DATE	LECTURE	TOPICS	READING	HOMEWORK
Friday, August 22, 2025	1	**Introduction to the course**: Syllabus, etc. **Linear equations in linear algebra**: Systems of linear equations.	Lay Section 1.1	HW 1a Lay Section 1.1: 1, 3, 14, 20, 30, 37.
Monday, August 25, 2025	2	**Linear equations in linear algebra:** Row Reduction and Echelon Form**.**	Lay Section 1.2 Here are some slides on the Reduced Row Echelon form of a matrix: https://math.colorado.edu/~casa/teaching/25fall/2130/notes/row_reduction/row_reduction.pdf	HW 1b Lay Section 1.2: 1, 2, 7, 16, 41, 42.
Wednesday, August 27, 2025	3	**Linear equations in linear algebra**: Vector equations, span, row span, column span, and the matrix equation Ax = b.	Lay Sections 1.3-4	HW 1c Lay Section 1.3: 1, 22, 41. Lay Section 1.4: 10, 12, 15.
Friday, August 29, 2025	4	**Linear equations in linear algebra**: Solution sets of linear systems.	Lay Section 1.5 Here are some slides on solving systems of linear equations with the modified matrix: https://math.colorado.edu/~casa/teaching/25fall/2130/notes/modified_matrix/modified_matrix.pdf	**HW 1 DUE** Solution to 1.1.20 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/1_1_20/1_1_20.pdf Solution to 1.2.7 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/1_2_7/1_2_7.pdf _____ HW 2a Lay Section 1.5: 2, 7, 12, 20, 24, 32.
Monday, September 1, 2025		**NO CLASS**	**LABOR DAY**	**NO CLASS**
Wednesday, September 3, 2025	5	**Linear equations in linear algebra**: Applications of linear systems, *a homogeneous system in economics, balancing chemical equations, network flow.*	Lay Section 1.6	HW 2b Lay Section 1.6: 3, 6, 11.
Friday, September 5, 2025	6	**Linear equations in linear algebra**: Linear independence.	Lay Section 1.7	**HW 2 DUE** Solution to 1.5.20 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/1_5_20/1_5_20.pdf Solution to 1.6.11 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/1_6_11/1_6_11.pdf _____ HW 3a Lay Section 1.7: 2, 6, 22, 24, 26, 28.
Monday, September 8, 2025	7	**Linear equations in linear algebra**: Introduction to linear maps ("transformations" or "mappings"), isomorphisms, and the matrix of a linear transformation.	Lay Sections 1.8-9	HW 3b Lay Section 1.8: 3, 22, 37. Lay Section 1.9: 2, 14, 38.
Wednesday, September 10, 2025	8	**Linear equations in linear algebra**: Appications: Linear models in business, science, and engineering, *constructing nutritious meals, linear equations and electrical networks, difference equations* .	Lay Section 1.10	HW 3c Lay Section 1.10: 1, 10, 11.
Friday, September 12, 2025	9	**Matrix algebra**: Matrix operations, inverse of a matrix, characterizations of invertible matrices.	Lay Sections 2.1-3	**HW 3 DUE** Solution to 1.9.2 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/1_9_2/1_9_2.pdf Solution to 1.9.38 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/1_9_38/1_9_38.pdf _____ HW 4a Lay Section 2.1: 2, 6, 31. Lay Section 2.2: 7, 10, 23. Lay Section 2.3: 4, 12, 35.
Monday, September 15, 2025	10	**Matrix algebra**: Partitioned matrices, matrix factorization, LU factorization.	Lay Sections 2.4-5	HW 4b Lay Section 2.4: 2, 5, 17. Lay Section 2.5: 1, 24, 25.
Wednesday, September 17, 2025	11	**Matrix algebra**: *The Leontief input-output model* .	Lay Section 2.6	HW 4c Lay Section 2.6: 1, 2, 5.

