MATH6510 SYLLABUS

FALL 2023

Instructor: Kurt Vinhage
Office: 309 JWB
Office Hours: Tue 10AM - 12PM

TA: Yotam Svoray
TA Office: JWB121
TA Office Hours: TBA

Contact. The best way to contact me is through email (`vinhage@math.utah.edu`). I will respond to emails within 48 hours, but many times sooner.

Course Content. We will use the textbook *Intoruction to Smooth Manifolds* by John M. Lee as a reference text, but will not cover the entirety of the material. This text is intended as a self-contained reference where complete proofs can be found. Lectures will follow Kevin Wortman's notes. See the last page of this syllabus for a tentative schedule. **All dates, including midterm dates, are subject to change. Come to class for the most up-to-date information.**

Homeworks and Quizzes. There will be regular homework assignments. Homeworks will be given roughly weekly (initially Fridays), and announced in-class and on a course website

Homework Policies.

- The instructor will choose 3 problems from each assignment to be graded. Each problem is worth 3 points. You will receive 1 point for turning in the homework. Each problem will be graded using the following rubric:
  - 0 points - No attempt was made, or writing was not relevant to the problem
  - 1 point - The solution is far from complete,, or has serious errors or omissions
  - 2 points - The solution is mostly complete and "has the right idea," but written poorly or has a small but crucial error or omission
  - 3 points - The solution is well-written and completely correct, modulo some very minor errors or omissions
- Homework must be turned in either at the during class on its due date, or to the TA, instructor or instructor's mailbox before the start of class on the due date.

Midterms and Final. Exams are timed and no outside resources will be allowed. There will be one midterm exam in the middle of October (tentative date **October 9, 2023**). The exam will be given in-class and be graded out of 100 points. The date of the midterm are preliminary and subject to change.

The final exam will be graded out of 100 points.

Course Grades. The course grades will be calculated based on the following scale:

Homeworks	30% total
Midterm	30%
Final	40%

The letter-grade cutoffs will be determined with the following thresholds. *These are guaranteed thresholds, they may be lowered later.*

Letter	Percent	Est. qual outcome
A	93%	High pass
A-	90%	Pass
B+	87%	Pass
B	83%	Fail
B-	80%	
C+	77%	
C	73%	
C-	70%	
D	60%	
F	50%	

Course goals. We aim to cover the following topics over the course of the semester:

- Manifolds
- Tangent spaces
- Orientation
- Whitney's embedding theorem
- Transversality
- Sard's theorem
- Partitions of unity
- Tubular neighborhoods
- Fiber bundles
- Degree theory
- Vector fields
- Flows
- Lie derivatives
- Frobenius' integrability theorem
- Differential forms
- DeRham cohomology