

# Mathematics 54: Linear Algebra and Differential Equations

## Summer 2008, UC Berkeley

**Instructor:** Scott Armstrong, sarm@math.berkeley.edu, 1041 Evans Hall.

**Office Hours:** Mondays and Tuesdays, 10:30-11:30, and Thursdays 12:00-13:00.

**Course Webpage:** <http://math.berkeley.edu/~sarm/math54>

Frequently check the course webpage for homework assignments, quiz solutions, course announcements, updates to the course schedule, etc.

**Class Meetings:** Monday through Friday, 08:00-10:00 in 6 Evans Hall.

**Texts:** There are two required texts:

- David C. Lay, *Linear algebra and its applications*, Custom edition for University of California, Berkeley
- R. Kent Nagle, et. al., *Fundamentals of differential equations and boundary value problems*, Custom edition for the University of California, Berkeley

**Grading Scale:**

Homework:	10%
Quizzes:	15%
Midterm #1:	20%
Midterm #2:	25%
Final Exam:	30%

**Homework:** There will be roughly two homework assignments each week. Homework submissions will receive a score of 3 (good), 2 (mediocre) or 1 (poor). Each student will have her/his two lowest homework submissions dropped, but no late submissions will be allowed. Given the fast-paced nature of this course, it is important that you keep up with the homework assignments or you will fall very far behind rather quickly.

**Quizzes:** On days in which homework assignments are due, there will be a short quiz based on the topics covered in the homework assignment. There will be no make-up quizzes, and there will be no quizzes given early or late. There will not be any exceptions made, for any reason. However, I will drop each student's two lowest quiz scores before calculating final semester grades.

**Exams:** Each exam will be in class and last 110 minutes. Midterm #1 (July 11) will cover material from lectures 1-11. Midterm #2 (July 30) will cover material from lectures 1-23, but emphasizing material from lectures 11-23. The Final Exam (August 15) will be comprehensive, but will emphasize material from lectures 24-35.

**Comments:** This course will be quite different from other mathematics courses you have taken. In a typical calculus sequence, you are required to perform calculations and apply known theorems to particular problems, but the theory itself is not emphasized. *In this course you will be expected to have a precise mathematical understanding of the theory, including definitions, theorems, and proofs.*

## Lectures and Assignments (Tentative)

Check Course Webpage for Updates

Date	Lecture Topics	Text	Assignments
<b>PART I: LINEAR ALGEBRA</b>		<i>(Lay)</i>	
1	June 23	Linear systems, row echelon form	
2	June 24	Vector and matrix equations	
3	June 25	Linear independence	
4	June 26	Linear transformations	
5	June 27	More on linear transformations	HW #1, Quiz #1
6	June 30	Matrix algebra	
7	July 1	Invertible matrices	
8	July 2	Subspaces	HW #2, Quiz #2
9	July 3	Rank, Determinants	
	July 4	HOLIDAY	
10	July 7	More on determinants	
11	July 8	Vector spaces	HW #3, Quiz #3
12	July 9	The characteristic subspaces of linear transformations	
13	July 10	Linear independence again	HW #4, Quiz #4
	July 11	MIDTERM #1	
14	July 14	Coordinates and dimension	
15	July 15	Rank, change of basis	
16	July 16	Eigenvalues and eigenvectors	HW #5, Quiz #5
17	July 17	Eigenvalues and diagonalization	
18	July 18	Eigenvalues of linear transformations	HW #6, Quiz #6
19	July 21	Inner product spaces	
20	July 22	Projections, Gram-Schmidt procedure	HW #7, Quiz #7
21	July 23	Least squares problems, Inner product space	
22	July 24	Symmetric matrices	
23	July 25	Quadratic forms	HW #8, Quiz #8
<b>PART II: DIFFERENTIAL EQUATIONS</b>		<i>(Nagle)</i>	
24	July 28	Second-order linear ODE	
25	July 29	More on second-order linear ODE	HW #9, Quiz #9
	July 30	MIDTERM # 2	
26	July 31	Higher-order ODE	
27	Aug 1	Linear systems of ODE	HW #10, Quiz #10
28	Aug 4	More on linear systems of ODE	
29	Aug 5	PDE, separation of variables	
30	Aug 6	Fourier series	HW #11, Quiz #11
31	Aug 7	More on Fourier series	
32	Aug 8	The heat equation	
33	Aug 11	The wave equation	
34	Aug 12	Laplace's equation	HW #12, Quiz #12
35	Aug 13	More on PDE	
36	Aug 14	Review	
	Aug 15	FINAL EXAM	