 UC Berkeley seal

Lior Pachter's Website

Departments of [Mathematics](#), [Molecular & Cell Biology](#) and [Electrical Engineering & Computer Science](#)

Website for Math 54: Linear Algebra and Differential Equations.
Mondays, Wednesdays and Fridays 3:00pm-4:00pm, 155 Dwinelle

Description Basic linear algebra; matrix arithmetic and determinants. Vector spaces; inner product as spaces. Eigenvalues and eigenvectors; linear transformations. Homogeneous ordinary differential equations; first-order differential equations with constant coefficients. Fourier series and partial differential equations.

Syllabus

- January 21: what is linear algebra? 1.1: 2,3,5,7,11,13,17,19,23,29.
- January 23: linear systems, row reduction: 1.2: 2,3,5,9,11,15,16,19,29,31.
- January 26: vectors and matrices: 1.3: 1,11,13,29,33; 1.4: 5,23,24,28,29.
- January 28: solution sets: 1.5: 1,3,5,7,9,11,13,15,17,40.
- January 30: linear independence: 1.7:5,7,9,16,18,21,33,34,35,36.
- February 2: matrix operations: 2.1: 5,7,10,11,12,13,15,16,24,25.
- February 4: matrix inversion: 2.2: 3,6,10,11,12,21, 2.3: 1,16,17,19.
- February 6: determinants: 3.1: 1,3,5,7,9,11,13,15,17,19.
- February 9: applications of determinants: 3.2: 1,3,5,7,41, 3.3: 3,18,19,29,31.
- February 11: linear transformations I: 1.8: 8,12,13,17,21,25,29,31,34,35.
- February 13: linear transformations II: 1.9: 1,2,3,4,5,6,7,9,23,25.
- February 16: holiday -- no class.
- February 18: **Review**
- February 20: **Midterm 1**
- February 23: vector spaces: 4.1:3,4,5,7,10,14,21,22,23,26.
- February 25: subspaces: 4.1: 32,33, 4.2: 1,3,5,17,19,23,25,31.
- February 27: subspaces and linear transformations: 2.6: 7,8,9,11,13,21,22, 4.2: 29,34,35.
- March 2: bases: 4.3:9,11,16,19,21,26,28,31,33,37.
- March 4: coordinate systems: 4.4:3,5,7,11,13,15,17,19,20,21.
- March 6: change of basis: 4.7:1,2,3,4,5,7,8,9,11.
- March 9: dimension and rank: 2.7:7,9,11,17,19,4.5:3,11,15,21,22.
- March 11: characteristic equation: 5.1:3,9,17,21,25,26, 5.2:3,5,8,15,21.
- March 13: eigenvectors, eigenvalues: 5.4:1,3,5,6,9,11,13,17,19,23,24.

- March 16: applications of eigenvectors I: 5.3:1,3,5,15,21,22,23,25,29,31.
- March 18: complex eigenvalues: 5.5:1,3,5,7,9,11,13,15,17,19.
- March 20: least squares and PCA: no homework.
- March 23: Spring break -- no class.
- March 25: Spring break -- no class.
- March 27: Spring break -- no class.
- March 30: complex exponentials and second order ODEs: 4.1: 1,3,5, 4.2:19,21,23, 4.3:5,13,28,31.
- April 1: non-homogeneous 2nd order ODEs, superposition: 4.4:9,21,4.5:1,3,9, 4.6:1,3,5,7.
- April 3: higher order linear ODEs: 6.1:1,5,9,13,21, 6.2:7,17,21,24,25.
- April 6: systems of ODEs: 9.1: 1,3,5,9, 9.3:1,5,7,9,21,23
- April 8: systems of ODEs, homogeneous linear ODE systems I: 9.4:1,3,5,7,9,11,13,15,17,19.
- April 10: homogeneous linear ODE systems II: no homework.
- April 13: **Review**
- April 15: **Midterm 2**
- April 17: non-homogeneous linear ODE systems, matrix exponential: 9.7:1,5,7,9, 9.8: 3,9,12,22,25,26.
- April 20: PDEs, separation of variables: 10.2:1,3,4,5,7,9,11,12,13,23.
- April 22: Fourier series I: 10.3:1,4,5,8,9,11,13,15,31,32.
- April 24: Fourier series II: 10.4:1,2,3,4,5,6,7,9,11,13.
- April 27: inner product spaces, orthogonal projections: 6.1,2,7,8
- April 29: heat and wave equations: 10.5,6
- April 30: **Gauss' birthday!**
- May 1: Laplace equation: 10.7
- May 13: **Final exam,** 7--10pm.

Homework and quizzes

There will be a weekly quiz given each Friday (Thursday) in section. There will be no make-up quizzes, but we will drop the two lowest quiz scores in computing your grade. Homework will be assigned in class and will be due in section on Wednesday (Tuesday). If you miss class and therefore don't know the assigned homework, ask your GSI.

Grading

Homework and quizzes will count for a total of 20% of the final grade. Each midterm will count 20% for a total of 40% of the grade. The final exam will count for 40% of the grade. **If you do not take Midterm #1, Midterm # 2 will count for 40 % of your grade. If you take Midterm #1 but not Midterm #2, the Final Exam will count for 60 % of your grade. If you take neither Midterm #1 nor Midterm #2, you will fail the course . Consequently, please mark them in your calendars.** Homework will be

graded pass/fail.

Contact

The class has a Piazza site accessible [here](). I will hold weekly office hours on Wednesdays and Thursdays from 9:10-10:30am.