

Math 654: Algebraic Topology I

Fall 2014

CB 335

MWF 11-11:50

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Text: *Algebraic Topology* by Hatcher.

Website: www.ms.uky.edu/~kate/teaching/f14_654.html.

Many fundamental questions in topology are very difficult to answer. For example, it can be difficult to determine if two topological spaces are homeomorphic. The idea of algebraic topology is to transform these questions to questions in algebra that may be easier to answer. The slogan for this class is *topology is hard and algebra is easy*.

There are many ways to convert topology to algebra. In this class we will focus on homology and cohomology. The main topics for this semester are:

- Simplicial, singular, and cellular homology and cohomology,
- The Mayer-Vietoris sequence,
- The cup product,
- The Universal coefficients and Künneth theorems,
- Poincaré duality.

Assignments: Homework will usually be assigned each class and will be due **in class** weekly. Assignments and due dates will be posted on the course website.

I **strongly** encourage you to discuss assignments with other students, but your solutions must be written up independently. *Copying a written solution from another student and submitting it as your own will be considered cheating.* Please see the UK office of Academic Ombud Services website (www.uky.edu/Ombud) for information about plagiarism.

All assignments should be neat, legible, and written in complete sentences.

Alternative Texts: If you are interested in additional references the following texts may be helpful:

- *Algebraic topology* by Edwin Spanier.
- *Algebraic topology* by Tammo tom Dieck.
- *Algebraic topology from a homotopical viewpoint* by Marcelo Aguilar, Samuel Gitler, and Carlos Prieto.

Prerequisites: The content of MA 551 and 651 will be assumed for this class. Compactness and continuity will be especially important. We will also make significant use of cell complexes, CW complexes and manifolds. (We will primarily work with these types of “nice” topological spaces.)

We will also use a lot of (homological) algebra. Specific familiarity with homological techniques is not assumed, but general comfort with algebra is.

Academic Integrity: All students are expected to follow the academic integrity standards as explained in the University Senate Rules.

Attendance: Class attendance is expected of all students.

Classroom Demeanor: Turn off all cell phones or other electronic devices prior to entering the classroom. An attitude of respect for and civility towards other students in the class and the instructor is expected at all times.

Academic Accommodations: If you have a documented disability that requires academic accommodations, please see me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resources Center (Room 2, Alumni Gym, 257-2754, jkarnes@uky.edu) for coordination of campus disability services available to students with disabilities. We can then collaborate on the best solution.