

Math 33A, Sec. 2 – Linear Algebra and Applications

Spring 2012

- Instructor: Professor Alan J. Laub
Dept. of Mathematics / Electrical Engineering
Math Sciences 7945
phone: 310-825-4245
e-mail: laub@ucla.edu
- Lecture: MWF 2:00 p.m. – 2:50 p.m.; Rolfe 1200
- Office Hours: MW noon – 1:00 p.m., AND by appointment
- Teaching Assistants: Alan P. Mackey, MS 3915C mackeya@math.ucla.edu
Justin Shih, MS 6617F justinshih@math.ucla.edu
Haokun Xu samxu@math.ucla.edu
(office hours to be determined)
- Discussion Sessions: 2A, 2C, 2E T 2:00 – 2:50 p.m.
2B, 2D, 2F R 2:00 – 2:50 p.m.
- Reader: Robert Chen rr780903@ucla.edu
- Prerequisite: Math 3B or 31B or 32A with a grade of C- or better
- Text: Gilbert Strang, *Introduction to Linear Algebra*, Fourth Edition, Wellesley – Cambridge Press, 2009. (Do not buy anything with the name Bretscher on it.)
- Homework: Assigned approximately weekly (generally due Fridays, in class)
Late homework policy: no late homework
- Examinations: Midterm examination: Friday, May 4, 2012 (2:00 – 2:50 p.m.);
Rolfe 1200
Final examination: Tuesday, Jun. 12, 2012 (11:30 a.m. – 2:30 p.m.);
Rolfe 1200
Both examinations will be closed-book (with one page, both sides, of “notes”).
Calculators, cell phones, etc. are *not allowed* at any time during the exam.
Make-up examination policy: no make-up examinations
(in case of a medical emergency, you must contact the instructor *before* the exam
and schedule your oral exam; be prepared to provide a doctor’s note)
- Grade: Homework: 15% Midterm: 35% Final: 50%

Tentative Outline

Date	Topic
Apr. 2	course logistics and motivation
Apr. 4	vectors and linear combinations; dot products
Apr. 6	matrices and linear equations; determinants
Apr. 9	Gaussian elimination and its matrix interpretation
Apr. 11	inverse matrices; matrix algebra
Apr. 13	elimination = factorization; $(P)A=LU$
Apr. 16	subspaces, linear independence, bases, dimension
Apr. 18	the four fundamental subspaces
Apr. 20	bases for the range and nullspace
Apr. 23	fundamental theorem of linear algebra
Apr. 25	row reduced echelon form; rank of a matrix
Apr. 27	orthogonality of the four fundamental subspaces; orthonormality
Apr. 30	pseudoinverse of a matrix
May 2	orthogonal matrices and projections
May 4	midterm examination
May 7	linear least squares; normal equations
May 9	QR factorization; $QA=R$
May 11	computation of QR factorization via Householder reflectors
May 14	the Gram-Schmidt process
May 16	eigenvalues and eigenvectors
May 18	(cont'd)
May 21	similarity, diagonalization
May 23	application to solving continuous-time and discrete-time systems
May 25	(cont'd)
May 30	symmetric matrices
Jun. 1	positive definite matrices; tests for p.d. matrices
Jun. 4	the singular value decomposition and its applications
Jun. 6	(cont'd)
Jun. 8	review
Jun. 12	final examination