Course Syllabus

Jump to Today

Mathematics 54-1, Fall 2018

Lecture schedule and Homework assignments

Please remember to check this page regularly for changes,
especially before starting your homework assignment!
This version: 31 October. BOOO!

Section numbers for lectures 1–24 refer to Lay; thereafter to Nagle, Saff&Snider. The Berkeley edition combines them in a single volume.
The right strategy is to read the sections *before* the lecture, and then consult them again as you go through your homework assignment.
Additional reading relevant to each lecture is linked under "Assignments" below.
Some non-examinable topics (starred) may be dropped if we are pressed for time.

The homework assignments are listed with the relevant lecture. Remember:

- assignments for the **Monday** lectures are due in section on **Thursday**,
- assignments for the **Wednesday** and **Friday** lectures are due on the following **Tuesday**.

Questions marked in **green boldface** will be discussed in section: think about them ahead of time, but there is no need to submit the answers. *Similar questions will appear on the tests*, possibly in T/F or Multiple Choice format.

	Date	Topic	Book Sections	Homework
1	W22 Aug	Linear systems. Matrices. Row-reduction.	1.1, 1.2	**1.1**: Odds 3-15; 20, **23**, **24**; **1.2:** 1, 3, 5, 6
2	F24 Aug	Echelon form. Parametric solution. Vectors	1.2, 1.3	**1.2:** Odds 7, 9,11; **21-24**, 25, 26; **1.3:** 1, 3, 5, 11, 12, **24**; **1.5: 29-32**
3	M27 Aug	Vector and Matrix equations. Parametric vector solution.	1.4, 1.5	**1.4:** 1, 5, 7, 9, 17, **24**, **31**, **34; 1.5:** 9, 14, **23**, **24**, 32;
4	W29 Aug	Span and linear independence. Subspaces.	1.7, 2.8	**1.7:** Odds 1-11, 17, **21**, **22**; **2.8:** 1-4
5	F31 Aug	More on subspaces. Basis and dimension. Finding bases of subspaces of $\mathbf{R}^n$.	2.8, 2.9, 4.2	**2.8:** Odds 5-11; **2.9:** 3, 5, **15**; **4.2:** 1, 3, 5, 17, 23, **25abdf**
6	W5 Sep	Linear transformations	1.8, 1.9	**1.8:** 1, 3, 9, 11, 17; **1.9:** Odds 1-7, 11, 15, **23**, **24**
7	F7 Sep	Matrix algebra. Invertible matrices.	2.1– 2.3	**2.1:** Odds 1-9, **15**, **16**, 17, **23**, **24**, 27; **2.3:** **11**, 21, 24, 30
8	M10 Sep	Abstract vector spaces and subspaces	2.2, 4.1	**2.2:** 1, 3, **9**, 11, 21; **2.3:** Odds 3-7**, 12, 13,15**, 17; **4.1:** 1, 3, 9, 11,17, **23**, **24**, 27; **4.2: 25**, **26**
9	W12 Sep	Bases and coordinates	4.2, 4.3, 4.4	**4.2:** 7, 9, 30, 31; **4.3:** 1, 3, 9, 11, 15, **21**, **22**, 32, 33; **4.4:** 3, 9, **15**, **16**, 17.
10	F14 Feb	Dimension and rank	4.5, 4.6	**4.5:** Odds 1-7, **19**, **20**, 26, 27; **4.6:** 1, 3, 5, 9, **10-15**, 33
11	M17 Sep	Change of basis	4.7	**4.7:** 1, 3, 5, 11, 12, 13; Supplementary **1**, 10, 11
12	W19 Sep	Determinants	3.1, 3.2	**3.1:** 1,5, 9, 13, 21, 41; **3.2:** 1, 3, 5, 7, 11, 19, 21, **27**, **28**, 31
13	F21 Sep	Applications: Cramer's rule and volumes	3.3	**3.3:** 3, 5, 7, 11, 21, 24
	M24 Sep	Review	Everything	Extra practice problems recommended
	W26 Sep	EXAM #1. In class at the usual time.		Covers Lectures 1–13
14	F28 Sep	Eigenvalues, eigenvectors	5.1, 5.2	**5.1:** 1, 3, 9, 11, 17, **21**, **22**; **5.2:** Odds 1-9, 17, **21**, **22**
15	M1 Oct	Diagonalization	5.3, 5.4	**5.3:** 1, 2, 3, 9, 11, **21**, **22**; **5.4:** 1, 3, 9, 17;
16	W3 Oct	Complex eigenvalues and rotations	5.5	**5.5:** Odds 1-15, **23**.

