

MATH 2220: Multivariable Calculus

Syllabus, Spring 2021

Learning objectives

This course covers the theory, practice, and application of differentiable functions in several variables. This is a beautiful subject and the foundation of much physical science and mathematical modeling. By the end of the course, students will:

- Be able to compute and understand the geometric and physical meaning behind derivatives and directional derivatives of functions of several variables.
- Understand coordinate systems (spherical, cylindrical, rectangular) and be able to choose the right set-up for a practical problem.
- Integrate functions and vector fields along paths, surfaces, and solid regions and apply this to real-world problems (e.g. computing flux of a fluid). Understand the physical meaning of the theorems of Green and Stokes.
- Build geometric intuition and visual reasoning, building on what you learned in linear algebra.

Instructor

Kathryn Mann

Office hours - Monday 10am - 11am, **new!** Tuesday 4:15pm-5:15pm (Zoom link on canvas)

Quick questions? I arrive 5 minutes before class and am happy to stay 5 minutes late!
Come chat - it's better than e-mail!

Teaching Assistants

Chase Vogeli (email: cpv29@cornell.edu)

Office hours: 10-11am Thursday, 3-4pm Thursday

Mark Walth (email: msw283@cornell.edu)

Office hours: 1-2pm Friday, 4:30-5:30 Sunday

Office hours of each TA are **open to all students** in MATH 2220.

Class zoom meetings

Lec 001: MWF from 9:05am-9:55am

Lec 002: MWF from 11:20am-12:10pm.

Discussion sections

Dis 201 (Mark): Wednesdays from 12:25pm-1:15pm (zoom)

Dis 202 (Mark): Wednesdays from 1:30pm-2:20pm in (zoom)

Dis 203 (Chase): Wednesdays from 2:40pm-3:30pm in WRN (Warren Hall) B25

Dis 204 (Chase): Wednesdays from 3:45pm-4:35pm in WRN (Warren Hall) B25

Lectures are interactive (polls, questions, activities), not pre-recorded. You will benefit by being there, and you will be able to quickly identify conceptual difficulties. Please attend the discussion section in which you are registered. This helps keep the numbers even for group work!

Prerequisites and Course Overlap

Prerequisite: MATH 2210 Linear Algebra.

Forbidden Overlap: Due to an overlap in content, students will receive credit for only one course in the following group: MATH 1920, 2130, 2220, 2240. For guidance in selecting an appropriate course, please consult First Steps in Math.

Canvas

Homework, handouts, zoom links, regular announcements, a copy of this syllabus, lecture recordings, and everything else you need will be posted on Canvas.

Textbook

Marsden and Tromba, Vector Calculus, Sixth Edition, W. H. Freeman, 2013.

The textbook is available through Instant Access on Canvas. See the Instant Access website for more info. **The Instant Access opt-out deadline is March 2.**

Assessments

Homework

Homework is due **at 9am sharp** on Mondays. **HINT: upload your homework sometime on the weekend so if you have a technical issue, you have time to fix it!**

The lowest homework score is dropped. Also, you may turn in up to two homeworks 3 days late without penalty. **Beyond this, there is no late homework accepted.** On some homework sets, you will have a multi-part investigation question. These questions apply techniques from the class to interesting situations, and depending on the question we may devote some discussion section time to group work on these problems. You are encouraged to discuss homework with your classmates, but you must *write up your own solutions*.

Tests/Exams

We have an in-class quiz (about 30 minutes), two evening Prelims and a final exam: *see the schedule file for the dates!* The prelims and exam are all weighted nearly equally towards your grade, so you should not view any one of them as a high-stakes test.

Distribution

25% homework, 10% quiz,
20% prelim 1, 20% prelim 2, 25% final exam

Accommodations

Please contact Cornell SDS if you need accommodations for class, assignments, or exams. They will send me a letter. Please also feel free to reach out to me by e-mail or set up an appointment to chat.

Collaboration and Academic Integrity

You are encouraged to discuss homework assignments with other students, and discussion section will even have time devoted to working on homework in groups! However, the documents that you turn in must be written up individually and contain your own original work. If you collaborate

with others on homework, you must include their names at the top of your assignment.

You are allowed to use your course textbook (Marsden and Tromba) as a reference for the exams, but no other external resources. Collaboration, copying, or referencing any other source is not allowed on the quiz, prelims, or exam.

In addition to exams, on all assignments copying from another source, e.g., another student, a book, a website (chegg, online course notes, etc) is prohibited and is a violation of Cornell's Code of Academic Integrity. Cornell's code expressly prohibits all students from buying or selling course materials through internet sites such as Chegg, CourseHero, and Slader.

Need help? Want resources?

The Math Support Center (MSC) can provide additional assistance with material covered in MATH 2220. See the MSC website for more details.

Office hours: TA office hours are a great place to ask questions about the homework, see examples, and meet other students from the course. Of course you may come to my office hours too! If you find yourself lost, want to ask something beyond homework, have fallen behind and need to make a plan to catch up, or anything else, my office hours are available for all of this.

The Canvas *discussion boards* function much like piazza. You are welcome to use this to post questions and answer questions from your classmates. Our TAs will look at Canvas regularly. I will not answer questions about how to do homework problems over e-mail – that's what discussion and office hours are for!

You can also find many good online resources (including practice exams) from other similar multi-variable calculus classes. For instance, MITOpenCourseware

Multivariable Calculus (Fall 2007)

Multivariable Calculus (Fall 2010)

Calculus of Several Variables (Fall 2010)

Multivariable Calculus with Theory (Spring 2011)

Video lectures from a course similar to MATH 2220:

Multivariable Calculus Videos