Linear Algebra (Fall 2018)

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Course name: Math 110 - LEC 001

Main Lectures: MWF 12:00--1:00, Dwinelle 155

Instructor: **Sug Woo SHIN (https://math.berkeley.edu/~swshin/)** (Sug Woo is my first name), **sug.woo.shin@berkeley.edu (mailto:sug.woo.shin@berkeley.edu)** (During the off-hours I may not reply.)

Office: 901 Evans Hall (on 9th floor) -- location for office hours on Mondays

Office hours: M 10-11 (in Evans 901), Th 2:30-4 (in Evans 732), or by appointment

Textbook: **Friedberg, Insel, Spence, Linear Algebra, 4th ed. (https://calstudentstore.berkeley.edu/courselisting/index/loadMaterials? utf8=%E2%9C%93&courses=%5B%7B%22school%22%3A%22UCB%22%2C%22term%22%3A%22FALL+2018%22%2C%22dept%22%3A%22MATH%22%2C%22cour** (I learned that an **e-book (https://www.chegg.com/textbooks/linear-algebra-4th-edition-9780130084514-0130084514? trackid=1d450a95&strackid=7236732a&autosuggest=1&ii=2&uqry=linear%20algebra%20friedberg&event=click_submit)** is available.)

Supplementary sources:

(1) **Helpful notes by Bergman (https://math.berkeley.edu/~gbergman/ug.hndts/sets_etc,t=7.pdf)** on common mathematical notation and language (Sections 1, 3, 6 are most relevant to us. I recommend you go through them at the beginning of the semester to be on the same page.)

(2) **Axler, Linear Algebra Done Right (https://link.springer.com/book/10.1007%2F978-3-319-11080-6)** (The approach in this book is somewhat different from ours, and it's interesting to compare. Some other instructors of Math 110 adopted this as the main textbook. That said, you don't need this book; we will make no reference.)

Important dates:

Two in-class **midterm exams**: **9/24**, **10/29** (Mondays),

Eleven in-class **quizzes** on **Friday** (in your discussion section) - see below for precise dates,

Weekly **assignments due**: every **Wednesday** (except the exam weeks),

Final exam time/place: **Friday 12/14, 11:30--2:30** (to be tested on the *entire material* for the semester), location TBA.

Grading scheme:

20% quizzes (best 8 out of 11)

20% first midterm, 20% second midterm, 40% final, or adjusted as follows:

* The lesser of your midterm scores will be replaced by your final exam score, appropriately scaled, if it leads to a higher total. Namely the exam portion of your grade is going to be the highest of the following three:

(1) 20% midterm 1 + 20% midterm 2 + 40% final (2) 20% midterm 1 + 60% final (3) 20% midterm 2 + 60% final.

Policy on grades and exams

* No early/late exams or quizzes will be given for whatever reasons, including sickness. Please refrain from asking for exceptions as they won't be granted. I already have a reasonable policy in place to be accommodating. (If you miss a quiz, the missed quiz will be "excused" by the best 8 out of 11 policy, unless you miss more than three. If you miss a midterm exam, my policy uses the final score to replace it. If you have to miss both midterm exams, or if you can't show up for the final exam, then you'd better drop this class as you would get an F.)

* No calculator or electronic devices are allowed in exams (unless you have an accommodation letter explicitly stating otherwise).

* No individual exam will be curved. After the final exam, your grand total score will be curved relative to the class. Generally you should expect A- or above if you're in the top 25%, B- or above if you're in the top 50%, C- or above if you're in the top 75%. Depending on the class' overall performance the actual cutoffs may go up or down. In fact your grade could be better than what's said above because the grade cutoffs will be determined based on your raw scores (before the adjustment, namely possibly replacing one of your midterm scores with the final score) but your final grade will be calculated using your adjusted score (which is greater than or equal to your raw score).

* An I (incomplete) grade is given only in rare circumstances such as personal emergencies or serious medical problems beyond one's control. Unqualified reasons include workload from other courses, conflict with the final exam schedule, and failing in the current class. The **official document**

(https://ls.berkeley.edu/advising/academic-progress/grades/incomplete-grades) reads "A grade of Incomplete may be assigned when a student has completed and passed a majority of the work required for a course but, for reasons beyond the student's control, cannot complete the entire course."

