MATH 2331 Section 6, Fall 2026 Syllabus

Course Title: Linear Algebra

Time/Location: MWR, 8:00 – 9:05am, Kariotis Hall 110

Office Hours: M: 12 – 1pm; W: 12 – 1pm; R: 11am – 12pm, Richards Hall 115A

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.
- Quizzes (20%) – In-class quizzes will given weekly, except on weeks which have an exam.
- Midterm exams (40%) – There will be three in-class, one-hour exams (see schedule).

Letter grades will follow the standard 10-point windows: 100–90% for an A, 89–80% for a B, etc. The top three % of each range are given a +.

Exercises and Homework: Suggested textbook exercises are included in the schedule below; these will not be collected – **you should do them anyway!** Exam and quiz questions will be based on these exercises.

Quizzes: Your lowest two quiz grades will be dropped when computing your final score; there will be no late or make-up quizzes. Quizzes will take place during the first 30 minutes of class on Thursdays, in weeks that do not have an exam (or as otherwise noted).

Exams: There will be three in-class midterm exams. The tentative dates for these are October 1, October 29, and November 23. I will confirm these dates at least a week ahead of time. Only two finals at the same time or three in one day constitute a university recognized legitimate reason to be excused from taking the final at the scheduled time. Students with such a conflict should complete a final exam conflict form, available on the registrar's website.

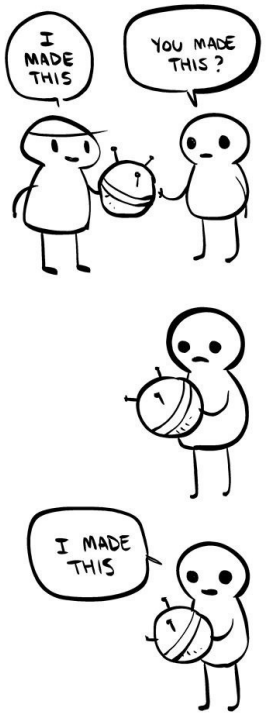
Exam Setting: Graphing calculators, phones, and other similar technology will not be allowed for exams or quizzes.

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.

DAS: Have a Disability Access Services (DAS) situation? No problem; just let me know.

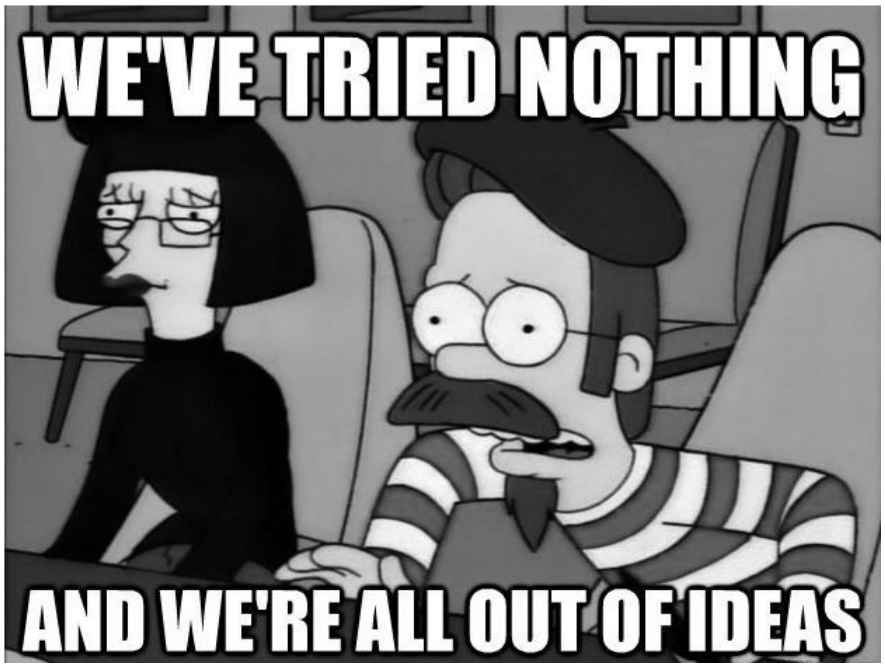
Exam Conflicts: If you are going to miss an exam for a university-sponsored event, provide the appropriate documentation at least a week ahead of time. Encourage your grandparents to stay healthy, as exam-season seems to be an extremely dangerous time for that population.

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. I expect you to give an honest effort and have a good attitude. The number one cause of poor performance in any math class is an "I can't do it" mentality.



