EK 103 (Spring 2025): Our class calendar, homework schedules, and weekly reading list

Week	Lectures (theme)	Topics	Readings (Lay, 6 th Ed)	Homeworks: Usually issued and due on Thursdays !
Week 1 (1/21, 1/23)	1 - 2 (basics)	Intro and course overview Vectors: Lengths, dot products, and angles Intro to matrices: How to multiply them using dot products	Ch. 6.1: pages 349 – 354 (up to Pythagorean Theorem Ch. 6.1: page 355 (Equation 2 on angles between 2 vectors) Ch. 2.1: pages 121 – 127 (especially the dot product methods in Examples 5, 6) Ch. 1.3 (optional): pages 50-55 (especially Example 5)	PS 1 issued Thurs 1/23
Week 1 (1/28, 1/30)	3 -4 (basics)	Matrices as linear transformations (Ax = b)	Ch. 1.9: page 76 - 80 Example 3 on rotations, and the operations in Table 1-4	PS 1 due Thurs 1/30 PS 2 issued
Week 3 (2/4, 2/6)	5 – 6 (Ax = b)	Systems of linear equations: Ax = b Solution existence + uniqueness for Ax = b Row reduction to upper-triangle [U c] Row reduction using augmented matrices [A b] Reduced row echelon form (RREF)	Ch. 1.1 Ch. 1.2 Ch. 1.2 (continued)	PS 2 due Thurs 2/6 PS 3 issued
Week 4 (2/11, 2/13)	7 – 8 (Ax = b)	Vector equations and span (Ch. 1.3) Ax = b as linear combo of column vectors Complete solutions to Ax = b	Ch. 1.3 Ch. 1.4 Ch. 1.5 Ch. 1.6	PS 3 due Thurs 2/13 PS 4 issued
Week 5 (<mark>2/18</mark> , 2/20)	n/a - 9 (Ax = b)	Tues 2/18: No class (Monday schedule) 	 Ch. 1.7	PS 4 due Thurs 2/20 No new PS issued on 2/20 b/c of exam

Week 6 (2/25, <mark>2/27</mark>)	10 - 11 (Ax = b)	Matrix inverses Matrix inverses (continued); exam review Exam 1 : Covers Lestures 1 - 8 (up to complete	Ch. 2.3: Theorem 8 (Invertible Matrix Theorem)	PS 5 issued Thurs 2/27
Fri 2/28	*	solutions to $Ax = b$) and PSets 1, 2, 3, and 4		
Week 7 (3/4, 3/6)	12 - 13 Vector spaces + (Ax = b)	Brief overview of vector spaces + subspaces Nullspace N(A), linear independence, and Ax = 0 Column spaces: C(A) Row spaces: C(A ^T) Basis vectors + linear independence Dimensions, rank, and their relationship with the inverse of A	Subspaces readings: Ch. 2.8: pages 155 - 156 Ch. 4.1: pages 202 - 207 Nullspace and column space: Ch. 4.2: pages 211- 215 215 - 217 (table) Row space: Ch. 4.2: page 215 (Example 5) Basis vectors : Ch. 4.3, pages 222 - 224 Basis sets and pivot columns: Ch. 4.3: pages 225 - 228 (Examples 8, 9, 10, 11) Dimensions: Ch. 4.5: pages 241 - 243 Rank of A (column space) versus A^{T} (row spaces): Ch. 4.5: pages 244 - 246	PS 5due Thurs 3/6 PS 6 issued Thurs 3/6 (Will be a longer homework spanning over spring break, due Thurs 3/20
Sat 3/8 - Sun 3/16		Spring break !!!!!!!! =)		
Week 8 (3/18, 3/20)	14 - 15 (Av = λv)	Basis + dimensions: Auxiliary issues Intro to determinants Determinants (continued) Intro to eigenvalues / eigenvectors	Determinants: Ch. 3.1 Ch. 3.2 Ch. 3.3: pages 189 – 195 (don't worry about Cramer's Rule)	PS 6 due Thurs 3/20 PS 7 issued
Week 9 (3/25, 3/27)	16 – 17 (Av = λv)	Eigenvalues / eigenvectors (part 1)	Ch. 5.1	PS 7 due Thurs 3/27 PS 8 issued

		Eigenvalues / eigenvectors (part 2): Repeated eigenvalues / degenerate eigenvectors	Ch. 5.2: pages 282 – 285 (skip similarity and dynamical sys.)	
Week 10 (4/1, 4/3)	18 – 19 (Av = λv)	Diagonalizations Powers of A and diagonalizations: A ^k = P D ^k P ⁻¹ Power method Markov chains and transition probabilities Fun examples for Markov chains (ie. Google PageRank, or others)	Diagonalizations and the proof of the <u>eigenvalue equation in</u> <u>matrix form</u> (AP = PD) on p. 291: Intro to eigenvalues: Ch. 5.3: pages 290 – 291 Repeated eigenvalues and if it's diagonalizable or not: Ch. 5.3: pages 292 – 294, Examples 3, 4, 6 Power of A: Ch. 5.3: pages 290, Example 2 The power method for finding dominant λ 's and \vec{v} 's: Ch. 5.8: page 329 – 332 (skip "inverse power" method) Markov matrices: Ch. 5.9: pages 335 – 342	PS 8 due Thurs 4/3 No new PS issued on 4/3 b/c of exam
Week 11 (4/8, 4/10)	20 – 21 Ortho- gonality	Projections onto a line Projection matrices P = A (A ^T A) ⁻¹ A ^T Projections onto a subspace	Orthogonality and projections onto a line: Ch. 6.2: pages 358 – 364 Projections onto a subspace: Ch. 6.5: pages 382 – 386 (Figure 2 on p. 383 is the key diagram)	PS 9 issued Thurs 4/10
Fri 4/11	*	Exam 2 : Covers Lectures (1 – 19, up to Power method) and PSets 1 - 8		
Week 12 (4/15, 4/17)	22 – 23 Ortho- gonality	Least-squares (part 1) Least-squares (part 2) Applications of least-square	Least-squares fitting: Ch. 6.6: pages 390 - 396	PS 9 due Thurs 4/17 PS 10 issued

Week 13 (4/22, 4/24)	24 – 25 (Ortho- gonality	Orthogonal matrices Symmetric matrices and diagonalizations	Diagonalizations of a symmetric matrix A: (A = PDP ^T): Ch. 7.1: pages 419 – 421 (skip spectral theorem Orthogonal matrices "U": Ch. 6.2: pages 362 – 364	PS 10 due Thurs 4/24
		Applications, review, and synthesis of linear algebra problems in science + engineering		PS 11 issued
Week 14 (4/29, 5/1)	26 -27 (Appli- cations)	Applications, review, and synthesis of linear algebra problems in science + engineering (continued)		PS 11 due Thurs 5/1
Thurs 5/1		Last day of class yaaaaaaayy !!! =)		
Finals week (Mon 5/5 – Fri5/10)	*	Final exam (to-be-determined date !)		