

# MATH 526 Algebraic Topology II

Fall 2020

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**Course Moodle site:** <https://learn.illinois.edu/course/view.php?id=51684>

**Course logistics:** All aspects of this course will be carried out remotely this semester. Pre-recorded lectures and notes will be posted online. I will hold virtual office hours via Zoom and there will also be an online discussion board. We will also have regular online class meetings for homework discussions, student presentations, and to foster a sense of community. These will be scheduled once the semester starts.

**Required technology:** To participate in this course you will need:

- computer or tablet,
- webcam, speakers/headphone and microphone,
- reasonable internet connection for downloading course content and participating in course discussions and office hours.

**Course description:** This is the second semester of the algebraic topology sequence, and for the most part will concentrate on studying singular cohomology, its structure and applications. The first part of the course will concentrate on the cup product in cohomology, Poincaré duality, and various applications. Then we will study vector bundles, characteristic classes, and cohomology operations, and if time permits, we will cover some basics related to complex K-theory.

**Prerequisites:** MATH 525 or consent of instructor.

**Textbooks:** The main textbooks will be

- *Algebraic Topology*, by Hatcher. Free pdf available at <http://www.math.cornell.edu/~hatcher/AT/ATpage.html>.
- *Geometry and Topology*, by Bredon. Free pdf available through our library.
- *Characteristic Classes*, by Milnor and Stasheff. Free pdf available through our library.

A couple more helpful references:

- *Algebraic Topology*, by Switzer,
- *A Concise Course in Algebraic Topology*, by May.

**Assessment:** Ample opportunities to demonstrate mastery of course material will be provided.

- *Homework exercises.* Homework will be assigned on a regular basis. Students are encouraged to collaborate and work together.
- *Student presentations.* Throughout the term there will be opportunities for student presentations on topics directly tied into and supplementing lecture material.
- *Course participation.* Ask and answer questions on the course discussion board about lecture materials, homework exercises, or anything related to algebraic topology.
- *Final written project.* Students will write a brief (5-10 pages) report on a topic of their choosing, which is related to, but goes beyond, what we cover in class.

**Disabilities:** To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class are asked to contact me as soon as possible.