

# MATH 6510/7510 – TOPOLOGY 1

DANIEL IRVING BERNSTEIN

**Instructor:** Daniel Irving Bernstein (pronouns: he or they)

**Instructor email:** dbernstein1@tulane.edu

**Days and times of the lectures:** MWF, 11:00pm-11:50pm

**Place of the lectures:** Gibson 325

**Instructor's office:** Gibson 401 A

**Instructor's office hours:** M 3:00pm-5:00pm, or by appointment

## COURSE DESCRIPTION

This is the first in a two-semester sequence on Topology. Over the course of both semesters, we will cover most of Chapters I-VI in the textbook. This includes: general topology, differentiable manifolds, fundamental groups, and (co)homology of topological spaces.

## COURSE GOAL

One extremely harmful myth in our culture is that math is something only a “genius” can really understand. The result is that many mathematicians have a voice in their head telling them that they aren’t smart enough to *really* do math, and any success suggesting otherwise is a fluke. This includes myself and literally everyone I’ve ever talked to about this, which includes a *lot* of people with PhDs. The truth, at least in my own experience, is that math is like literally any other skill. Sure, at any given moment, some progress faster and with less effort than others, but this fact gets *far* more attention than it deserves. Based on my years of experience as a mathematician and educator, I believe that with the right guidance and resources, anyone can get better at math through consistent focused effort, and that doing this over the course of many years will make anyone *really really good* at math.

My ultimate goal in teaching this course is simple: I want to enable you to see your own mathematical potential. I hope to do this by helping you achieve the following:

- (1) gain a baseline factual knowledge about topological spaces, manifolds, and algebraic objects one can use to better understand them
- (2) sharpen your geometric and topological intuition through many attempts (successful and unsuccessful) to prove theorems, find counterexamples to false statements, and determine whether a given true-seeming statement is actually true
- (3) improve your mathematical writing skills by submitting typed solutions to weekly homework assignments
- (4) improve your ability to gain from and contribute to mathematical work as part of a group.

## INSTRUCTOR DEI STATEMENT

Mathematics culture, and STEM culture more generally, has many problematic aspects. Various kinds of systemic exclusion and abuse along racist, sexist, LGBTQ-phobic, ablest,

classist, and other lines, are perpetuated both intentionally and unintentionally. Many of us in various STEM communities are working to change this, but we all have blind spots and bad habits, myself included. If there's anything I can do to more effectively welcome you into my classroom, or if I do something that inhibits your ability to fully participate, I want to know. You are welcome to share concerns with me at any time, and I will solicit anonymous feedback from the class at least once during the semester.

#### ACCOMMODATIONS FOR STUDENT NEEDS

I will make every reasonable effort to accommodate your needs including, but not limited to, religious observances, disabilities, and health (physical and mental). If you require accommodations of any kind, including deadline extensions, please let me know as soon as you are aware. For disability accommodations, I may ask you to register with the Goldman Center for Student Accessibility (URL below).

#### TEXTBOOK

The textbook for the course is *Topology and Geometry* by Glen E. Bredon. Each lecture will be based on a section, more or less. I *highly* recommend that after each lecture, you read the corresponding section of the textbook.

#### WEBSITE

Real-time information pertaining to the course will be communicated on Canvas.

#### HOMEWORK

A homework will be assigned about once a week. It will include both graded and ungraded problems of varying levels of difficulty. Submissions must be written up using  $\text{\LaTeX}$ . You are encouraged to consult each other and work together. Good math is rarely done in isolation, no matter what someone else's ego wants you to believe.

#### EXAMS

Some of you are probably going to take the qualifying exam in topology. In order to give you some practice, I will administer two exams during the semester. Both will be optional.

#### GRADE

Your final grade will be the average of your homework grades. Conversion from numerical grades to letter grades will be determined at the end of the semester.

## ADA/Accessibility Statement

Tulane University is committed to offering classes that are accessible. If you anticipate or encounter disability-related barriers in a course, please contact the Goldman Center for Student Accessibility to establish reasonable accommodations. If approved by Goldman, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. I will never ask for medical documentation from you to support potential accommodation needs. **Goldman Center contact information:** Email: [goldman@tulane.edu](mailto:goldman@tulane.edu); Phone (504) 862-8433; Website: [accessibility.tulane.edu](http://accessibility.tulane.edu)

## Code of Academic Conduct

The Code of Academic Conduct applies to all undergraduate students, full-time and part-time, in Tulane University. Tulane University expects and requires behavior compatible with its high standards of scholarship. By accepting admission to the university, a student accepts its regulations (i.e., [Code of Academic Conduct](#) and [Code of Student Conduct](#)) and acknowledges the right of the university to take disciplinary action, including suspension or expulsion, for conduct judged unsatisfactory or disruptive.

*Unless I indicate differently on instructions, all assignments and exams are to be completed individually and without any study aid, including textbooks, class notes, or online sites. If you have any question about whether a resource is acceptable, you must ask the instructor rather than assume.*

## Equity, Diversity, and Inclusion Statement (EDI)

Equity, diversity, and inclusion (EDI) are important [Tulane values](#) that are key drivers of academic excellence in our learning environments. In our drive for academic excellence, we seek to ensure that students, faculty, and staff across diverse social identities, cultural backgrounds, and lived experiences can thrive - especially those from underrepresented and underserved communities (e.g., race/ethnicity, gender identity and expression, sexual orientation, disability, social class, international, veterans, religious minorities, age, and any other classification protected by applicable law - see [Tulane's Nondiscrimination Policy](#)). In order to build a supportive culture and climate for every member of our community, we recognize that we each of have unique EDI strengths to share with others and that we also have areas for EDI growth, learning, and change. This EDI commitment and cultural humility helps us collectively build a university community and culture where everyone experiences belonging.

## Religious accommodation policy

Per Tulane's religious accommodation policy as stated at the bottom [Tulane's academic calendar](#), I will make every reasonable effort to ensure that students are able to observe religious holidays without jeopardizing their ability to fulfill their academic obligations. Excused absences do not relieve the student from the responsibility for any course work required during the period of absence. Students should notify me within the first two weeks of the semester about their intent to observe any holidays that fall on a class day or on the day of the final exam.

## Title IX:

Tulane University recognizes the inherent dignity of all individuals and promotes respect for all people. As such, Tulane is committed to providing an environment free of all forms of discrimination including sexual and gender-based discrimination, harassment, and violence like sexual assault, intimate partner violence, and stalking. If you (or someone you know) has experienced or is experiencing these types of behaviors, know that you are not alone. Resources and support are available: you can learn more at [allin.tulane.edu](http://allin.tulane.edu). Any and all of your communications on these matters will be treated as either "Confidential" or "Private" as explained in the chart below. Please know that if you choose to confide in me, I am required by the university to share your disclosure in a Care Connection to the Office of Case Management and Victim Support Services to be sure you are connected with all the support the university can offer. The Office of University Sexual Misconduct Response and Title IX Administration is also notified of these disclosures. You choose whether or not you