MA 110AB: Fall 2025   **Introduction to Linear Algebra**
Mathematics   *Albert Nerken School of Engineering at The Cooper Union*

Course Descripton:	Vectors in two- and three- dimensions, vector algebra, inner product, cross product, and applications, analytic geometry in three dimensions (lines, planes, spheres); matrix algebra, the solution of systems of linear equations, determinants, inverses, and basic properties of the complex number system. *2 credits. Prerequisite: none*
Instructor:	Mili Shah (mili.shah@cooper.edu) 41 Cooper Room 311
Lectures:	Tuesdays, 41 Cooper Room 502 Wednesdays, 41 Cooper Room 506
Office Hours:	Wednesdays 1:0PM-2:00PM or by appointment, 41 Cooper Room 311
Participation:	Please contribute to the classroom environment by asking questions and participating in discussions. Your interaction will be considered when assigning borderline grades, as will improving performance throughout the course of the semester.
Grading:	10% Homework, 15% Quizzes, 45% Exams, 30% Final
Homework:	Homework problems are posted on the following page. Grading on the homework will be based on completeness and a random subset will be graded. Similar homework will be presented on quizzes, exams, and finals. Homework will be due at the beginning of class on Tuesdays. Collectively, homework will constitute 10% of the final grade. The lowest individual homework grade will be dropped.
Quizzes:	There will be quizzes given throughout the semester due Mondays at 11:59pm. These will be based on problems from the previous week. As a result, please do the homework **before** attempting the quiz. Collectively, these quizzes will constitute 15% of the final grade. The lowest individual quiz grade will be dropped.
Exams:	Two exams and one final (split over two final exam days) will be given during the semester. You may not use outside resources: calculators, other students, other books, etc. The first exam will constitute 20% of your total grade, the second exam 25%, and the final will constitute 30% of your total grade. Exam 1: Wednesday, October 1 Exam 2: Wednesday, November 19 Final Exam I: Tuesday, December 16 Final Exam II: Wednesday, December 17 *Note: I reserve the right to adapt exam dates.*
Assessment:	Quizzes will be posted on the website `https://webwork-hosting.runestone.academy/webwork2/cooper-shah-ma110-fall2025/` Your initial login is your Cooper username and your password is your Cooper ID number.
Late policy:	No quiz, exam, or final may be made up without prior arrangement or a written excuse.
Text:	-Cuoco, A., Waterman, K. Kerins, B. Kaczorowski, E., Manes, M., *Linear Algebra and Geometry*, AMS/MAA, Vol. 46, 2019. `https://bit.ly/4n1addA` -Anton, H., *Elementary Linear Algebra*, 9th edition, Chapter 10 `https://bit.ly/45yJtet` -Stein, Sherman K., and Anthony Barcellos. Calculus and Analytic Geometry. New York: McGraw-Hill, 1992. `http://bit.ly/3UKSqes`
Disabilities:	If you believe you are entitled to an accommodation on assessments through the Americans with Disabilities Act, you must self-identify to the Office of the Dean of Students and meet with me during the first week of the term to discuss arrangements for meeting your accommodation.

Timeline

Please note that this schedule is tentative and will likely be adjusted as the semester progresses.

Week	Schedule
9/2/2025	1.1: 7, 9, S&B12.1.13
	1.2: 4(adg), 7, 9(cd), 11(a), S&B12.4.44
	1.3: 1(efg), 2(efg), 7(b), 10, 11, 15, S&B12.1: 13, 34, 36,37
9/9/2025	1.4: 2(abc) Compute $\|A\|, \|B\|$, 3(ade), 13, 15, S&B12.1: 21, 28
	2.1: 1(adf), 3(bdh), 5(cdh), 6(abdh)
	2.2: 1(d(ii),d(iv)), 2, 4, 9, 11(a), 12, 20, 22, 26, 35, S&B12.3: 37, 38
9/16/2025	2.3: 1,2,5, 9, 13, 14(c), S&B12.2: 23, S&B12.3: 19
	2.4: 1(c,e),2(b) draw triangle,5,8,13,16, S&B12.3: 25
	2.5: 1(d) do directly and by vector identity ,2,4,8,11,19, S&B12.6: 29,30
9/23/2025	2.6: 1(acf), 2(adf), 3(a), 5(ac), 9-11, 14, 17, 18, S&B12.7: 8,1017,18,21
9/30/2025	**Exam 1 on Wednesday October 1**
10/7/2025	3.1: 2, 4, 5, 7(bc), 9(abcd), A10th.1.1.15, A10th.1.1.17
	3.2: 1-3, 5, 6, 8(adh), 9, 11(a)
10/14/2025	3.3: 1, 2, 5(cef), 7, 8, 10, 11
10/21/2025	3.4: 1(abfg), 2, 3, 4, 5, 14
	3.5: 1, 2, 3(ab), 4(b), 5(adf), 6-9, 11, 13-15
10/28/2025	4.1: 7, 8, 9
	4.2: 2, 3(d), 5(i), 7(aef), 9(fg), 11(cf), 12
	4.3: 3, 6, 11(f)
	4.4: 1(acd), 4, 9, 10(bde), 15, 17, 20, 22, 24, 27
11/4/2025	4.5: 1, 3, 11, 13, 14, 22, 28, 29
	4.6: 2, 3, 4, 14(ace), 15, 18, 26, 28
11/11/2025	5.1: 1, 3, 10, 11, 13, 15
	5.2: 1(a,d,e,h), 2(h), 3(c,e), 5,6,7,10(c),13,18,24,25,27
	5.3: 1(f),2(c),5,6,8(a,f,g),22
11/18/2025	**Exam 2 on Wednesday November 19**
11/25/2025	**Thanksgiving**
12/2/2025	5.4: 1, 2, 4, 8, 10, 13, S&B12.5: 23
	9.1: 1-3, 6-8
	9.2: 1(aegj), 3, 5(c), 7(adf), 11, 14, S&B12.5: 17
	9.3: 1, 2, 4(cdm), 5, 6
12/9/2025	10.1 (A9th): 1, 2, 4(bcd), 7(b), 8(a), 10(cd), 20(c), 21, 30; optional/recommended: 29
	10.2 (A9th): 1(bce), 2(bde), 6(ad), 13, 17, 27, 28, 36, 37, 38, 40
	10.3 (A9th): 3(abcf), 6(ab), 7(def), 11, 18, 20, 21
12/16/2025	**Final Exam Part I**
12/17/2025	**Final Exam Part II**