Math 54: Linear algebra and Differential equations

Instructor: Vivek Shende
Lectures: Tu-Th 8:00 AM - 9:30 AM, 155 Dwinelle
Final location & Discussion sections

Required text: Lay, Linear Algebra; and Nagle, Saff and Snider, Fundamentals of Differential Equations, combined Berkeley custom edition.

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

Piazza: ask and answer questions here.

Enrollment issues: Please contact Thomas Brown, 965 Evans, brown@math.berkeley.edu, (510) 643-9292.

Office hours: (you are welcome to attend any of these)

Monday:
12-2 Vivek Shende (873 Evans)
2-3 Adele Padgett (1060 Evans)
3-5 James Dix (1056 Evans)

Tuesday:
2-3 Onyebuchi Ekenta (student learning center)
4-5 Guillaume Massas (836 Evans)

Wednesday:
10-12 Magda Hlavacek (1044 Evans)
1-2 Benjamin Siskind (937 Evans)
230-330 Guillaume Massas (836 Evans)

4-5 Adele Padgett (1060 Evans)
6-8 Dun Tang (844 Evans)

Thursday:
11-12 Luya Wang (828 Evans)
2-3 Onyebuchi Ekenta (student learning center)
340-440 Benjamin Siskind (937 Evans)

Friday:
10-12 Mostafa Adnane (840 Evans)
12-1 Luya Wang (828 Evans)

Grading: Based on homework (10%), quizzes (10%), two midterms (20% each) and the final exam (40%).

There will be **no** makeup homework, quizzes, midterms, or finals, except for in the case of extreme medical emergencies. Instead, we have the following policies in place:

- The two lowest homework grades and quiz grades will be dropped.
- The lowest midterm grade will be replaced by the final grade, if higher.

Incompletes will be offered only if a medical emergency causes you to miss the final, and only if your work up to that point has been satisfactory.

Academic integrity: You are expected to rely on your own knowledge and ability, and not use unauthorized materials or represent the work of others as your own. Follow the honor code: "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others."

Exams

Midterm 1: at lecture meeting, **Thursday Feb. 14** ; covers Lay chapters 1-3.
Practice midterm from 2016, with solutions

Midterm from 2016

Midterm 2: at lecture meeting, **Thursday Mar. 21** ; covers up to Lay 6.5. (solutions)
Practice midterm from 2016, with solutions
Midterm from 2016

Final: **Thursday May 16; 7-10 PM** (Group 16); covers the entire class.
Practice final and solutions from 2016.
Final and solutions from 2016.
Practice final and solutions.

Quizzes: There is a quiz **every Thursday** during discussion section. The quizzes are intended to check that you have a basic understanding of the material, and are **significantly easier** than the exams.

Lecture and homework schedule: There will be one homework assignment for every lecture. Homework for the Tuesday lecture is due the following **Tuesday**. Homework for the Thursday lecture is due the following **Thursday**.

You are encouraged to discuss ideas with other students. However, you must write and hand in your solutions independently. Please follow your GSI's instructions for turning in the homework. Each week one or two problems from the homework assignments will be graded.

The lecture and homework schedule is as follows. I will post the slides after every lecture, in two versions. The “sl” version has pauses in them just like in the lecture. The “ho” slides have no pauses.

	Date	Text Sections	Slides	Homework
1	1/22 (Tu)	Lay: 1.1, 1.2	sl , ho	**1.1** : 1,5,7,13,15,20,28; **1.2** : 1,5,7,11,15,23,26,30
2	1/24 (Th)	Lay: 1.3, 1.4	sl , ho	**1.3** : 1,5,7,11,15,22,25; **1.4** : 1,5,7,9,11,17,18,29
3	1/29 (Tu)	Lay: 1.5, 1.7	sl , ho	**1.5** : 1,5,9,14,24,29; **1.7** : 1,5,11,17,21,23,33,36

