Math 33A Linear Algebra & Applications
Spring 2025

Instructor: Dr. C Johnson
Email: casey@math.ucla.edu
Office Hours: See Canvas or by appointment
Office: Math 5226

Class Meetings: MWF
9-950am Franz 2258A
Final Exam: Monday June 9 3-6pm
Prerequisites: Refer to course catalog

Welcome to Linear Algebra!

This math course will probably be different from every other math course you have ever taken. Up until now (most likely), each course you have taken could be classified under the heading "arithmetic". Going forward, your math courses will focus instead on understanding. Understanding is the essence of being a mathematician. Some students find this transition difficult, so I have a few hints to help you:

- Definitions are the building blocks of math. Most of the exercises of this course will follow directly from definitions. Thus, you should know the definitions perfectly.
- If you are unsure how to approach an exercise, try a simple example; the simpler the better.
- Discuss the concepts and definitions with everyone. Question your own understanding as well as the understanding of others. It is difficult to find holes in your own understanding, but easier for others to point them out.
- The rabbit hole is immensely deep. The more you delve into each term, concept, theorem, and idea the better you will understand. Even if you have mastered an idea, there is more to learn about it. "The more I know, the more I know I don't know."

Here are some things I want you to know about this course.

- **I want you to be successful in this course.** My job is to help you learn and develop a deep understanding of the course material. I am on your side! I would like our relationship to be like that between a client and a consultant who work together to achieve an end goal. Please feel free to come speak to me at any time about the course and your work in it.
- **You are accountable for being actively engaged in your learning.** In order to learn mathematics, you have to do mathematics. In Math 33A you will be expected to work actively and contribute to others' work.
- **You are ultimately responsible for your learning.** I have worked hard to create a course that will help you all learn, and I am here to help you learn it. But your learning is ultimately up to you. Take responsibility and make sure to do everything that you can to learn the course material.
- **Preparation before class is essential for success.** If you do not prepare for class, you will not be able to actively participate in class and might not have the assumed foundation for what is discussed in class. A credit hour is defined as "one hour of classroom or direct faculty instruction and a minimum of two additional hours of student work each week."
- **Confusion, and sometimes frustration is part of the learning process.** If you are doing things well, you should be confused at different points in the semester. The material is too rich for a human being to completely understand it immediately. This confusion can lead to frustration, and some amount of that is to be expected (but let me know if your frustration level gets too high). Engage in productive struggle. Tolerate being stuck or confused; it's part of the process.

- **Success in this course is not 'Perfection'.** I am not expecting you to get every question correct in this class; as in life, this would be unreasonable. I am expecting you to make mistakes, since they lead to good learning.
- **You may ask a question about anything at any time, especially in office hours.** Learning mathematics is not always easy. There are times when you will get stuck and frustrated. This is part of the learning process. Seek out help. I will not do your work for you, but I will help you get unstuck.
- **Our class is one community.** As your instructor, We learn together. We work together. We will respect one another. All students are equally welcomed and valued. A growth mindset includes our ability to grow together, to learn to be tolerant, and to become more compassionate. No one is being asked to leave the table. Everyone is being asked to make room at the table, so that everyone has a seat and a fair chance!

Preparing for Class

Each class will be run assuming a certain base level of understanding of material. Time in class will be used to challenge and fix any misconceptions in the base level of understanding as well as further our understanding of the topics. Class time will be ineffective if you do not have the base level of understanding before class. The schedule of topics is listed on BruinLearn. Base level of understanding may include some or all the following:

- Reading from the textbook
- Watching videos made by the professor
- Completing reading questions
- Homework problems
- Memorizing relevant definitions
- Discuss topics with classmates and friends
- Meeting with the professor

Textbook & Required Materials

O. Bretscher, *Linear Algebra*, 5th Ed., Prentice Hall. (Part of BruinAccess)
Writing Utensils (Prefer pencils)

Instructor

Name: Dr. C Johnson
Office: Math 5226
How to contact me: If you have a question related to the course material, please post it on the Piazza! (See below. You can post anonymously!) If you a grading question, please check that it is not already answered in the syllabus below. If it's a private matter, feel free to email me at casey@math.ucla.edu.
Email Responses I do my best to reply to emails promptly and helpfully. However, I receive a *lot* of email. To help both you and me, here are some specific expectations about emails:

- The subject must include the class/time of the course you are in. For example, Math 1, 11am.
- During the work week (M-F) I try to respond the same day, however, you can expect that I will respond within 24 hours. I do not respond to emails after 5:00 pm, over the weekend or on holidays.
- If your email asks a question that is answered in the Syllabus or BruinLearn or more appropriate to be asked on Piazza, I may not reply or reply by directing you to read the appropriate document/place. If you've read the relevant document and still have questions about it, please make this clear in your email, by describing what you've already read, and which specific part of it you have a question about.