Friday, September 19, 2025	12	**Matrix Algebra**: *Applications to computer graphics* .	Lay Section 2.7	**HW 4 DUE** Solution to 2.2.10 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/2_2_10/2_2_10.pdf Solution to 2.5.24 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/2_5_24/2_5_24.pdf _____ HW 5a Lay Section 2.7: 2, 3, 4, 13, 19, 20.
Monday, September 22, 2025	13	**Review**		
Wednesday, September 24, 2025	14	**Review practice exam**	Practice exam and solutions https://math.colorado.edu/~casa/teaching/25fall/2130/sample_exams/sample_midterm1.pdf https://math.colorado.edu/~casa/teaching/25fall/2130/sample_exams/sample_midterm1_sols.pdf	
Friday, September 26, 2025		**MIDTERM I**		
Monday, September 29, 2025	15	**Matrix Algebra**: Subspaces of RR^n, column space, kernel ("null space"), basis for a subspace, basis for the kernel, basis for the column space, dimension, rank, rank-nullity theorem ("rank theorem").	Lay Sections 2.8-9	HW 5b Lay Section 2.8: 2, 5, 16. Lay Section 2.9: 4, 19, 18. (Number 19 was meant to be number 9.)
Wednesday, October 1, 2025	16	**Review exam**		
Friday, October 3, 2025	17	**Determinants**: Introduction to determinants, properties of determinants.	Lay Sections 3.1-2	**HW 5 DUE** Solution to 2.7.3 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/2_7_3/2_7_3.pdf Solution to 2.9.4 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/2_9_4/2_9_4.pdf _____ HW 6a Lay Section 3.1: 2, 5, 11. Lay Section 3.2: 2, 7, 28.
Monday, October 6, 2025	18	**Determinants**: Inverse formula, Cramer's Rule, cofactor matrix ("adjugate"), volume, linear maps ("transformations").	Lay Section 3.3	HW 6b Lay Section 3.3: 1, 6, 8, 18, 26, 27.
Wednesday, October 8, 2025	19	**Vector spaces**: Vector spaces and subspaces, linear maps ("transformations"), isomorphisms, span, kernel ("null space"), source ("domain"), target ("codomain"), image ("range"), column space, row space.	Lay Sections 4.1-2 You may also want to take a look at the following pdf: https://math.colorado.edu/~casa/teaching/25fall/2130/notes/linear_algebra.pdf	HW 6c Lay Section 4.1: 2, 6, 24. Lay Section 4.2: 2, 8, 26.
Friday, October 10, 2025	20	**Vector spaces**: Linear independence, basis, cooridnate systems, dimension.	Lay Sections 4.3-5	**HW 6 DUE** Solution to 4.1.6 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/4_1_6/4_1_6.pdf Solution to 4.2.26 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/4_2_26/4_2_26.pdf _____ HW 7a Lay Section 4.3: 4, 5. Lay Section 4.4: 2, 10. Lay Section 4.5: 1,9.
Monday, October 13, 2025	21	**Vector spaces**: Change of basis.	Lay Section 4.6	HW 7b Lay Section 4.6: 1, 2, 5, 8, 11, 16.
Wednesday, October 15, 2025	22	**Vector spaces**: *Digital signal processing.*	Lay Section 4.7	HW 7c (optional) Lay Section 4.7: 2, 8, 13, 14, 16, 26.
Friday, October 17, 2025	23	**Vector spaces**: *Applications to difference equations* .	Lay Section 4.8	**HW 7 DUE** Solution to 4.5.9 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/4_5_9/4_5_9.pdf Solution to 4.2.26 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/4_6_5/4_6_5.pdf _____ HW 8a Lay Section 4.8: 5, 9, 16, 17, 28, 31.

Monday, October 20, 2025	24	**Eigenvectors and eigenvalues**: Introduction to eigenvectors and eigenvalues.	Lay Section 5.1	HW 8b Lay Section 5.1: 2, 7, 22, 24, 35, 37.
Wednesday, October 22, 2025	25	**Eigenvectors and eigenvalues**: Characteristic polynomial and equation.	Lay Section 5.2	HW 8c Lay Section 5.2: 1, 9, 15, 22, 24, 32.
