Linear Algebra

Summer B: 7/5/2022-8/12/2022

Instructor:	Alvaro Martinez (he/him)	**Time:**	MTWTh 14:45-16:20
Email:	alm2297@columbia.edu	**Office hours:**	MW 13:30-14:30
Website:	math.columbia.edu/ martinez		
TA:	Kevin Chang (he/him)		
Email:	kyc2130@columbia.edu	**Office hours:**	Th 10:00-12:00, 16:00-17:00

Textbook: The textbook for this class is

Linear algebra with applications, Otto Bretscher, Fifth Edition.

Course content: Systems of linear equations, linear transformations as matrices, determinants, subspaces. Bases, change of basis, eigenvalues and eigenvectors. Euclidean spaces, orthogonality, orthogonal diagonalization. Time permitting, singular value decomposition.

Homework: Homework is due every Friday (at 23:59pm), to be uploaded to **Gradescope**. It will be graded by Monday by the TA for the class, Kevin. At the end of the course, the lowest homework score will be dropped. Late submissions will be accepted if justified, but they will be graded separately by the instructor (to avoid placing an undue burden on the grader).

You're highly encouraged to discuss the problems with your classmates – the best way to learn is to think hard about a problem on your own until you either solve it or get really stuck, then to ask someone else how they thought about it.

Pre-class quizzes: There will be a short quiz on **Courseworks** before every lecture (open from the end of the previous lecture up until 2.40pm of the day of the lecture). This will typically involve watching a short video and answering some questions about it. You will be expected to have completed these *before* the class. The goal is that you have some basic familiarity with the day's topic so that you can get the most out the lecture.

In-class exercises: Towards the end of each lecture (time permitting) you will work in groups to solve some exercises relating the pre-class quiz with the lecture. The answers will be collected at the end of the class. You will not be expected to finish them, all honest attempts will be awarded full points. Part of the goal is that you continue to learn to communicate mathematical ideas with others.

Feedback forms: These will be anonymous quizzes on Courseworks. They will serve to estimate the best pace for the class, help identify concepts that weren't explained clearly, and your general perceived progress. They will be available on **Courseworks** up until Friday at 23:59.

Extra credit project (optional): You may choose to do a project (preferably in groups of 2-3) exploring a connection of Linear Algebra with a topic of your choice. A list of potential topics will be available on Courseworks, but you are welcome to suggest your own. The format is flexible. It will typically be either a written document (you're highly encouraged to use LaTeX, but you may use any text editor) of ∼2-5 pages or a ∼20 minute oral presentation (to be seen by the instructor and the TA only).

Exams and grading: There will be an in-class midterm and a final. Your overall grade will be determined by:

- Final: 30%

- Midterm: 20%

- Homework: 25%

- Pre-class quizzes: 10% (5% participation, 5% evaluation)

- In-class exercises: 10% (participation based)

- Feedback forms: 5% (participation based)

- Extra credit project: 10%

There will be no midterm makeups, however, if the grade of the final is higher than that of the midterm (for instance, if you miss the midterm), the grade of the final will be used for both.

Important Dates:

Midterm .... Tuesday, July 19
Extra Credit Project Deadline .... Monday, August 8
Final Exam .... Tentatively 8/10-8/12 (TBD)

The date of the final is a provisional one estimated by the university administration and is subject to change.

Getting help: If you are stuck, please come to my or Kevin's office hours. Besides the office hours, help is available without appointment in the Mathematics Help Room (room 406 in the Math department) 9am-5pm Monday to Thursday. The Help Room is staffed by both grad and undergrad TA's who can help you with questions related to this course. Your classmates are also a great resource – discussing the material with them can help prevent getting stuck on a specific point, and will teach you how to express mathematical ideas to others.

Disability services: To receive disability-related academic accommodations for this course, students must first be registered with their school Disability Services (DS) office. Detailed information is available online for both the Columbia and Barnard registration processes. Refer to the appropriate website for information regarding deadlines, disability documentation requirements, and drop-in hours. For this course, students registered with the Columbia DS office can refer to the "Courses that do not require professor signature" section of the DS Testing Accommodations page for more information about accessing their accommodations.