Math 455 Schedule  
Fall 2001  
Text: “Principles of Applied Mathematics” by Keener

- REVIEW: Finite Dimensional Linear Algebra.\footnote{It is expected that all students will have a fairly strong background in linear algebra including eigenvalues, eigenvectors etc. The first few lectures will review this material, and hopefully introduce some less familiar material.}
  - Spectral theorem for Symmetric Matrices
  - Fredholm Alternative
  - Matrix Norms
  - Minimax Characterization of eigenvalues
  - Discrete Fourier Transform / FFT
  - Haar Wavelets

- Chapter 2: Function Spaces
  - Complete metric spaces
  - Completeness of polynomials (Stone-Weierstrauss)
  - Orthogonal Polynomial Bases
  - Wavelet Bases
  - Approximation in Hilbert Spaces

- Chapter 3: Integral Equations/Compact Operators
  - Spectral Theory for Compact Operators
  - The resolvent
  - Approximate solutions/ Contraction Mapping Thm.
  - Singular integral equations

- Chapter 4: Differential/Unbounded Operators
  - Distributions/ the Delta function
  - Green’s Functions
  - Domain of a differential operator
  - Eigenfunctions of a differential operator

- Chapter 5: Calculus of Variations
  - Euler Lagrange equations
  - Hamilton’s Principle
  - Eigenvalue problems/ minmax problem.
• Chapter 7: Spectral Theory (Unbounded Operators)
  • Fourier Transform
  • Laplace Transform
  • Z Transform
  • Additional Topics as time permits.

This exact topics covered and emphasis may vary somewhat depending on the interests of the class.