# Mathematics 205: Topology

Fall 2009 Tuesdays, Thursdays 2:50–4:05pm Physics building 259

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**Course web site:** You can check http://www.math.duke.edu/~ng/math205/ for assignments, office hours, and other information.

**Textbook:** *Basic Topology* by M. A. Armstrong (Springer, 1997, though earlier printings are probably also fine).

Armstrong's book emphasizes geometric intuition and could be considered a bit on the informal side. For those who prefer a more rigorous and formal treatment of much of the same material, I highly recommend Munkres' *Topology* (second edition, though the first edition will also work) as a supplementary text.

**Office hours:** Tuesdays 4:05–5:05, Wednesday afternoons TBA.

**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.
- Simplicial homology.

**Assignments:** There will be weekly/biweekly homework sets, as well as exams (midterms and 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. At this point, I expect there to be two midterm exams (disregard what the course synopsis says). Your grade will be based on a weighted average of your grades in these components: homework 20%, each midterm 20%, final 40%.

**Prerequisites:** Officially, the only prerequisite for this course is Mathematics 104, 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 121, 139, or essentially any course $> 110$). It may also help to be acquainted with the notion of a group (Math 121 again) and perhaps some basic real analysis (Math 139 again).