Discussion Sections/Teaching Assistants

Mia Zender zender@math.ucla.edu

Office Hours

Your teachers are your best resources! The TA and I will hold office hours where we are guaranteed to be in our offices (or specified location) with the door open to chat about anything. We are happy to re-explain concepts, clarify questions, chat about research, etc.

Piazza

Piazza is a discussion board like extension from BruinLearn/Canvas. Important information and announcements for the course will be posted primarily on Piazza, with occasional updates on BruinLearn. Please check Piazza regularly for updates and use it for questions about course material. Before posting, see if your question has already been addressed by classmates, TAs, or me. Piazza allows anonymous posting if preferred (though the TA and I will know who you are). Engaging with your peers can lead to quicker responses, as classmates might answer faster than I can. You are encouraged to help each other by answering questions and discussing material until the TA or I can provide further clarification.

Attendance Policy

You are expected to attend every class meeting and to ARRIVE ON TIME! If you must miss a class, you are solely responsible for the material you missed. Refer to the course schedule and BruinLearn for missed material. You are strongly encouraged to make arrangements with a classmate to obtain the notes from missed lectures. Late arrivals and early departures are disruptive. If arriving late or leaving early is UNAVOIDABLE, minimize the disruption when you arrive/leave.

Students should understand that absences, whether excused or not, can significantly affect class grades. Successful students are seldom absent.

Grading

At the end of the quarter, your course grade will be computed according to the primary scheme. *To be considered for the alternate grading scheme, you must provide the instructor a doctor's note **prior** to the midterm you will be missing.*

	Primary	Alternate[1]
Homework	12%	12%
Reading Quizzes	8%	8%
Midterm 1	20%	30% (one not missed)
Midterm 2	20%	
Final Exam	40%	50'%

Your grade in this class is based on your own personal performance. It will not be based on your ranking relative to your classmates, and it will not be based on any sort of quota of how many students receive each letter grade. Grading in this class is not competitive. If every single student performs at an A level, then every single student will receive an A. ***Any student scoring less than 50% on the final exam will receive a grade no higher than a D-, regardless of their***

[1] *You must provide the instructor a doctor's note **prior** to the midterm you will be missing.*

overall grade. If you miss both a midterm and the final exam, then you will **not** be given an incomplete grade.

A final average of 90% or higher will guarantee you at least an A–, a final average of 80% or higher will guarantee you at least a B–, and a final average of 70% or higher will guarantee you at least a C–. These letter grade cut-offs may be adjusted downward at the end of the quarter, so that more students receive higher grades. But under no circumstances will the grade cut-offs be higher than stated above: this policy can only help you, not hurt you.

Note: The math department policy is to reserve the A+'s for students who do exceptional outstanding work and will be given sparingly.

Reading Quizzes

Each week you will have a reading quiz due the start of Friday's lectures, i.e. **Fridays at 9am**. These will be straightforward and easy to answer if you read the textbook sections. **No Late Quizzes will be accepted. The lowest two quiz scores will be dropped**. This is to allow for all reasons that the quiz is not completed on time, including illness, emergencies, officially excused absence from campus, absence for religious observances, etc.

Homework

All homework assignments posted on BruinLearn and are **Sundays at 11:59pm** on Gradescope as a PDF with corresponding pages matched/assigned. Please ensure your work is written in a clean and clear manner (not your first messy draft). It is each student's responsibility to ensure that their own assignments are uploaded correctly and that their uploads are legible. ***Oversized files, messy writing, unmatched problems/pages, and rotated pictures will not be graded.*** You may work on homework with a partner, but all students must write up and submit their own **unique** solutions. **No Late Homework will be accepted. The lowest homework score will be dropped**. This is to allow for all reasons that homework is not completed on time, including illness, emergencies, officially excused absence from campus, absence for religious observances, etc.

Homework will be graded for correctness and completeness. Due to grading time constraints, each homework will have randomly selected subset of problems graded rigorously. If a problem is not graded rigorously, credit will be given for being complete.

Gradescope

Everything will be turned in/uploaded via Gradescope as a PDF. You can access it through BruinLearn and clicking on the Gradescope link. The assignment may be submitted to Gradescope by uploading a single PDF file with all of the problems. For a quick tutorial on this, see the following video: https://youtu.be/u-pK4GzpId0 If you do your work on paper, the easiest way to submit it is to use a scanner app on your smartphone to create a PDF file, and submit that.

