

# Math 540: Algebraic Topology, Fall 2023

**MWF 11:00-11:50am in KAP 137**

## Teaching Staff

|                     |                            |                     |                            |
|---------------------|----------------------------|---------------------|----------------------------|
| <b>Instructor</b>   | JoJ Helfer                 | <b>TA</b>           | Chenchen Zhao              |
| <b>email</b>        | jhelfer (at) usc (dot) edu | <b>email</b>        | zhao109 (at) usc (dot) edu |
| <b>Office Hours</b> | TBA (in <b>KAP 464-B</b> ) | <b>Office hours</b> | TBA                        |

## Contents

1. Contents
2. Overview
3. Textbook
4. Prerequisites
5. This page, Blackboard, Gradescope
6. Grading scheme
7. Homework
8. Exams
9. Project
10. Office hours
11. Statement for students with disabilities
12. Statement on academic integrity
13. Statement on academic integrity
14. Emergency preparedness/course continuity in a crisis
15. Disclaimer

## Overview

This course is an introduction to topology, and specifically to the two most important tools in this field: the fundamental group (and higher homotopy groups), and the homology groups. We will also see various applications of these tools.

In addition, we will begin with an introduction to category theory, which is an important tool in algebraic topology and most other fields of mathematics.

For a list of topics to be covered, please see the lecture plan.

## Textbook

We will not be following any specific text. There will be course notes, that will be updated continuously throughout the semester.

Here are some standard textbooks which I recommend and which I may reference:

- Allen Hatcher. *Algebraic Topology*
- J.P. May. *A Concise Course in Algebraic Topology*

- Glen E. Bredon. *Topology and Geometry*

For an excellent history of the subject, I also recommend

- Jean Dieudonné. *A History of Algebraic and Differential Topology, 1900-1960*.

These books are all made available online either by their author or through the USC library.

## Prerequisites

The prerequisites are an introductory course's worth of topology and algebra.

## This page, Blackboard, Gradescope

Most information and material related to the course will be posted on this page.

The exceptions are:

- Gradescope will be used to submit homework assignments, and to see your graded homework.
- Blackboard will be used to make announcements, and also to view your grades.
- Email should be used to email to contact the instructor or TA.

## Grading scheme

- 35% Homework
- 20% Midterm Exam
- 15% Final project
- 30% Final Exam

## Homework

Homework assignments will be assigned every week.

Homework is to be submitted on Gradescope (you should see the course there if you are enrolled; if you have any problems, please inform the instructor or TA). When you submit on Gradescope, *please don't forget to match your scanned pages with the problems*.

**Homework must be submitted by the posted due dates.** If you expect to have issues submitting the homework on time, or if you are having difficulties with gradescope, please write to the instructor or TA as soon as possible, *and attach a scanned copy of your submission* (this is a wise practice for any class).

## Exams

- The midterm will (tentatively) be on **Monday, October 9, in class** (e.g., at the usual time 11:00am-11:50am, in the usual place KAP 137).
- The final exam will be held on **Wednesday, December 6 from 11 am to 1 pm, in KAP 137**, as per the USC exam schedule.

Both exams are *closed book, closed notes* exams, with no calculators or other electronic aids permitted. The final exam will cover all topics from the semester, but will have greater emphasis on topics developed after the midterm.

## Project

A portion of your class grade will be based upon a project exploring an aspect of topology beyond the topics covered in class. Concretely, with a small group of 2-3 students, you will be asked to write a *short expository article* (around 4-6 pages, typed), and give an *in-class 20 min presentation*. The topic of study will be chosen in consultation with the instructor.

## Office hours

The TA's and instructor's office hours are TBA.

## Statement for students with disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in GFS 120 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website for DSP (<https://dsp.usc.edu/>) and contact information: (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) [dspfrontdesk@usc.edu](mailto:dspfrontdesk@usc.edu).

## Statement on academic integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

## Statement on academic integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

## Emergency preparedness/course continuity in a crisis

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies. See the university's site on Campus Safety and Emergency Preparedness.

## Disclaimer

This syllabus is not a contract, and the Instructor reserves the right to make some changes during the semester.