



MTG 7396, Advanced Topics in Topology

Time and Location

M W F Period 8 (3:00-3:45pm), Little Hall 219

Description and Goals

In this course we will survey some exciting new areas in topology.

Exciting new areas in topology

- Stochastic topology – What does a random topological object look like? What are its properties?
- Topology of the Brain – Understanding the brain is one of today's grand scientific challenges. Algebraic topology is emerging as an important tool in this effort.
- Topological Data Analysis – Across academia and industry there is a huge appetite for new tools to make sense of the vast quantities of data being produced and recorded. Algebraic topology can be used to represent and learn from the shape of data.

Along the way to understanding these subjects, we will learn some interesting and useful mathematics: Morse theory, category theory, and homological algebra. In addition to algebraic topology, we will see interesting connections with other areas of mathematics: probability and algebra; and with areas outside of mathematics: statistics, machine learning, and neuroscience.

These topics have much to offer the aspiring mathematician: interesting new mathematical problems, important applications, conferences with support for graduate students, and a demand for postdocs.

Prerequisites

This course will be mostly self-contained. Any student ready for a 4000/5000 level math course is welcome.

Please contact me if you have any questions and/or requests!