Regrade Requests: You will have 1 week from date of grade posting to request regrades on homework, quizzes, and midterm. There will be ***no regrade requests for the final exam***. ***Requests may only be made on correctness*** (not on the amount of partial credit given). All requests must clearly state why you feel there was an error in the grading. A request does not guarantee an increase in the grade. Once a regrade request is processed, the grade is final. Note that regrade requests are our lowest priority to process. Only be concerned if it is the end of the quarter and they are still not processed.

Exams

There will be two (2) midterm exams and a comprehensive final exam. No calculators will be allowed on the exams. Note: If you arrive late to an exam you will not be given extra time. There are **no make-ups for missed exams**. If you miss a midterm and provide the instructor a doctor's note ***prior*** to the exam, your grade will be computed using the alternate grading scheme. The date of the final exam, stated above, was set by the university months in advance, and cannot be changed. In accordance with university policies, you must take the final exam to pass the class. Make-ups for the final exam are permitted only under exceptional circumstances, as outlined in the UCLA student handbook.

Midterm Dates: Fri April 25 & Fri May 30

Exam Rules Note this list is not exhaustive.

- Bring your student ID to be checked during the exam.
- No talking, wandering eyes, sharing of answers, etc.
- No calculators.
- No headphones, cellphones, or smartwatches allowed on your person during the exam.
- All bags/things will be at the front of the room.
- If you are sooo late to the exam that someone else has already finished, you cannot start the exam.

Important: It is department policy that each exam must contain the statement: "I certify on my honor that I have neither given nor received any help, or used any non-permitted resources, while completing this evaluation." This statement must be signed by the student. If it is not signed, the evaluation must be given a failing grade, per department policy.

THE GOLDEN RULES OF COLLABORATION

For individual assignments: Your submitted work must represent *your own* understanding in *your own* words, regardless of collaboration. To ensure this, you must wait at least 30 minutes after discussing the assignment with anyone else before writing it up and then write it up without reference to any notes that you took during the discussion.

For group assignments: You must make a significant contribution to any assignment that is submitted with your name on it. If any work does *not* represent your understanding, you must not allow your name to be placed on the assignment.

Academic Integrity

I have a ZERO TOLERANCE policy of academic dishonesty. Being unaware of what constitutes such violations is not an excuse. This statement serves as your warning.

It is considered a violation of Academic Integrity to misrepresent someone else's work as your own. The approved materials for the course are the course textbook and lecture and other appropriate academic sources can be used if cited. Solvers, AI websites, and websites like Chegg are never allowed[2]. Enabling another student to violate these rules or providing help to another student violate these rules is a violation of the rules.

For all coursework except exams, you are allowed to work with other students. However, you need to write up solutions in your own words. The penalty for submitting other people's work as your own are severe. We are aware of sites like Chegg, where homework and exam questions can be posted to get community answers. We check these websites regularly, and they will give

[2] This list of items/tools that are never allowed is not exhaustive.

us the ID of any student who posts a question from the course or reads a posted answer. Students using these sites either to post questions or look up answers will face severe penalties.

Failure to follow the exam rules, talking, having wandering eyes, etc are considered cheating on an exam and will be handled accordingly.

A first offense will result in a score of 0. A second offense will result in an immediate grade of F for the course. Depending on the severity of the offense, students caught cheating may be given an F for the course on the first violation. Cheating/plagiarism on a quiz or exam is considered a flagrant violation and may result in an immediate F in the course. Other violations of academic honesty, as outlined in UCLA's academic integrity code, may result in an immediate grade of F in the course (on the first offense).

Student Math Center

The Student Math Center (SMC) is where Math TA's hold flexible office hours throughout Weeks 2 – 10 of an academic quarter (fall, winter, and spring). Students are welcome to stop by to ask questions about lower division math courses. No appointments needed.
Location: MS 3974
Times: 9 AM – 3 PM (Monday – Thursday).

Students with Disabilities

If you are already registered with the Center for Accessible Education (CAE), please request your Letter of Accommodation in the Student Portal. If you are seeking registration with the CAE, please submit your request for accommodations via the CAE website. Students with disabilities requiring academic accommodations should submit their request for accommodations as soon as possible, as it may take up to two weeks to review the request. For more information, please visit the CAE website (www.cae.ucla.edu), visit the CAE at A255 Murphy Hall, or contact us by phone at (310) 825-1501.

Testing accommodations can only be granted if the quiz/exam is taken at the testing center. It is your responsibility to schedule exams and/or quizzes on the same day and time in the testing center.

