

Instructor: Clover May

Office: MS 6903

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Office Hours: MW 10:30-11:30am
and by appointment

Class Meetings: MWF 2:00-2:50pm, MS 5127

Discussions: Tuesdays 2:00-2:50pm, MS 5127 with Jackson Bahr

Course Website: <https://ccle.ucla.edu/course/view/20W-MATH115B-1>

Prerequisites: C- or better in Math 115A or equivalent.

Textbook: The textbook is *Linear Algebra*, 5th edition by Friedberg, Insel, and Spence. The math department and bookstore have made this course part of a textbook program called Inclusive Access. It appears you can access the textbook on the CCLE site and you may also be sent an email to the address on file with the registrar.

Everyone enrolled in the course will automatically have access to the digital course materials. **Those who have not opted-out** and are still enrolled after Friday of Week 2 **will be billed \$45.87 to their Bruin Bill account**. This program is optional; however **you must ACTIVELY OPT-OUT if you do not wish to be billed**. If you choose to Opt-Out, you must do so **on or before January 17, 2020** by going to the UCLA Store's Compare website for this class: <https://ucla.verbacompare.com/comparison?id=246984>. If you have questions or concerns, contact the UCLA Store at inclusiveaccess@asucla.ucla.edu.

Grading: Your grade will be determined by the following:

5% Reading Assignments + 15% Homework + 30% Midterm + 50% Final Exam

Reading Assignments: There will be frequent reading assignments from the textbook. These assignments will be found in Gradescope (linked on CCLE) and will be due by 11:59pm on the due date. This is an opportunity to familiarize yourself with the material before it's discussed in class. I don't expect that you will understand everything you read, but that you will have been introduced to the topics and form thoughtful questions to bring to class.

Homework: Written homework assignments will be due each week, usually in discussion on Tuesdays. Homework must be written neatly and clearly, using correct notation and complete sentences. You are encouraged to work together on these problems, however you must write and turn in your own work. **No late assignments will be accepted.**

Exams: There will be one in-class midterm exam and a cumulative final exam. The tentative date for the midterm is below. The final exam is scheduled by the registrar.

Midterm Exam: **Wednesday, February 12** (Week 6)
Final Exam: **Wednesday, March 18, 11:30am-2:30pm** (Week 11)

You must bring your student ID to exams. **There will be no make-up exams.** You must take the final exam as scheduled by the registrar in order to pass the class.

Course content and goals: This is a second course in abstract linear algebra. We will study topics such as quotient spaces, direct sums, dual spaces, invariant factors and elementary divisors, the Cayley Hamilton Theorem, spectral theory, singular values, bilinear forms, quadratic forms, and Smith normal, rational, and Jordan canonical forms.

General Expectations/Study Tips:

- *Attendance is mandatory.* You are responsible for any announcements, material, and assignments discussed in class.
- You must show all work and justify your reasoning on homework and exams. If I do not understand what you have written for a problem, you will not get credit for it.
- An atmosphere of mutual respect. In particular, cell phones, tablets, and laptops are to be powered off or silent and put away during class to limit distractions. Please keep talking to a minimum and raise your hand if you have a question.
- Go over your notes after each class. Explain to yourself or someone else what the lecture was about, what the key ideas were, and how the examples work.
- Reading math is not like reading a novel, you may need to read a section in the book multiple times before you understand it.
- Form a study group with others in the class. The best way to learn something is to try to explain it to someone else.
- Keep your old assignments. Make sure you know how to do each problem correctly, this is part of studying for exams.
- If you are having trouble with the course material, I expect you to ask for help. You are encouraged to come to my office hours and to your TA's office hours.
- If you need to contact me via email you should write **Math 115B** in the subject line or I may not receive it.

Student Conduct: Violations of the student conduct code can result in a failing grade on any course work related to the violation, a failing grade in the course, and/or suspension. Cheating includes, but is not limited to

- (a) looking at another student's exam during a quiz or test,
- (b) copying the work of another person and submitting it as your own, and
- (c) using any materials except those explicitly approved during a test-taking situation.

For more information, see the Student Conduct Code at

<https://www.deanofstudents.ucla.edu/studentconductcode>.

Accessibility: Students needing academic accommodations based on a disability should contact the Center for Accessible Education (CAE) at (310) 825-1501 or in person at Murphy Hall A255. In order to ensure accommodations, students need to contact the CAE within the first two weeks of the term.

Tentative Schedule:

Week	Date	Sections
1	Mon 1/6 Wed 1/8 Fri 1/10	Review of Math 115A 2.6: Dual vector spaces 2.6: Dual vector spaces
2	Mon 1/13 Wed 1/15 Fri 1/17	5.1, 5.2: Review eigenvalues, eigenvectors, diagonalizability 5.4: Invariant subspaces 5.4: Cayley Hamilton theorem
3	Mon 1/20 Wed 1/22 Fri 1/24	Martin Luther King Jr Day - No class 5.4: Cayley Hamilton theorem 6.1, 6.2: Review inner products, norms, Gram-Schmidt
4	Mon 1/27 Wed 1/29 Fri 1/31	6.3, 6.4: Review of adjoints, normal and self-adjoint operators 6.5: Unitary and orthogonal operators 6.5: Unitary and orthogonal operators
5	Mon 2/3 Wed 2/5 Fri 2/7	6.5: Unitary and orthogonal operators 6.6: Orthogonal projections and the spectral theorem 6.6: Orthogonal projections and the spectral theorem
6	Mon 2/10 Wed 2/12 Fri 2/14	6.6: Orthogonal projections and the spectral theorem Midterm Exam 6.7: Singular Value Decomposition
7	Mon 2/17 Wed 2/19 Fri 2/21	Presidents' Day - No class 6.11: Geometry of orthogonal operators 6.11: Geometry of orthogonal operators
8	Mon 2/24 Wed 2/26 Fri 2/28	6.11: Geometry of orthogonal operators 7.1 Jordan canonical form 7.1 Jordan canonical form
9	Mon 3/2 Wed 3/4 Fri 3/6	7.1 Jordan canonical form 7.3 The minimal polynomial 7.3 The minimal polynomial
10	Mon 3/9 Wed 3/11 Fri 3/13	Smith normal form Bilinear forms Catch up and Review
11	Wed 3/18	Final Exam