17	F5 Oct	Inner product, length, angles, orthogonality.	6.1, 6.2	**6.1:** 1,5,7,9, 13, 17, **19**, **20**, 22, 24; **6.2:** 3, 9, 17, 21, **23**, **24**;
18	M8 Oct	Projections	6.3	**6.3:** 1, 3, 5, 7, 11, 17, **21**, **22**;
19	W10 Oct	The Gram-Schmidt process and QR factorization	6.4	**6.4:** Odds 1-9, **17**, **18**, 22
20	F12 Oct	Normal equations and Least Squares	6.5, 6.6	**6.5:** 1, 3, 7, 13, **17**, **18**; **6.6:** 1, 3, 5, 7a
21	M15 Oct	Inner product spaces. Weighted least squares.*	6.7, 6.8*	**6.7:** 1, 3, 5, 7, 13, 19, 22; **6.8:** 1,2; Supplementary **1**
22	W17 Oct	Symmetric matrices. Spectral theorem	7.1	**7.1:** 7, 11, 13, 17, 24, **25**, **26**
23	F19 Oct	Variant Spectral theorems.* Quadratic forms	7.2	**7.2:** 3, 5, 9, 19, **21**, 24
	M22 Oct	Review	Ch. 5,6, 7.1	
	W24 Oct	EXAM #2. In class at the usual time.		Lectures 14 through 22
24	F26 Oct	The Singular Value Decomposition	7.4	1, 3, 5, 7, 9
25	M29 Oct	Homogeneous linear ODE's. Auxiliary equation	4.2, 4.3	**4.2:** Odds 5-15, 26; **4.3:** 1, 3, 9, 11, 33abc
26	W31 Oct	2nd order, and inhomogeneous 1st order equations	4.3; Reading material	See the next lecture
27	F2 Nov	Inhomogeneous equations: Undetermined coefficients	4.4, 4.5; Reading material	**4.4:** Odds 1-13; **4.5:** Odds 1-15, 26
28	M5 Nov	Variation of constants. Reduction of order.	4.6, 4.7 from p.195 on	**4.6:** 1, 3, 9, 11, 15; **4.7:** 32, 33, 47
29	W7 Nov	Free and forced oscillations*	4.1, 4.9*, 4.10*	**4.1:** 1, 3, 8, 9; **4.9:** 3, 10
30	F9 Nov	Matrix methods for ODEs	9.1 - 9.4	**9.4:** 1, 3, 9, 11, 17, 21, 24, 27
31	W14 Nov	The eigenvector method for constant-coefficient systems	9.5, 9.6	**9.5:** Odds 13-21, 31, 33;**9.6:** 1, 3, 9, 11
32	F16 Nov	Matrix methods for inhomogeneous systems	9.7	**9.7:** 3, 5, 11, 13, 27
33	M19 Nov	Matrix exponential; Generalized eigenvectors*	9.8	**9.8:** 1, 3, 5, 11, 12
34	M26 Nov	Fourier series of periodic functions	10.3	**10.3:** 9, 11, 17, 19, 26, 27, 34, 35
35	W28 Nov	Fourier series on the interval	10.4	**10.3:** Odds 1-7; **10.4:** Odds 1-15
36	F30 Nov	The Heat equation	10.1, 10.5	**10.5:** Optional: Odds 1-9, 12
	M3 Dec	Optional: Problems and Review		
	M10 Dec	FINAL EXAM, 8–11am, location TBA		Comprehensive (all the material)

Course Summary:

Date	Details	
Wed Aug 22, 2018	**Row Reduction Summary** (https://bcourses.berkeley.edu/courses/1471391/assignments/7913837)	due by 11:59pm
Fri Sep 14, 2018	**Row Reduction Boot Camp** (https://bcourses.berkeley.edu/courses/1471391/assignments/7923643)	due by 11:59pm
Sat Sep 22, 2018	**Dets as Volume scalings** (https://bcourses.berkeley.edu/courses/1471391/assignments/7926067)	due by 11:59pm
Thu Oct 4, 2018	**Complex Eigenvalues** (https://bcourses.berkeley.edu/courses/1471391/assignments/7928719)	due by 11:59pm
Fri Nov 2, 2018	**Reading for Differential Equations Week1** (https://bcourses.berkeley.edu/courses/1471391/assignments/7934972)	due by 11:59pm
	Complex exponential (https://bcourses.berkeley.edu/courses/1471391/assignments/7935363)	