<div align="center">**Class schedule: Math 8530, Fall 2023**</div>

Week 1: 8/23–8/25. Course overview Wednesday. Lecture for 10 minutes Wed, and on Friday, covering Section 1 slides, p. 1–11. Corresponding YouTube videos:

- Lecture 1.1: Vector spaces and linearity
- Lecture 1.2: Spanning, independence, and bases (0:00–32:50)

Week 2: 8/28–9/1. HW 1 due Friday. One in-class lecture Monday, up to Lecture 1.4, (0:00–32:30). Watch the rest of Section 1 asynchronously. Corresponding YouTube videos:

- Lecture 1.2: Spanning, independence, and bases (32:50–39:25).
- Lecture 1.3: Direct sums and products
- Lecture 1.4: Quotient spaces
- Lecture 1.5: Dual vector spaces
- Lecture 1.6: Annihilators

Week 3: 9/4–9/8. Labor Day Monday. HW 2 due Friday. Corresponding YouTube videos:

- Lecture 2.1: Rank and nullity
- Lecture 2.2: Applications of the rank-nullity theorem

For Monday: Watch Lecture 2.3: *Algebra of linear maps*.

Week 4: 9/11–9/15. HW 3 due Friday. Three lectures.

- Lecture 2.4: The four subspaces.
- Lecture 2.5: The transpose of a linear map
- Lecture 2.6: Matrices
- Lecture 2.7: Change of basis

Week 5: 9/18–9/22. HW 4 due Friday. Three lectures.

- Lecture 3.1: Determinant prerequesites (15:05–27:10)
- Lecture 3.2: Symmetric and skew-symmetric multilinear forms
- Lecture 3.3: Alternating multilinear forms
- Lecture 3.4: Determinants of linear maps

Week 6: 9/25–9/29. HW 5 due Friday. Three lectures.

- Lecture 3.5: The determinant and trace of a matrix
- Lecture 3.6: Minors and cofactors (0:00–25:06)
- Lecture 3.7: Tensors

For Monday: Finish watching Lecture 3.6: *Minors and cofactors* (25:07–31:33).

Week 7: 10/2–10/6. HW 6 due Friday. 2 lectures, but with time spent going over HW 6 on Wednesday. Friday's class canceled and done asynchronously.

- Lecture 4.1: Eigenvalues and eigenvectors
- Lecture 4.2: The Cayley-Hamilton theorem
- Lecture 4.3: Generalized eigenvectors

Week 8: 10/9–10/13. HW 7 due Friday. Three lectures.

- Lecture 4.4: Invariant subspaces
- Lecture 4.5: The spectral theorem
- Lecture 4.6: Generalized eigenspaces
- Lecture 4.7: Jordan canonical form

Week 9: 10/16–10/20. No class Monday (Fall Break). Midterm 1 Wednesday. HW 8 due next Tuesday. One lecture.
- Lecture 4.8: Generalized eigenvectors of differential operators

Week 10: 10/23–10/29. Three lectures. HW 8 due Tuesday.
- Lecture 5.1: Inner products and Euclidean space
- Lecture 5.2: Orthogonality
- Lecture 5.3: Gram-Schmidt and orthogonal projection (0:00–11:08)

Week 11: 10/30–11/3. Three lectures. HW 9 due Tuesday.
- Lecture 5.3: Gram-Schmidt and orthogonal projection (11:09–52:29)
- Lecture 5.4: Adjoints
- Lecture 5.5: Projection and least squares
- Lecture 5.6: Isometries

Week 12: 11/6–11/10. Three lectures. HW 10 due Tuesday.
- Lecture 5.7: Norms of linear maps
- Lecture 5.8: Sequences and convergence (skipped)
- Lecture 5.9: Complex inner product spaces
- Lecture 6.1: Quadratic forms

Week 13: 11/13–11/17. Three lectures. HW 12 due Tuesday.
- Lecture 6.2: Spectral resolutions
- Lecture 6.3: Normal linear maps
- Lecture 6.4: The Rayleigh quotient (0:00–30:00).

Week 14: 11/20–11/24. One lecture. Thanksgiving break Wed–Fri. HW 12 due Tuesday.
- Lecture 6.4: The Rayleigh quotient (30:00–53:09).

Week 15: 11/27–12/1. Two lectures. Midterm 2 Wednesday. HW 13 due Friday.
- Lecture 6.5: Self-adjoint differential operators
- Lecture 7.1: Definiteness and indefiniteness
- Lecture 7.2: Nonstandard inner products and Gram matrices (0:00–5:00).

Week 16: 12/4–12/8. Three lectures. HW 14 due Friday.
- Lecture 7.2: Nonstandard inner products and Gram matrices (5:00–40:48)
- Lecture 7.3: Polar decomposition
- Lecture 7.4: Singular value decomposition
- Lecture 7.5: The partial order of positive maps (quick summary).
- Lecture 7.6: Monotone matrix functions (quick summary).