

Math 367K: Undergraduate Topology
UT Austin, Fall 2020
TTh 9:30-10:45 online (Zoom)

Instructor: Sam Payne

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Office Hours: TTh 11:00-11:50 and by appointment (online)

TA: TBD

Textbook: *Topology Through Inquiry* by Michael Starbird and Francis Su

Instructional strategy: This course will be taught using an **Inquiry Based Learning** method, meaning that you, the student, will be responsible for doing the exercises and proving the theorems on your own. During class, you will present your proofs and solutions, and see those of your classmates. In order to get the most out of this course, you must be willing to put in a sustained effort from the beginning of the semester to the end.

Grading: Grades in this course will be on the plus minus system, based on:

- Homework – 25%
- Presentations and participation – 25%
- Two midterm exams and one final exam – 50%

For the exam grades, we will count the two best scores from your three exams, and each of the two will count 25%. If you happen to miss or perform poorly on one exam, just do your best on the other two. There will be no make-up exams. Please reserve the exam dates listed below on your calendar when you commit to the course.

Your notebook: The textbook for this class contains neither the proofs of the theorems that we will cover nor solutions to the exercises. Each week, we will assign theorems and exercises for you to work on; please LaTeX your proofs of the theorems and solutions to the exercises and keep these in your notebook file. From time to time we will ask to see the whole file.

Typed homework will be due each class day at the **beginning** of class. Not every problem will be graded. Keep in mind the crucial difference between the scratch work required to find an answer and the clarity and structure expected in a well written solution. Your homework will be graded, in part, on this clarity and structure.

You may not be able to prove all of the theorems and solve all of the exercises before they are presented in class. Therefore, you will be given the opportunity to receive full credit for your work on a theorem or exercise even if you are unable to solve it completely. You can receive full credit if you carefully write up and submit the strategies and techniques you used in trying to find a proof or solution before it is presented in class and then, after it is presented,

you submit a complete proof or solution. As the class progresses you will develop an increasingly effective list of strategies for solving problems. (There is a hidden agenda in this grading system; namely, you may find that when you carefully write down what you attempted, and why it did not work, some insight into the solution magically appears. Try it, and see if this is true for you.) The goal and expectation is for you ultimately to write careful and correct proofs for all of the theorems, and solutions for all of the exercises.

Participation: All classes and TA meetings will be held online, via Zoom. In addition to our class meetings on Tuesdays and Thursdays, you will also meet in smaller groups at regularly scheduled times with the TA. In both class and TA meetings, we will ask you to present proofs of theorems or solutions to exercises that you have been working on. Please show up each day prepared to present the exercises and theorems scheduled for that day. If you proved one theorem that you thought was particularly interesting or difficult, and would like to present it, let us know in advance.

Talking to others about a proof is different from writing a proof. The act of speaking, especially when it becomes a dialogue, gives you additional opportunities to show people how the ideas of the proof fit together, and what issues you had to deal with when working on the problem. In this course, we want you to develop your skills communicating mathematics to others. This may or may not come easily, but is something you can cultivate through practice, and will carry over to other aspects of your education and future professional life.

When your classmates are presenting, it is your responsibility to follow their line of reasoning. We also want you to listen actively and interact, whether by asking questions to clarify, offering suggestions at impasses, or more generally contributing to discussion. Keep in mind that alternate proofs are common, and the argument presented may be different from yours. If you see something in a proof that you don't understand, or sense a possible mistake, please ask about it. And if there is something about the proof that you find interesting or clever, feel free to comment on this as well! In all cases, please be considerate and respectful of the person who is presenting, and follow the golden rule.

Rules of the game: Most of the theorems that we will prove in this course can be readily found in textbooks or on the internet. This semester, we are asking you **not** to use these sources. Proving theorems and solving exercises on your own is the best way to learn mathematical ideas and retain them for years to come. We want you to experience the joy of figuring things out and being a producer, rather than a consumer, of mathematics. One of the major goals of this course is for you to develop the skill of creating mathematical ideas and proofs on your own. Therefore, for the purposes of this class, turning in a solution to a homework problem that you obtained from an outside source is considered plagiarism, just like writing a report that consists entirely of quotes from other books or papers would be considered plagiarism in another course. We know that since you are not allowed to look to outside sources for help, you may get stuck from time to time and not be able to prove all of the theorems or solve all of the exercises that are assigned. This is okay; we will take this into account when determining grades.

We do encourage you to talk with your classmates when working on homework for this class,

but please use the following method in doing so. First work on proving the theorem or solving the exercise on your own. If you get stuck, you may work with other students who have not solved the problem. If you ask a student in the class who has solved the problem, that is okay; however, the student who knows the answer should not simply tell the answer. Instead, the person who knows should give a hint or helpful guidance so that you can solve the problem on your own. As a general rule, everything you turn in for this class should represent your own work; it should not be something that somebody else gave you without any work on your part, and it should, of course, never be copied from someone else's paper. If you do learn a substantial part of an idea from someone else, then please note this on your paper.

Accommodations: The University of Texas provides, upon request, appropriate academic accommodations for qualified students with disabilities. For more information, contact Services for Students with Disabilities at 512-471-6259 or ssd@austin.utexas.edu.

Exams: We will have two midterm exams during the regularly scheduled class period on September 29 and November 10. We will also have a final exam, on Thursday, December 10, from 2-5 pm, Austin time. All exams will be administered online, through Canvas, with Proctorio enabled. There will be an in-class practice exam prior to the first midterm, which will not count toward your grade, to help you get comfortable and familiar with the technology and testing format. On the actual exams, there will be four major types of problems: problems that ask you to apply your understanding to examples and counterexamples, problems that ask you to describe an outline of the proof of a theorem and explain its usefulness or importance, problems that ask you to prove one of the theorems that we covered in class, and problems that ask you to prove new fact. This last type will (necessarily) be simpler, on average, than the theorems you have been assigned to prove at home.

Topics: The material covered in this course is an introduction to topology.

This syllabus is subject to change. Students who miss class are responsible for learning about any changes to the syllabus. All students are expected to uphold the highest standards of academic honesty and integrity and, in particular, to follow the UT Student Honor Code. Some classes may be recorded. Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the class in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings.

You belong here