

MATH 4377/6308-03 (17674) – Advanced Linear Algebra I – Spring 2020
UPDATED Syllabus (as of March 23, 2020)

Instructor: Dr. Gordon Heier

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Lectures: Lectures will be posted on Blackboard in an "asynchronous" way (starting the week March 30 - April 3). Students will be notified by email once a new lecture has been posted. Lectures may be posted as PDF files or in a video file format.

Exams: Midterm Exam: Thursday-Friday, March 26-27, as a 4 hour take-home exam
Final Exam: to be determined

Text: Linear Algebra, 4th edition, by Friedberg, Insel, and Spence, ISBN 0-13-008451-4

Lecture notes will be posted on my web site (see above). They are provided "as is" and as a courtesy only. They do not replace use of the textbook or following the course. I will continue to maintain the lecture notes after the switch to online instruction.

Homework will be assigned every Thursday (starting April 2) on BLACKBOARD and will be due the following Thursday at 1pm on Blackboard. Late homework will not be accepted.

Quizzes: Every Tuesday (starting April 7) a pop-quiz will be conducted through Blackboard in the time period 10am-5pm. After downloading the pop-quiz, you will have 1 hour to work on it and upload your solution to Blackboard.

File formats for submissions: The ONLY acceptable file format for any submissions by students is PDF. Students should ensure that they have access to a scanner or scanner app on a mobile device at all times. In particular, files in JPG format are NOT acceptable.

Attendance: Participation in all aspects of this course is mandatory for all students. Substantial documentation is necessary to receive any kind of excuse or make-up privilege.

Grades: The pop-quizzes and the midterm exam will each account for 25 percent of your grade. The homework will account for 20 percent, and the final exam will account for 30 percent. Your two lowest homework scores and your two lowest pop-quiz scores will be dropped.

4377 vs. 6308: All students will be treated the same, regardless of their seniority. When very challenging problems are to be solved by students, then it will usually be for extra credit only. For simplicity, I will refer to this course usually as "Math 4377" only.

Academic Dishonesty will not be tolerated and dealt with appropriately.

Disability: If you think or know that you have a disability that needs special accommodation, please see me at the beginning of the semester so that the proper steps can be taken.

UH CAPS Statement:

Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS (www.uh.edu/caps) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. No appointment is necessary for the “Let's Talk” program, a drop-in consultation service at convenient locations and hours around campus.

http://www.uh.edu/caps/outreach/lets_talk.html

Course Content: The following is a tentative list of the sections from the textbook that I intend to cover.

- 1.1 Introduction (with excerpts from Appendices A (Sets), B (Functions), C (Fields), D (Complex Numbers))
- 1.2 Vector Spaces
- 1.3 Subspaces
- 1.4 Linear Combinations and Systems of Linear Equations
- 1.5 Linear Dependence and Linear Independence
- 1.6 Bases and Dimension
- 1.7* Maximal Linearly Independent Subsets

- 2.1 Linear Transformations, Null Spaces, and Ranges
- 2.2 The Matrix Representation of a Linear Transformation
- 2.3 Composition of Linear Transformations and Matrix Multiplication
- 2.4 Invertibility and Isomorphisms
- 2.5 The Change of Coordinate Matrix
- 2.6 Dual Spaces
- 2.7* Homogeneous Linear Differential Equations with Constant Coefficients

- 3.1 Elementary Matrix Operations and Elementary Matrices
- 3.2 The Rank of a Matrix and Matrix Inverses
- 3.3 Systems of Linear Equations—Theoretical Aspects
- 3.4 Systems of Linear Equations—Computational Aspects

- 4.1 Determinants of Order 2
- 4.2 Determinants of Order n
- 4.3 Properties of Determinants
- 4.4 Summary—Important Facts about Determinants
- 4.5* A Characterization of the Determinant

- 5.1 Eigenvalues and Eigenvectors (and Appendix E (Polynomials))
- 5.2 Diagonalizability

Sections marked with a * will be included if time permits.