4	1/31 (Th)	Lay: 1.8, 1.9	sl , ho	**1.8** : 1,3,9,15,19,21,33,36; **1.9** : 1,5,9,15,23,24
5	2/5 (Tu)	Lay: 2.1, 2.2	sl , ho	**2.1** : 1,3,7,11,15,23,27; **2.2** : 1,5,9,13,21,38
6	2/7 (Th)	Lay: 2.8, 2.9	sl , ho	**2.8** : 1,4,7,11,18,25,28; **2.9** : 10, 13, 14, 16, 20, 26
7	2/12 (Tu)	Lay: 3.2	sl , ho	**3.2** : 1,3,5,7,11,19,21,27,31,33-35
	2/14 (Th)	Midterm 1		
8	2/19 (Tu)	Lay: 3.3	sl , ho	**3.3** : 3,7,13,21,32
9	2/21 (Th)	Lay: 4.1, 4.2	sl , ho	**4.1** : 1,3,9,13,24,32; **4.2** : 1,3,5,7,9,23,25
10	2/26 (Tu)	Lay: 4.3	sl , ho	**4.3** : 3,7,13,15,21, 26, 27, 28, 32, 33, 34
11	2/28 (Th)	Lay: 4.4, 4.7	sl , ho	4.4 : 3,7,19,27 **4.5** : 25, 26; **4.6** : 15, 20, 25, **4.7** : 5,9,11,13
12	3/5 (Tu)	Lay: 5.1, 5.2	sl , ho	**5.1** : 1,5,7,9,13,17,21; **5.2** : 3,9,11,15,19,21
13	3/7 (Th)	Lay: 5.3, 5.4	sl , ho	**5.3** : 1,3,5,7,11,17,21; **5.4** : 3,5,7,15
14	3/12 (Tu)	Lay: 5.5, 6.1	sl , ho	**5.5** : 1,3,7,13,15; **6.1** : 1,5,7,19,22,24
15	3/14 (Th)	Lay: 6.2, 6.3	sl , ho	**6.2** : 5,7,9,13,15,23; **6.3** : 1,3,9,11,17,21
16	3/19 (Tu)	Lay: 6.4	sl , ho	**6.4** : 1,3,5,9,17
	3/21 (Th)	Midterm 2		
	3/26 (Tu)	Spring Break		
	3/28 (Th)	Spring Break		
17	4/2 (Tu)	Lay: 6.5, 6.7	sl , ho	**6.5** : 1,3,9,11,17; **6.7** : 1,5,7,11,16
18	4/4 (Th)	Lay: 7.1, 7.4	sl , ho	**7.1** : 3,5,9,17,25 **7.4** : 1,3,5,7,9,23,25
19	4/9 (Tu)	NS&S: 4.2, 4.3	sl , ho	**4.2** : 3,5,10,13,27,34; **4.3** : 1,3,21,24,29(b)
20	4/11 (Th)	NS&S: 4.4, 4.5	sl , ho	**4.4** : 3,5,7,13,21,27,31,33; **4.5** : 1(b),3,5,9,21,27,33

21	4/16 (Tu)	NS&S: 9.1, 9.4	sl , ho	**9.1** : 3,7,10,13; **9.4** : 3,7,13,16,19,23,27
22	4/18 (Th)	NS&S: 9.5, 9.6	sl , ho	**9.5** : 13,17,21,31,35; **9.6** : 3,9,13,19 (Extra slides on solving systems)
23	4/23 (Tu)	NS&S: 10.1, 10.2	sl , ho	**10.2** : 1,3,5,9,12,15,21,23
24	4/25 (Th)	NS&S: 10.3	sl , ho	**10.3** : 1,5,7,11,17,19,26,27
25	4/30 (Tu)	NS&S: 10.4	sl , ho	**10.4** : 1,3,5,11,17,19;
26	5/2 (Th)	NS&S: 10.5	using the chalkboard today	**10.5** : 3,7,9,15,17
	5/16 (Th)	Final Exam		

9. Evaluate the integral

$$\iint_S z^{2018}\, dS, \qquad S = \{x^2 + y^2 + z^2 = 1\}$$