MATH 2331 Section 6, Fall 2025 Syllabus

Course Title: Linear Algebra

Time/Location: MWR, 8:00 – 9:05am, Forsyth Building 129

Office Hours: M: 12 – 1pm; W: 12 – 1pm; R: 9:30 – 10:30am

Instructor: Vance Blankers, `v.blankers@northeastern.edu`

Textbook: *Linear Algebra with Applications*, 5th Edition, by Otto Bretscher

Content: Uses the Gauss-Jordan elimination algorithm to analyze and find bases for subspaces such as the image and kernel of a linear transformation. Covers the geometry of linear transformations: orthogonality, the Gram-Schmidt process, rotation matrices, and least squares fit. Examines diagonalization and similarity, and the spectral theorem and the singular value decomposition. Is primarily for math and science majors; applications are drawn from many technical fields.

Grading: The following items will contribute to your final grade.

- Final exam (40%) – There is a 2-hour cumulative final exam during the final exam week.
- Homework (15%) – Assignments will be given most weeks, posted on Canvas one week before the due date.
- Tests (45%) – There will be three in-class, one-hour tests (see schedule), each worth 15%.

Letter exams will follow the standard 10-point windows.

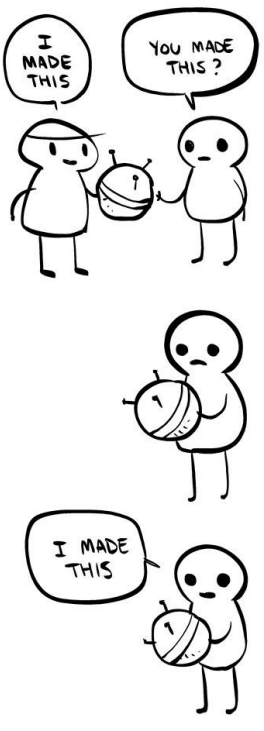
Exercises and Homework: Suggested textbook exercises will be posted each week in Canvas; these will not be collected – **you should do them anyway!** Seven graded Homeworks will also be assigned throughout the semester. You are expected to show all work and justify all answers on Homeworks. You are allowed to discuss and work together on Homework problems, but the write-ups and submissions must be done separately. Your lowest Homework score will be dropped; if you have a missed assignment, it will count as the drop.

Exams: There will be three in-class midterm exams. The tentative dates for these are January 30, February 27, and April 3. I will confirm these dates at least a week ahead of time.

Exam Setting: Graphing calculators, phones, and other similar technology will not be allowed for exams. However, you will be permitted to bring a sheet of paper (standard printer paper: 8.5" × 11"); on one side (and only one side) of this piece of paper, you may handwrite (and only handwrite) anything you'd like. You can create a fresh sheet for each exam.

Academic Integrity: Don't cheat. You can access the NU academic integrity policy for details. While many things in life operate on the "better to ask forgiveness than permission" principle, this is not one of them. When in doubt, ask me ahead of time.

In particular, while you are encouraged to work together, you should not copy the work of anyone else (where "anyone else" includes classmates, ChatGPT, the internet in general, and so forth).



DRC: Have a Disability Resources Center (DRC) situation? No problem; just let me know as soon as possible.

Late Homework: In general, no late work will be accepted. You'll be asked to turn in homework at the beginning of class on whichever day it is due, though you can always turn it in early. Exceptions for extreme circumstances and emergencies will be considered but not guaranteed.

Exam Conflicts: If you are going to miss an exam for a university-sponsored event, provide the appropriate documentation at least a week ahead of time. Encourage your grandparents to stay healthy, as exam-season seems to be an extremely dangerous time for that population.

Other Expectations: Treat your classmates and me with respect: silence phones when you get to class, don't cause distractions during lecture, don't eat delicious-smelling food without sharing, etc. Homework must be presented legibly and separate sheets must be stapled, with no fringes; **points will be docked for failing to meet these requirements.** If your handwriting is atrocious, either practice or type up your solutions. Finally, I expect you to give an honest effort and have a good attitude. The number one cause of poor performance in a math class is an "I can't do it" mentality.