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

- Canvas will be our hub for information about the course, where your grades will be posted, etc.
- 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.
- The last day to drop a class without a W grade is September 22. The last day to drop a class with a W grade is December 13.
- 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 problem can be resolved via communication. If you do not feel comfortable talking to me directly, you can always contact the Course Coordinator, Dr. Oana Veliche. If the issue remains unresolved, you can contact the Mathematics Teaching Director, Dr. Alexander Martsinkovsky.
- 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.
- Use of generative AI/large language models (e.g., ChatGPT, Claude) or similar technology is expressly prohibited in this course. 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. Instead of using generative AI, you should direct your questions to your peers or the instructor, in person or via email.
- 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. Attempt 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 1: September 9–11 (no quiz)
§1.1 Introduction to Linear Systems. #1, 7, 10, 21, 24, 25, 36, 37, 42
§1.2 Matrices, Vectors, and Gauss-Jordan Elimination. #2, 4, 5, 7, 18, 21–24, 31–33, 36, 37
Week 2: September 14–18 (Quiz 1)
§1.3 On the Solution of Linear Systems. #1–8, 11–15, 21–31, 34, 36, 47, 55
§2.1 Intro to Linear Transformations and Their Inverses. #1–7, 9, 47
§2.2 Linear Transformation in Geometry. #1, 2, 4, 6, 7, 10, 11, 17, 19, 21, 26(a)(b)(c), 53
Week 3: September 21–25 (Quiz 2)
§2.3 Matrix Products. #3, 5, 11, 13, 17–22, 25, 29, 47
§2.4 The Inverse of a Linear Transformation. #1–6, 13, 29, 34, 37, 69–75
§3.1 Image and Kernel of a Linear Transformation. #1, 3, 5, 7, 12, 15, 16, 23, 25, 33, 35, 39, 42
Week 4: September 28–October 2 (no quiz)
§3.2 Subspaces of $\mathbb{R}^n$; Bases and Linear Independence. #1, 3, 4, 11, 13, 15, 19, 29, 33, 49, 52
Review & **Exam 1 (October 1)**
Week 5: October 5–9 (Quiz 3)
§3.3 The dimension of a subspace of $\mathbb{R}^n$. #1, 3, 5, 7, 11, 13, 17, 21, 23, 27, 37, 39
§3.4 Coordinates. #1, 2, 6, 7,19, 20, 28, 37–40, 47
Week 6: October 12–16 (Quiz 4)
§5.1 Orthogonal Projections and Orthonormal Bases. #3, 5, 15, 17, 26, 27, 35, 37, 39
§5.2 Gram-Schmidt Process and QR Factorization. #5, 7, 13, 16, 19, 21, 27, 33, 35
Indiginous Peoples Day, no class October 12
Week 7: October 19–23 (Quiz 5)
§5.3 Orthogonal Transformations and Orthogonal Matrices. #5–8, 13–17, 27, 29, 31, 37, 4, 47, 69
§5.4 Least Squares and Data Fitting. #1, 5, 7, 17, 19, 21, 23, 25, 30, 31, 32, 33
Week 8: October 26–30 (no quiz)
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Review & **Exam 2 (October 29)**
Week 9: November 2–6 (Quiz 6)
§6.1 Introduction to Determinants. #5, 11, 13, 17, 27, 29, 30, 31, 43, 44
§6.2 Properties of Determinants. #5, 6, 11, 13, 15, 37, 38, 39, 42
Week 10: November 9–13 (Quiz 7)
§7.1 Diagonalization & Eigenvalues. #1–9, 15, 17, 19, 34, 43, 44
§7.2 Finding the Eigenvalues of a Matrix. #1, 3, 5, 9,16, 17, 29, 33
Veteran's Day, no class November 11
Week 11: November 16–20 (Quiz 8)
§7.3 Finding the Eigenvectors of a Matrix. #1, 3, 5, 9, 13, 16, 18, 35, 36
§8.1 Symmetric Matrices. #1, 3, 7, 9, 11, 22
Week 12: November 23–27 (Quiz 9)
Exam 3 (November 23)
Thanksgiving Break, no class November 25 & 26
Week 13: November 30–December 4 (Quiz 10)
§8.2 Quadratic Forms. #1–11, 27, 28, 37
§8.3 Singular Value Decomposition. #1, 2, 4, 6, 12, 13, 14
Week 14: December 7–11 (no quiz)
Buffer
Review for the final exam
December 14–20, Final Exams