Math 467, Fall 2024
David Singer
Course Information

Text The textbook for the course is:*An Introduction to Manifolds*, by Loring W. Tu, Second Edition, Springer, (2010). ISBN 978-1-4419-7399-3.

Other Materials Suggested texts for supplementary reading include *Differential Topology: First Steps*, by Andrew Wallace; *Topology from the Differential Viewpoint*, by John Milnor; and *Introduction to Differentiable Manifolds* by Louis Auslander and Robert MacKenzie.

Office Hours I will have in-person office hours on Monday and Wednesday, and Zoom office hours at other times. I enjoy talking to students, so do not hesitate to see me, either by schedule, appointment, or lucky drop-in.

Homework There will be homework problems assigned on a regular basis, which you may submit in person or via Canvas. Handwritten solutions must be written clearly and neatly. For electronic submissions, I prefer that the format you use is PDF. Word files sometimes do not display properly because of font issues, and it is easy to save a word document as a PDF. You may also upload scanned documents, but make sure they are legible; dark ink on white paper is optimal in that case.

Important: I grade all homework myself and will write comments to give you personalized feedback. If you submit electronically, Canvas allows me to attach comments to your paper, and I will use that feature. Please leave some **blank spaces** on each homework page, so that I can insert the comments on your paper.

On the top of the front page of each assignment, please put your name in the upper left corner, followed by the assignment number and date.

Grading Policies Homework assignments will count for 30% of the grade. Problems are due roughly on alternating class days. There will be a midterm exam tentatively scheduled for **Friday, October 25, 2024**, which will count for 30%. The final exam will be on **December 17, 8:00–11:00AM** and will count for the remaining 40%.

Schedule Below you will find the sequence topics covered in the course, together with their location in the text.

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Math 467 Syllabus

Part 1:

Topic	Section(s) to read
Some Topology	Notes, §A31, §A5, §A7, §a8
C^∞ functions on $\mathbb{R}^n$ and their Germs	§1, §2.2
Tangent vectors and vector fields, Derivations	§2
Cotangent vectors and 1-forms	§3
Differential Forms	§4
Manifolds	§5.1,5.2
Smooth Manifolds	§5.3-4
Smooth Maps	§6.1-4
Lie Groups (first glance)	§6.5
Quotient Spaces	§7
Inverse and Implicit Functions	§6-7, §B
Differentials	§8
Submanifolds	§9, §11.3-5
Introduction to Categories	§10
Tangent Bundle and Vector Bundles	§12
Vector Fields on manifolds	§14.1-3
Lie Brackets	§14.4
Lie Groups	§15
Lie Algebras	§16

Part 2 How much of this we do will depend on how the first part of the course goes!

The Quaternions	S E
$SO(3)$ and $SO(4)$	pp. 117, 165, …
Differential Forms	§17,§18,§19
Integration	S23
Cohomology	SS24
De Rham Theory	Chapter 7