Leftovers: Extra stuff that didn't fit any of the categories above:

- Use of generative AI/large language models (e.g., ChatGPT, Claude) or similar technology is expressly prohibited in this course. Submitting answers generated by such models as if it is your own work constitutes plagiarism and will receive an automatic zero on the assignment. In particular, use of generative AI as a "study aid", to search or summarize course information, or to check answers is strongly discouraged, as responses are not typically accurate enough to learn effectively from and will actively hamper your ability to retain the information yourself. (Generative AI responses often make numerical errors, skip details that are complicated or difficult, assert conclusions that have not been justified, and may be partly or completely nonsensical.) Instead of using generative AI, you should direct your questions to your peers or the instructor, in person or via email.
- As the instructor, I reserve the right to alter this syllabus at any time. I'll announce any such changes in as timely a manner as possible.
- Every student is expected to complete the online TRACE survey at the end of the semester.
- If you have any issues at all, please do not hesitate to contact me. Pretty much every (non-homework) problem can be resolved via communication. If you do not feel comfortable talking to me directly, you can always contact the Course Coordinator, Dr. Valerie Hower.
- This is a fast-paced course. *Do not get behind.* This class will require a significant chunk of out-of-class time; make sure you respect the amount of work needed.
- Technology is a double-edged sword in learning mathematics. You should strive to use technology to enhance your understanding without using it as a crutch.
- Related to the above, patience is your biggest ally. You will get stumped from time to time. Resist the urge to immediately ask for help or to right away Google or ask ChatGPT the answer. Instead, try different things; see what you can do with the tools and techniques you have. Draw a picture. Attemnpt to do the stupidest, most straight-forward thing possible, and work from there. The process of exploring questions and actively struggling with them will be the most helpful aspect of the class. Don't be Flanders Sr.:

Tentative Weekly Schedule

Week	**Dates**	**Sections and Topics**	**Important Events**
1	Sep 3–5	§1.1 Introduction to Linear Systems §1.2 Matrices, Vectors, and Gauss-Jordan Elimination	
2	Sep 8–12	§1.3 On the Solution of Linear Systems §2.1 Intro to Linear Transformations and Their Inverses §2.2 Linear Transformation in Geometry	Homework 1 due Sep 11
3	Sep 15–19	§2.3 Matrix Products §2.4 The Inverse of a Linear Transformation §3.1 Image and Kernel of a Linear Transformation	Homework 2 due Sep 18
4	Sep 22–26	§Subspaces of $\mathbb{R}^n$; Bases and Linear Independence Review	Exam 1 on Sep 25
5	Sep 29–Oct 3	§3.3 The Dimension of a Subspace of $\mathbb{R}^n$ §3.4 Coordinates	
6	Oct 6–10	§5.1 Orthogonal Projections and Orthonormal Bases §5.2 Gram-Schmidt Process and QR Factorization	Homework 3 due Oct 9
7	Oct 13–17	§5.3 Orthogonal Transformations and Orthogonal Matrices §5.4 Least Squares and Data Fitting	Homework 4 due Oct 16
8	Oct 20–24	Buffer Review	Exam 2 on Oct 23
9	Oct 27–31	§6.1 Introduction to Determinants §6.2 Properties of Determinants	
10	Nov 3–7	§7.1 Diagonalization §7.2 Finding the Eigenvalues of a Matrix	Homework 5 due Nov 6
11	Nov 10–14	§7.3 Finding the Eigenvectors of a Matrix §8.1 Symmetric Matrices	Homework 6 due Nov 13
12	Nov 17–21	§8.2 Quadratic Forms Review	Exam 3 on Nov 20
13	Nov 24–25	§8.3 Singular Value Decomposition Buffer	
14	Dec 1–5	Buffer Review	Homework 7 due Dec 4