

Math 200 - Linear Algebra

Fall 2022

Emily Proctor

Course Meetings: MWF 11:15-12:05 (Section C) and 1:45-2:35 (Section D) in 105 Warner Hall

Office Hours: M 12:30-1:30pm, Tu 11:30am-1:00pm, Th 2:00-3:30pm, and by appointment

Contact information: 212 Warner Hall, eproctor@middlebury.edu, x5954

Course Description

Linear algebra is an accessible yet powerful branch of mathematics that supports the work of many other disciplines, including pure and applied mathematics, computer science, economics, political science, and more. One of our main objectives in this class will be to use linear algebra as a vehicle for moving from the concrete to the abstract. We will proceed in a step by step way from the very hands-on problem of finding the solutions of a system of two equations in two unknowns to a full development of the theory of vector spaces and linear transformations. As we work our way through the course, our other main goal will be to work on developing proof-writing skills and style.

Course Website

The website for this course can be found at:

<https://f22.middlebury.edu/MATH0200C>

Here you will find course information and homework assignments.

Text

We will cover most of Chapters 1 through 6 in *Linear Algebra and Its Applications, 5th ed.* by Lay, Lay, and McDonald.

Course Objectives

The goals of this course are to help you develop:

- an understanding of the concepts, notation, and theorems of linear algebra,
- the ability to apply your understanding to solve straightforward and complex problems,
- introductory proof-reading and proof-writing skills,
- an appreciation for the development of a full, cohesive mathematical theory, and
- persistence in the face of academic challenges.

Course Structure and Homework

Our class meeting times will have a traditional lecture-style format. Homework assignments will be posted on the course website after each class and are due at the beginning of the following class period.

Doing your homework diligently is the best way to succeed in this course. Math is most easily absorbed in small, consistent chunks. By looking at the material for a little while each day and keeping up with the problem sets, over time you will build intuition for the subject. If you keep a steady rhythm with the homework, you will learn the material well.

Please **write neatly** and **staple your work**. The best way to prepare for exams is to take your homework seriously.

I am here to help. If you have problems with an assignment or with some of the material that we cover in class, please come see me during my office hours. I will be happy to see you there. We will also have peer tutors to help you learn the material.

Homework problems are graded on a 0-1-2 scale. A 2 is given for a mostly or totally correct answer accompanied by a complete explanation, a 1 is given if the exercise is attempted but isn't quite right or lacks a complete explanation, and a 0 is given for little or no work shown (even if the answer is correct).

Please note that **no late homework will be accepted**. Late homework will receive an overall score of zero. You may however, hand in homework early if a conflict arises. In order to create space for unexpected events that might arise during the semester, when computing your final grade for the course, I will drop your three lowest homework scores.

Exams

There will be two midterm exams and one final exam. The midterm exams are scheduled for

Tuesday, October 11 at 7pm

Tuesday, November 8 at 7pm.

If you have a conflict with either midterm exam date, please see me **two weeks** before the scheduled exam date to arrange to take the exam early.

The final exam will be scheduled by the registrar later in the semester. I will let you know the date as soon as it is set. Note that vacation plans are not a legitimate reason for arranging an early final exam so please wait until the final exam schedule is announced by the registrar to make travel plans.

Attendance

I expect you to attend all classes. Your attentive presence in class obviously benefits you, but it also makes a significant contribution to class as a whole. While attendance is not formally part of the grade, poor attendance will have a negative effect on your final grade.

Honor Code

Working together with classmates has many benefits, including the sharing of ideas, increased growth, and the development of friendship. With this in mind, I encourage you to work together in pairs or groups while you are figuring out the problems in your homework assignments.

While working together can be beneficial, your final write-up of each problem must be your own. The best way to achieve this is to **talk** with classmates about how to decipher a problem, but **write** your answer on your own.

The reason for this requirement is that it will allow you to know what you know, and to receive feedback on your assignments that is appropriate to your particular situation. Working in this way also speaks to the important and much broader question of honesty in general. The goal is not to be perfect; the goal is to learn.

I expect you to complete exams completely on your own. All exams will be closed-book and there will be no calculators allowed.

Students with Disabilities

Students who have Letters of Accommodation in this class are encouraged to contact me as early in the semester as possible to ensure that such accommodations are implemented in a timely fashion. For those without Letters of Accommodation, assistance is available to eligible students through the Disability Resource Center (DRC). Please contact ADA Coordinators Jodi Litchfield and Peter Ploegman of the DRC at ada@middlebury.edu for more information. All discussions will remain confidential.

Grading

I will determine final grades according to the following percentages:

Exam 1	30%
Exam 2	30%
Final Exam	30%
Homework and Class Participation	10%

Tentative Schedule of Topics

Week Beginning	Topics
Sept 12	Solving systems of linear equations, row reduction, vector equations
Sept 19	Matrix equation $A\mathbf{x} = \mathbf{b}$, solution sets of linear systems, linear independence
Sept 20	Linear transformations and matrices, matrix operations
Oct 3	Inverting matrices, characterizations of invertible matrices
Oct 10	Introduction to and properties of determinants (Exam 1) (Fall break)
Oct 17	Determinants and volume, vector spaces and subspaces
Oct 24	Null and column spaces, linear independence, bases, coordinate systems
Oct 31	Coordinate systems cont., dimension of a vector space, rank
Nov 7	Change of basis, eigenvalues, eigenvectors (Exam 2)
Nov 14	The characteristic equation, diagonalization, eigenvectors and linear transformations
Nov 21	(Thanksgiving break)
Nov 28	E-vectors and LTs cont., inner products, length, orthogonality, orthogonal sets
Dec 5	Orthogonal projections, The Gram-Schmidt process, least-squares
Dec 12	Wrap-up