Quizzes

Each quiz is 15 minutes long, taken in your section under GSI's supervision. Typically (but not necessarily; at the discretion of GSI) a quiz consists of two T/F questions, a computation problem, and a theoretical problem (possibly asking for a proof).

You are tested on the course material learned since the last quiz up until Monday of that week. To put it differently, Quiz on day n+2 is closely based on the homework due day n (and the sections of the textbook the homework is taken from), which is in turn based on what's learned up to (and including) day n-2.

Every quiz is taken in your designated discussion section. You are not allowed to take it in a different section.

(Exceptions are made only in the first few weeks when the student does not belong to a section due to waitlisting. Even in that case, one needs to contact the GSI responsible for the section where you are going to take a quiz, to get permission well in advance. For issues with enrolling in a section, please contact the math department staff **Thomas Brown (https://math.berkeley.edu/people/staff/thomas-brown)** or **Jennifer Pinney (https://math.berkeley.edu/people/staff/jennifer-sixt-pinney)** for help. The instructor and GSI's have no control.)

Weekly assignments:

The **first assignment is due Wed August 29.** The subsequent assignments are **due every Wednesday** (except the exam weeks and the Thanksgiving week). The problems are posted on the course website under "Assignments" tab.

Your solutions will not be collected or graded, but it is extremely important to keep up, as that's the *best way* to prepare for quizzes and exams. Indeed, quiz problems are supposed to be similar (but not identical) to homework problems. Solutions to weekly assignments will be available through the course website.

Piazza:

We will be using Piazza, mainly its **Q & A** interface, for quick questions/answers as well as extensive discussions.

The system is highly catered to getting you help fast and efficiently from classmates, the GSI, and myself. Rather than emailing questions to the teaching staff, I encourage you to **post your questions on Piazza**. (If you do email questions, you will be reminded to post your questions on Piazza.) All questions are welcome: math questions or other course-related questions. There's no need to be shy as you have the option to post your question anonymously. If you have any problems or feedback for the developers, email **team@piazza.com (mailto:team@piazza.com)** .

Incentive: To incentivize your active participation, I will give some credit to the students frequently answering others' questions. The precise incentive (including how much participation would lead to credit) is determined at the instructor's discretion.

(Caveat 1: I will refrain from answering math questions to allow you enough time to answer each other's questions. My role will be generally limited to intervening if confusion lingers or a problem remains unresolved for several days. All questions on Piazza will be public posts. If you'd like to ask a question privately or want an immediate answer from me (or GSIs), please come to office hours. I'm more than happy to help!)

(Caveat 2: It's fine to exchange ideas and hints for homework problems, but let's not ask for answers or post answers before deadline. It's like a movie spoiler.)

Find our class Q & A page at: **https://piazza.com/class/jklsval6p1197** **(https://piazza.com/class/jklsval6p1197)** or use the link to Piazza on the left.

Lecture notes:

Usually they are uploaded under the "**Files**" tab in the afternoon of each lecture day, and no later than the following day in any case. (Please do remind me if I happen to forget.) There are two versions for slides: (1) with pauses as in the lecture (2) without any pause.

I may also use a notepad app to give lectures (instead of blackboard or slides) in the future; still the notes will be uploaded in the same way.

Grading of exams:

We will be using **Gradescope** **(https://gradescope.com)** to grade midterm and final exams. This means that everyone's exam will be scanned, uploaded to the gradescope page, and then graded online by the instructor and GSIs. Some of you may already have experience with gradescope. You'll hear more about this later.

Tips on whom to contact:

- Emergencies: Email me (SWS) or come to my office hours.

- Math questions: Use discussion sections, post your questions on Piazza, or come to office hours (mine or GSI's). <u>Don't *email* math questions -- if you do, you'll be reminded to ask on Piazza.</u>

- Quiz scores: Come to GSI's office hours

- Exam scores: Any regrade requests shall be filed through gradescope, which will be automatically forwarded to me and the GSIs according to who graded what.

<u>General tips on math classes</u>:

- Preview: Read the textbook before coming to class. You'll get more out of lectures.

(If the textbook and lectures are too easy and boring to you, it might be appropriate for you to take a more advanced course.)

- Concepts: It's important that you understand all concepts and definitions thoroughly. Try to get a mental "picture" or an intuition. Visualize if possible. View each concept from different angles. In all this, use examples.