Limitations on accommodations: The nature of this class makes it impossible for me to provide additional extensions to any homework. If your CAE accommodation includes extra time to complete homeworks, and you are unable to meet a posted homework deadline, then you should speak with me during a class or office hour, and I will provide you with a reduced set of homework questions you may instead complete to receive full credit for the homework. I cannot guarantee that I will be able to respond in time to requests made over email or using Piazza. I am not able to provide a makeup midterm exam. If you miss the midterm exam for the class for an allowed reason, then your grade will be determined using the alternate grading scheme. I cannot provide a makeup final exam for the class even if a student misses the final exam for an allowed reason.

Title IX Responsible Employee Information

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the CARE Advocacy Office for Sexual and Gender-Based Violence, 1st Floor Wooden Center West, care@careprogram.ucla.edu, (310) 206-2465.

In addition, Counseling and Psychological Services (CAPS) provides confidential counseling to all students and can be reached 24/7 at (310) 825-0768. You can also report sexual violence or sexual harassment directly to the University's Title IX Coordinator, 2241 Murphy Hall, titleix@equity.ucla.edu, (310) 206-3417. Reports to law enforcement can be made to UCPD at (310) 825-1491.

Students should be aware that most employees, including myself as the instructor and our TA are REQUIRED under UC Policy to inform the Title IX Coordinator should they become aware that you or any other student has experienced sexual violence, sexual harassment, domestic or dating violence, or stalking. The exceptions are the employees at the CARE Advocacy Office and CAPS, as well as the doctors at the Arthur Ashe Student Health and Wellness Center.

Mental Health Resources

The importance of taking care of one's mental health cannot be overstated. All registered UCLA students are eligible to use UCLA's Counseling and Psychological Services (CAPS) (https://www.counseling.ucla.edu). 24/7 crisis support is always available by phone at (310) 825-0768.

A course syllabus is intended to point out important aspects of a course as well as it serves as a contract between the instructor and students enrolled in the class. As the instructor, I reserve the right to make changes.

Tentative Schedule (Exam Dates won't Change)

Week	Lecture	Day	Date	Section
1	1	M	Mar 31	Section 1.1 & 1.2 Intro to Systems & Matrices, Vectors & Gauss-Jordan Elimination
	2	W	Apr 2	Section 1.2 & 1.3 Matrices, Vectors & Gauss-Jordan Elimination & Solutions of Linear Systems; Matrix Algebra
	3	F	Apr 4	Section 2.1 Introduction to Linear Transformations & Their Inverses
2	4	M	Apr 7	Section 2.2 Linear Transformations in Geometry
	5	W	Apr 9	Section 2.3 Matrix Products
	6	F	Apr 11	Section 2.4 Inverse of. Linear Transformation
3	7	M	Apr 14	Section 3.1 Image and kernel of a Linear Transformation
	8	W	Apr 16	Section 3.2 Subspaces of R^n; Bases and Linear Independence
	9	F	Apr 18	Section 3.3 The Dimension of a Subspace of R^n
4	10	M	Apr 21	Section 3.4 Coordinates
	11	W	Apr 23	Section 5.1 Orthogonal Projections and Orthonormal Bases
	12	F	Apr 25	**MIDTERM 1**
5	13	M	Apr 28	Section 5.2 Gram-Schmidt Process and QR Factorization
	14	W	Apr 30	Section 5.2 Gram-Schmidt Process and QR Factorization
	15	F	May 2	Section 5.3 Orthogonal Transformations & Orthogonal Matrices
6	16	M	May 5	Section 5.4 Least Squares

	17	W	May 7	Section 6.1 Intro to Determinants
	18	F	May 9	Section 6.2 Properties of the Determinant
7	19	M	May 12	Section 6.3 Geometrical Interpretations of the Determinant; Cramer's Rule
	20	W	May 14	Section 7.1 Diagonalization
	21	F	May 16	Section 7.2 Finding the Eigenvalues of a Matrix
8	22	M	May 19	Section 7.3 Finding the Eigenvectors of a Matrix
	23	W	May 21	Section 7.4 Moore on Dynamical Systems
	24	F	May 23	Section 7.5 Complex Eigenvalues
9	------	M	May 26	NO CLASS Memorial Day
	25	W	May 28	Section 8.1 Symmetric Matrices
	26	F	May 30	**MIDTERM 2**
10	27	M	Jun 2	Section 8.2 Quadratic Forms
	28	W	Jun 4	Section 8.3 Singular Values
	29	F	Jun 6	Review/Catch-Up
Final Exam: Monday June 9 3-6pm				