

# Math 3510/3510H Syllabus

## Spring 2025

### 1. COURSE INFORMATION

Dr. Jason Cantarella  
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Our classroom: Boyd 302 (TR), Boyd 304 W  
The course webpage is linked here.

Book: **Shifrin, Multivariable Mathematics**

### 2. COURSE SCHEDULE

See the Google calendar, which will be kept up to date throughout the semester. Generally, we will cover the last section of Chapter 5, then Chapters 6, 7, 9, and 8 in Shifrin (in that order).

### 3. PREREQUISITES

Students are expected to have taken MATH 3500/3500H in the preceding semester. (Since this is the second half of a two part course, exceptions to this are extremely rare.) Students should be prepared for a very challenging and fast-paced theoretical course. Computer skills in Mathematica or similar symbolic computation environment (Sage or Maple) will also be helpful.

### 4. COURSE GOALS

Students will develop a deep understanding of multivariable integration, including determinants and the  $n$ -dimensional change of variables theorem. Students will learn the basics of differential forms and integration on manifolds, including line integrals and conservative vector fields, surface integrals and the flux theorem, and the general form of Stokes' theorem. Students should understand the consequences of Stokes' theorem in physics and topology. Students should understand eigenvectors and eigenvalues and the spectral theorem, as well singular values and the singular value decomposition. We hope to cover the basics of principal component analysis and independent component analysis.

### 5. DISCLAIMER

The syllabus is a general course plan, but deviations may become necessary over the course of the semester.

### 6. PRINCIPAL COURSE ASSIGNMENTS

The course will have a midterm and a final exam. Homework will be assigned using Gradescope. Reading assignments will be an integral part of the course.

### 7. GRADING AND POLICIES, PEDAGOGY

This course mixes reading, lecture, and active learning instructional styles. Each class will be preceded by a reading assignment (with a quiz at the start of class designed to assess what you've learned from the reading). Class will mostly consist of an interactive lecture, with some group and individual in-class exercises. Out-of-class homework will complete the process, giving you harder problems to think and write about.

The overall course grade is computed from homework, exam, and final grades by the formula:

- (1) 30% for the midterm.
- (2) 40% for the final exam.
- (3) 30% for the homework assignments

After grades are calculated for each student using these weights, the instructor will rank the students by average and determine thresholds for grades of A, B, C, D, and F. Though improvement, final grades and other circumstances are taken into account in deciding thresholds for letter grades, students with a higher numerical average almost always receive higher letter grades than those with lower numerical averages.

## 8. ATTENDANCE POLICY

Students are expected to attend class regularly unless they have a medical or pandemic-related reason to miss class. Students who miss more than 3 classes (one full week of class) with no excuse may be withdrawn from the course by the instructor.

## 9. ACADEMIC HONESTY

As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, "A Culture of Honesty," and the Student Honor Code. All academic work must meet the standards described in A Culture of Honesty found at: [www.uga.edu/honesty](http://www.uga.edu/honesty). Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

The most important thing is to clearly distinguish between **your own original work** and **collaborative, searched, or AI work**. Both are allowed, and neither is an academic honesty violation. But you have different responsibilities in each case. For your own work:

- **Develop your thought process using sentences.** The most important purpose of writing is to figure out what you think. Unless you can express your argument in the form of a sentence, you may only have a vague or intuitive idea about what you're doing. This can make it very hard to understand what's wrong when you make a mistake.
- **Compute carefully and neatly.** Paper and pencil are tools for mathematical reasoning. Use them properly! Organize your calculations and start each section of algebra with a sentence explaining why this is the correct computation to do. Write neatly (it helps you avoid copying errors). Only use the equals sign to connect expressions that are, in fact, equal. If one thing implies another, use a phrase to indicate this.
- **Cite the book or the notes (or previous homework).** If your argument depends on something you've learned before, or a theorem from the class, make a note of it. ("page 4 of notes on ..."). That way, if you're wrong about it (for instance, you missed a hypothesis) there's something to check. Better yet, double check it yourself!

Collaborative, searched or AI work is worth full credit, but graded according to the rubric below:

- **Acknowledge the source up front.** Example: "After some online searching, I found a helpful discussion on StackExchange (include the url), which suggested that I try the approach below." or "I talked about the problem with Fionna, and got this idea.", or "ChatGPT proposed the following solution".
- **Check the work.** Your responsibility when you find something written online is to make sure that it holds up. Don't just believe things because a chatbot told you to or someone wrote it on StackExchange. Are the calculations right? Do the sources they cite actually say what they claim? You must explicitly discuss these issues in your writeup of the solution.
- **Realize that you're still responsible for doing similar work.** You will have to demonstrate your knowledge on the exams. Looking up answers can help you get unstuck, but try to immediately do a similar problem yourself. You can always ask your chatbot to generate a similar problem for you to solve.
- **Failure to clearly identify this kind of work results in a grade penalty.** If you don't clearly identify work that was collaborative, searched, or AI, you haven't met the responsibilities above and this will result in a grade penalty on the problem.

## 10. MAKE-UP EXAMINATIONS

**No makeup examinations will be given in the course.** You may be marked "excused" from an exam if you have an acceptable excuse for missing the exam (generally, these are medical or legal in nature). In this case, your grade on the other exam will count for 60% of the course grade. Students who are excused from both the midterm and the final will receive a course grade of "Incomplete".