Math 3A: Linear Algebra

Fall 2017 Course Information and Syllabus

Instructor: Nathan Kaplan, Rowland Hall 540c, nckaplan@math.uci.edu.
Lectures: M,W,F 10:00 - 10:50 AM in MSTB 124.
Nathan's Office Hours: M 11:00 AM - 12:00 PM, Rowland Hall 540c.
TA: Luke Fredericks, lrfreder@uci.edu.
TA Office Hours: Tu 11:00 AM- 12:00 PM and 1:00 - 2:00 PM, Rowland Hall 250A.
Th 12:00 - 1:00 PM and 2:00 - 3:00 PM, Rowland Hall 250A.
Discussion Sections: Tu, Th 10:00-10:50 AM in RH 114.

Course Goals

Linear algebra is a core area of mathematics that is applied in many other fields. The subject has applications in statistics, economics, engineering, and computer graphics (just to name a few).

In linear algebra we study linear transformations, an important class of functions with many applications. We will see how to understand solutions to sets of linear systems of equations and will see connections to geometry.

By the end of the course you should have a detailed understanding of how to use linear transformations, vectors, and matrices to solve many types of problems. In additional to learning new material, we would also like you do get a lot of practice solving different types of mathematical problems and to develop your abstract reasoning skills. We would also like you to develop a foundation that will be useful in further subjects where linear algebra arises, in pure and applied mathematics, and also in the sciences, engineering, and social sciences.

Grading

- Homework: 10%
- Quizzes in Discussion Section (there will be approximately six): 15%
- Two Midterm Exams (in class- October 23rd and November 20th): 30%
- Final Exam (December 11th, 10:30 AM - 12:30 PM): 45%

Weekly homework will be an important part of this course. The best way to learn any mathematical subject is by doing lots of problems. Learning linear algebra is somewhat like learning a new language. There will be many of new definitions. The best way to learn to use them fluently is to get lots of practice.

I have always found that I think better about mathematics when I can discuss it with others and that I only really understand a problem when I can explain its solution to somebody else. *You are encouraged to work together on problem sets, but write up your solutions individually.* If you use outside sources (other textbooks, websites, etc.) for your homework, you must acknowledge them. Homework will be due at the beginning of the Tuesday discussion sections.

We will have approximately six quizzes in discussion section. The quizzes will last approximately 20 minutes each. These quizzes are not designed to test new material in a clever way, but rather are meant to reinforce the basic definitions and results of the course. If you are keeping up with the homework and the reading in the textbook then the quizzes should not be a problem.

Your lowest quiz grade and lowest homework grade will be dropped.

Textbook

Linear Algebra and its Applications 5th ed., D. Lay, S. Lay, and J. McDonald.
ISBN: 978-0321982384

Math 3A is a fast-moving course and reading the textbook will be an important part of mastering the material. We will cover about one section of the text per class meeting, but there will not be time to cover all of the topics and examples in detail in lecture. You are expected to carefully read the text outside of class to fill in the details. You should read the relevant section *before* it is covered in lecture.

Note: The 4th edition of the book is very similar to the 5th. If you plan to use an earlier edition of the book, you should check with someone else in the course that the topics covered are the same and that the homework problems in your edition match those in the current version.

Course Outline

1. Gaussian Elimination and Solutions of Linear Systems.
2. Linear Independence and Linear Transformations.
3. Matrix Algebra, Invertible Matrices.
4. Subspaces of $\mathbb{R}^n$, Bases, Dimension.
5. Determinants.
6. Eigenvalues and Eigenvectors, Diagonalization.

We plan to cover the following sections of the textbook:
Sections 1.1-1.5 and 1.7-1.9.
Sections 2.1-2.3, 2.8, 2.9.
All of Chapter 3 (only part of Section 3.3).
Sections 5.1-5.3, 5.6 (only part of Sections 5.6).