailed and on the dry side. For those who prefer a more informal treatment that emphasizes geometric intuition, I recommend *Basic Topology* by M. A. Armstrong as a supplementary text. I'll be teaching somewhere in between the two books, roughly speaking. Both books should be on reserve at Perkins.

Office hours: TBA, and by appointment (set up in person or by email). If you want to set up an appointment via email outside of scheduled office hours, please keep in mind that I can't usually answer email immediately; on occasion it may take a day for me to respond.

Course synopsis: This course is a broad introduction to point set topology, differential topology, and algebraic topology. Topics will include:

- Topological spaces, connectedness, compactness, product and quotient topologies.
- Homotopy, the fundamental group, covering spaces.
- Triangulations, classification of surfaces, Euler characteristic.
- Jordan curve theorem, Brouwer fixed point theorem, Borsuk–Ulam theorem.

Assignments: There will be homework sets due most weeks on Thursdays, as well as exams (two midterms and a final). You are allowed and encouraged to work with fellow students on the homework; however, each student must write up their problem sets on their own. Your grade will be based on a weighted average of your grades in these components: homework 15%, each midterm 25%, final 35%.

Prerequisites: Officially, the only prerequisite for this course is Mathematics 221, and I expect to provide any necessary mathematical background beyond this level. However, you may find your experience in the course to be more fulfilling and pleasant if you have a reasonable familiarity with proofs (on the level of Math 401, 431, or essentially any course > 400). It may also help to be acquainted with the notion of a group (Math 401 again) and perhaps some basic real analysis (Math 431 again), but these are not necessary.