- Examples: Work through examples in the textbook carefully. Make your own examples and counterexamples.

- Ask: Make it a habit to ask yourself and others (including instructor and GSIs) questions. This makes you a critical, thus more effective learner. Over time you will be trained to ask better questions, not only in math but in all subjects. This is a key to success in academia and the real world. Great inventions and discoveries come from asking good questions.

- Exercise: Don't think that you have understood after reading the textbook and attending lectures. It doesn't stick and become yours until you do homework and try (at least some) exercises in the textbook. By doing so, another benefit is that you get faster at thinking, computing, and solving problems -- a key to exam success.

- Collaboration: You need your own time to think independently but you are encouraged to work together at other times, not only when doing homework. Ask each other questions. Try to explain what you learned to your friends. Share your ideas, intuitions, and perspectives. Make a good use of Piazza.

<u>Tentative Schedule</u>:

Dates / Planned coverage in the textbook (caveat: *subject to change!*) / Comments on events

* The sections in ( ) may be omitted depending on our progress.

Week 1	Aug 22, 24	1.1, 1.2, 1.3, 1.4		Aug 22 is the first day of instruction.
Week 2	Aug 27, 29, 31	1.5, 1.6, 2.1	Quiz 1 on Aug 31	
Week 3	Sep 5, 7	2.1, 2.2	Quiz 2 on Sep 7	Sep 3 is an academic holiday.
Week 4	Sep 10, 12, 14	2.3, 2.4, 2.5	Quiz 3 on Sep 14	
Week 5	Sep 17, 19, 21	2.6, 3.1, 3.2	Quiz 4 on Sep 21	
Week 6	Sep 24, 26, 28	3.3, 3.4	Midterm 1 on Mon Sep 24	Midterm 1 covers chapters 1 and 2 (1.2-1.6, 2.1-2.6).
Week 7	Oct 1, 3, 5	4.1, 4.2, 4.3, 4.4	Quiz 5 on Oct 5	
Week 8	Oct 8, 10, 12	5.1, 5.2	Quiz 6 on Oct 12	
Week 9	Oct 15, 17, 19	(5.3), 5.4	Quiz 7 on Oct 19	Instructor will be away on Oct 19 for a governmental service. (Substitute instructor on Oct 19: Chanwoo Oh)
Week 10	Oct 22, 24, 26	6.1, 6.2	Quiz 8 on Oct 26	
Week 11	Oct 29, 31, Nov 2	6.3, 6.4	Midterm 2 on Mon Oct 29 (covering ...)	Midterm 2 tentatively covers chapters 3, 4 and 5.
Week 12	Nov 5, 7, 9	6.5, 6.6	Quiz 9 on Nov 9	
Week	Nov 14, 16	6.7, 7.1	Quiz 10 on Nov 16	Nov 12 is an academic holiday.

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Week 14	Nov 19	7.2		Nov 21 is a non-instructional day. Happy Thanksgiving!
Week 15	Nov 26, 28, 30	7.3, 7.4	Quiz 11 on Nov 30	Nov 30 is the last day of instruction.
Final	Dec 14			Final exam covers the entire course material learned since day one.

Sections

Alex Appleton <aja44@berkeley.edu>, Office hours M 4-6, 787 Evans
22416 S DIS 113 F 0200 0300 P 4 EVANS
24588 S DIS 114 F 0300 0400 P 2 EVANS
22431 S DIS 105 F 0400 0500 P 85 EVANS

Sander Mack-Crane <sander@berkeley.edu>, Office hours Tu 3-4:30, F 1:30-3, 747 Evans
26036 S DIS 115 F 0300 0400 P 87 EVANS
22433 S DIS 107 F 0400 0500 P 70 EVANS
31209 S DIS 117 F 0500 0600 P 6 EVANS

Alexander Bertoloni Meli <a.b.m@berkeley.edu> Office hours W 11-12, Th 11-12, Th 2-3, 747 Evans
22434 S DIS 108 F 1100 1200 P 285 CORY
22436 S DIS 110 F 0100 0200 P 2 EVANS
22415 S DIS 112 F 0200 0300 P 105 LATIMER

Chanwoo Oh <chanwoo@berkeley.edu> Office hours: W 10-12, 941 Evans
22428 S DIS 102 F 0800 0900 A 4 EVANS
22429 S DIS 103 F 0900 1000 A 285 CORY
22432 S DIS 106 F 1000 1100 A 736 EVANS

