Instructor: Benjamin Pollak
Email: pollakb@math.upenn.edu
Lectures: MTWR 10AM - 12:10PM in DRL 4C6
Office Hours: MW 12:10PM - 1:10PM in DRL 3C11
Course Website: https://www.math.upenn.edu/~pollakb/
Grader: Matthew Wiener, mpwiener@sas.upenn.edu

Course Description: We will cover the following topics (and more, time permitting):

- Solving Systems of Linear Equations
- Vector Spaces and Subspaces
- Basis and Dimension
- The Rank-Nullity Theorem
- Least Squares Approximation
- Orthonormal Bases and Gram-Schmidt
- Determinants
- Eigenvalues and Eigenvectors
- Diagonalization
- The Singular Value Decomposition
- Linear Transformations
- Applications

Prerequisites: The official prerequisite is Math 240. I will attempt to keep the class self-contained, but familiarity with differentiation, integration, scalars, vectors, matrices, lines, and planes will be helpful.

Course Grade:

- Homework: 25%
- Quizzes: 25%
- Midterm: 20%
- Final: 30%

Homework: There will be 10 homework assignments, all largely adapted from the textbook. Working through problems and examples is the most effective way to learn and understand the material, and as such is a key component of the course. Homework will be accepted up to 3 class days late at a penalty of 10% for each day late.

Quizzes: There will be one quiz each week on the dates indicated in the calendar below. If for some reason the date of one of the quizzes must change, I will notify you ahead of time. The quizzes will


take place during the first 15 minutes of class, and will be similar to the most recent homeworks. Please give me ample notice if you will be absent for one of the quizzes.

**Exams**: There will be a 1 hour in-class midterm. There will also be a 90 minute final on the last day of class. Please give me ample notice if you will be absent for one of the exams.

**Academic Integrity**: Communicating and discussing your ideas can be an effective way to gain a deeper understanding of the material. Consequently, I encourage you to collaborate with each other on how you might approach or solve a problem. However, when you actually write up solutions to the homework, I do ask that you do so individually. Copying solutions is a violation of academic integrity and also a detriment to your own learning.

**Resources**: Due to the compressed nature of the Summer, the course will be fast-paced. Please do not hesitate to ask questions; if you are confused it is most likely because I did a poor job explaining something, and asking a question will help to clarify the material for both yourself and your classmates. The following resources may also be helpful:

- Gilbert Strang, the author of our textbook, has published two courses he taught from the book on the MIT OCW website (18.06 and 18.06SC). The website includes video lectures, problem sets and exams with solutions, and other study materials.
- Math help: Monday - Thursday from 9AM - 1PM in DRL 4C8.
- Wikibooks provides a comprehensive introduction to concepts in linear algebra. At certain points it may go into more depth than we will in this class, but there are many worked examples that may be helpful. The link is: [https://en.wikibooks.org/wiki/Linear_Algebra](https://en.wikibooks.org/wiki/Linear_Algebra)

**Disabilities**: Any student requiring special accommodations should contact the Office of Student Disabilities Services ([https://www.vpul.upenn.edu/lrc/sds/](https://www.vpul.upenn.edu/lrc/sds/)). Please also notify me of any special accommodations that are approved.
(Tentative) Schedule:

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<th>Monday</th>
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<td>Midterm</td>
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<td>5.2 - 5.3</td>
<td>6.1 - 6.2</td>
<td>Quiz 3</td>
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<td>7.4 - 8.1</td>
<td>Quiz 4</td>
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<td>Applications (9.3, 10)</td>
<td>7/31 Quiz 5 Applications (9.3, 10)</td>
<td>8/1 Review</td>
<td>8/2 Final Exam</td>
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