Friday, October 24, 2025	26	**Eigenvalues and eigenvectors**: Diagonalization.	Lay Section 5.3	**HW 8 DUE** Solution to 4.8.16 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/4_8_16/4_8_16.pdf Solution to 5.2.24 https://math.colorado.edu/~casa/teaching/25fall/2130/hw/5_2_24/5_2_24.pdf _____ HW 9a Lay Section 5.3: 1, 5, 22, 30, 33, 37.
Monday, October 27, 2025	27	**Review**		
Wednesday, October 29, 2025	28	**Review practice exam**	Practice exam and solutions https://math.colorado.edu/~casa/teaching/25fall/2130/sample_exams/sample_midterm2.pdf https://math.colorado.edu/~casa/teaching/25fall/2130/sample_exams/sample_midterm2_sols.pdf	
Friday, October 31, 2025		**MIDTERM II**		
Monday, November 3, 2025	29	**Eigenvectors and eigenvalues**: Eigenvalues and linear maps ("transformations").	Lay Section 5.4	HW 9b Lay Section 5.4: 2, 6, 10, 15, 27, 28.
Wednesday, November 5, 2025	30	**Review exam**		
Friday, November 7, 2025	31	**Eigenvalues and eigen vectors**: Complex eigenvalues.	Lay Section 5.5	**HW 9 DUE** HW 10a Lay Section 5.5: 1, 2, 8, 14, 27, 28 (Exercise 28 is FALSE as stated -- see if you can find the error -- the solution, when posted, will explain the error).
Monday, November 10, 2025	32	**Eigenvalues and eigen vectors**: *Discrete dynamical systems.*	Lay Section 5.6	HW 10b Lay Section 5.6: 1, 2, 6, 8, 12, 18.
Wednesday, November 12, 2025	33	**Eigenvalues and eigen vectors**: *Applications to differential equations.*	Lay Section 5.7	HW 10c Lay Section 5.7: 1, 2, 4, 7, 9, 10.
Friday, November 14, 2025	34	**Eigenvalues and eigen vectors**: *Applications to Markov chains.*	Lay Section 5.9	**HW 10 DUE** HW 11a Lay Section 5.9: 1, 2, 6, 10, 15, 16.
Monday, November 17, 2025	35	**Orthogonality and least squares**: Inner product, dot product, length, orthogonality, orthogonal sets, orthogonal projection.	Lay Sections 6.1-2	HW 11b Lay Section 6.1: 20,30, 38. Lay Section 6.2: 3, 11, 34.
Wednesday, November 19, 2025	36	**Orthogonality and least squares**: Orthgonal projection, Gram-Schmidt.	Lay Sections 6.3-4	HW 11c Lay Section 6.3: 1, 12, 22. Lay Section 6.4: 4, 10, 23.
Friday, November 21, 2025	37	**Orthogonality and least squares**: Least squares problems.	Lay Section 6.5	**HW 11 DUE** HW 12a Lay Section 6.5: 2, 6, 12, 27, 28, 30.
Monday, November 24, 2025		**NO CLASS**	**THANKSGIVING BREAK**	**NO CLASS**
Wednesday, November 26, 2025		**NO CLASS**	**THANKSGIVING BREAK**	**NO CLASS**
Friday, November 28, 2025		**NO CLASS**	**THANKSGIVING BREAK**	**NO CLASS**
Monday, December 1, 2025	38	**Orthogonality and least squares**: *Machine learning and linear models.*	Lay Section 6.6	HW 12b Lay Section 6.6: 1, 2, 5, 13a, 20, 25.
Wednesday, December 3, 2025	39	**Review**		
Friday, December 5, 2025	40	**Review practice exam**		**HW 12 DUE**
Tuesday, December 9, 2025		**FINAL EXAM Tuesday, December 9, 2025, 1:30 PM -- 4:00 PM MEUN E064 (Lecture Room)**	EXAM SCHEDULE	