Alex Sherman <alexsherman@berkeley.edu> Office hours Tu 1:30-3, W 1:30-3, 1057 Evans
22427 S DIS 101 F 0800 0900 A 2 EVANS
22430 S DIS 104 F 0900 1000 A 2 EVANS
22435 S DIS 109 F 1000 1100 A 126 WHEELER

Hong Suh <hong.suh@berkeley.edu> Office hours Tu 4-5:30, W 4-5:30, 845 Evans
22437 S DIS 111 F 0100 0200 P 4 EVANS
31208 S DIS 116 F 0400 0500 P 81 EVANS
31210 S DIS 118 F 0500 0600 P 4 EVANS

Course Summary:

Date	Details	
Fri Aug 31, 2018	📅 **Quiz 1 (https://bcourses.berkeley.edu/calendar?event_id=2185805&include_contexts=course_1473793)**	12am
Fri Sep 7, 2018	📅 **Quiz 2 (https://bcourses.berkeley.edu/calendar?event_id=2185809&include_contexts=course_1473793)**	12am
Fri Sep 14, 2018	📅 **Quiz 3 (https://bcourses.berkeley.edu/calendar?event_id=2185810&include_contexts=course_1473793)**	12am
Fri Sep 21, 2018	📅 **Quiz 4 (https://bcourses.berkeley.edu/calendar?event_id=2185811&include_contexts=course_1473793)**	12am
Mon Sep 24, 2018	📅 **Midterm 1 (https://bcourses.berkeley.edu/calendar?event_id=2185806&include_contexts=course_1473793)**	12pm to 1pm
Fri Oct 5, 2018	📅 **Quiz 5 (https://bcourses.berkeley.edu/calendar?event_id=2185812&include_contexts=course_1473793)**	12am

Date	Details	
Fri Oct 12, 2018	📅 **Quiz 6** (https://bcourses.berkeley.edu/calendar?event_id=2185813&include_contexts=course_1473793)	12am
Fri Oct 19, 2018	📅 **Quiz 7** (https://bcourses.berkeley.edu/calendar?event_id=2185814&include_contexts=course_1473793)	12am
Fri Oct 26, 2018	📅 **Quiz 8** (https://bcourses.berkeley.edu/calendar?event_id=2185815&include_contexts=course_1473793)	12am
Mon Oct 29, 2018	📅 **Midterm 2** (https://bcourses.berkeley.edu/calendar?event_id=2185807&include_contexts=course_1473793)	12pm to 1pm
Fri Nov 9, 2018	📅 **Quiz 9** (https://bcourses.berkeley.edu/calendar?event_id=2185816&include_contexts=course_1473793)	12am
Fri Nov 16, 2018	📅 **Quiz 10** (https://bcourses.berkeley.edu/calendar?event_id=2185817&include_contexts=course_1473793)	12am
Fri Nov 30, 2018	📅 **Quiz 11** (https://bcourses.berkeley.edu/calendar?event_id=2185818&include_contexts=course_1473793)	12am
Fri Dec 14, 2018	📅 **Final Exam** (https://bcourses.berkeley.edu/calendar?event_id=2185808&include_contexts=course_1473793)	11:30am to 2:30pm
	📝 **Homework 01 (due Wed Aug 29)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7905896)	
	📝 **Homework 02 (due Wed Sep 5)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7910976)	
	📝 **Homework 03 (due Wed Sep 12)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7914295)	
	📝 **Homework 04 (due Wed Sep 19)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7923336)	
	📝 **Homework 05 (due Wed Oct 3)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7926683)	
	📝 **Homework 06 (due Wed Oct 12) - now open** (https://bcourses.berkeley.edu/courses/1473793/assignments/7928571)	
	📝 **Quiz01 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921604)	
	📝 **Quiz02 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921606)	
	📝 **Quiz03 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921605)	
	📝 **Quiz04 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921608)	
	📝 **Quiz05 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921607)	
	📝 **Quiz06 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921609)	
	📝 **Quiz07 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921610)	
	📝 **Quiz08 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921611)	
	📝 **Quiz09 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921612)	
	📝 **Quiz10 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921613)	
	📝 **Quiz11 (empty)** (https://bcourses.berkeley.edu/courses/1473793/assignments/7921614)	