

Course Syllabus

Instructor: Jonathan Rogness

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Course Page: On Canvas, <https://canvas.umn.edu>

Schedule MW 12:20pm-2:15pm

Location Vincent Hall 6

The fastest, most reliable way to reach me is via email. Occasionally I get a deluge of email, but anything with "Math 5335" in the subject line will get tagged as a high priority message.

General Information

Course Description:

The first part of the semester will use vector techniques for advanced study of Euclidean geometry in the plane, concentrating on figures such as polygons and circles. We will also study special functions called isometries, and classify all possible isometries on the plane.

Later in the semester, we'll show that our vector techniques are consistent with the "regular" geometry one might find in a high school. Then we'll learn the basics of hyperbolic and elliptic geometry and how they compare to Euclidean geometry.

During class you should expect a mixture of lecture and problems for you to work on with your fellow students.

Prerequisites:

[2243 or 2373 or 2573], & [2263 or 2374 or 2574]. Roughly this means a sophomore-level sequence in linear algebra and multivariable calculus. Between the two, linear algebra will be more important; we'll work with vectors throughout the course, and use linear transformations to classify isometries of the plane. I'll only make use of multivariable calculus a few times throughout the semester. However, comfort with two-dimensional coordinates and parametric curves will be important.

The ability to read, write, and understand proofs is important for success in this course. If you haven't previously taken such a course, pay careful attention to comments on your homework, and make use of office hours to ask me questions.



Textbook and Materials:

College Geometry using Vectors and Calculus (2019 version) by Baxter & Fristedt. Normally you would purchase a copy from Alpha Print for \$35-40, but this year it will be provided for free on Canvas. (Unfortunately I don't have permission to let you download the PDF, but you can bookmark the link and use it anywhere. You don't have to follow the link from Canvas.)

There's some chance we'll supplement using a second textbook later this semester. If so, I'm aiming for that book to be free as well, but will make sure it stays below \$50.

Course Components and Grades

Homework:

You will generally have a homework assignment every Wednesday, depending on our pace, selection of material, scheduled exams, etc. Some weeks you will have in-depth assignments with multiple written problems and proofs. (Those assignments will be turned in via **Gradescope**  (<https://gradescope.com>).) During other weeks you will have "lab assignments" using **GeoGebra**  (<http://www.geogebra.org/>). These lab assignments are generally shorter than the written assignments.

Assignments will be announced in class and placed online. Homework will not be accepted after an announced due date unless you've made previous arrangements with me. Collaboration is highly encouraged -- *please* work with other students! However, your solutions need to be written in your own words, and your homework should include a note saying whom you worked with. Occasionally I might give a special problem in class which is not required, but might have some other benefit.

Because life happens, I'll give everybody one free late assignment throughout the semester; you can turn one written homework assignment or lab in up to a week late with no penalty to your score. If you need to turn something in more than one week late, check with me so we can talk about your situation. (In general, more than a week late is a problem, because it delays me from giving feedback to the other students in the class by publishing their scores and graded homework.)

Exams:

We'll have two exams this semester, tentatively scheduled for Wednesday 10/25 and Wednesday 12/6. (These dates will be confirmed or adjusted at least one week in advance.) You will have a group project at the end of the semester instead of a final exam.

Project:

Geometry is a rich subject, with far more material than we could hope to cover in one semester! Towards the end of the semester, instead of a final exam, you'll have a chance to work with other students to learn more about a topic you find interesting, and which we haven't covered in class. You

can expect to produce a written document and supporting materials (e.g. GeoGebra demonstrations), and you'll present your work to the class. Full details and a project timeline will be provided later this semester.

Participation:

In this class I'll often ask you to work on problems with each other, which means being present and engaged is not only important for your own learning, but for your classmates as well! If you miss an occasional class it's not a problem, but if you start missing a class every week or two, it will affect your participation. You can talk to me if you have any concerns. (Note that "participation" does not mean that your in-class work has to be correct!)

If we have to switch to an online format at any point (see the COVID-19 section below), then participation becomes even more important. It's hard to engage with an instructor and other students in a zoom session, so we all have to put in a little extra effort in that situation.

Grading Scheme:

35% Homework

40% Midterms (20% each)

15% Project

10% Participation

Overall course grades will be at least this generous; I reserve the right to *lower* gradelines if a test or homework assignment turns out to be harder than intended:

90%-100% A-, A

80%-89% B-, B, B+

70%-79% C-, C, C+

60%-69% D, D+

Other Information

COVID-19: Now that we're a few years past the beginning of the pandemic, COVID-19 hopefully won't affect our class much. You can read the current updates to the University of Minnesota COVID-19 policies by **following this link** (<https://provost.umn.edu/covid-19-response>). In short:

- It's no longer required, but we're all highly encouraged to be vaccinated and get boosters when eligible.
- Masks are no longer required, but you're welcome to wear one if you'd prefer. I will probably forego a mask when lecturing at the front of the room, but may put one on if I'm walking around

the room, interacting with all of you, or in office hours. (Particularly if I have a cold and don't want to share germs with the class.)

- Please stay at home if you experience symptoms of COVID-19 and consult with your healthcare provider about an appropriate course of action. I will work with you to find the best course of action for missed work and/or class experiences.
- In case I come down with COVID-19: I'll let you know if I have to cancel class, or if somebody will substitute for me, or if I have to move a class online. With that in mind: the schedule, assignments, and structure of the class will be similar to how I taught Math 5335 online in the Fall 2020 semester, so that if we have to adjust our course modality, we'll be able to do so quickly and (hopefully!) effectively.

Other Policies:

We will follow all University and CSE policies regarding academic honesty and other matters. The most common situation involves asking for a grade of incomplete. Incompletes are given only in extremely unusual circumstances, and only if you arrange it with me in advance. Incompletes are given only if you have completed most of the course material at a satisfactory level -- at least one midterms at a C level and a majority of the homework -- but some terrible, unexpected event prevents you from finishing the course. In particular, *we cannot give you an incomplete if you simply fall behind in your work.*

(Last updated: 9/2/23)