• **Instructor:** Professor Atanas Stefanov

• **Office:** Snow 615, Phone: 4-3009

• **Office Hours** By appointment.

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• **Prerequisite:** Math 646 or higher, Math 810 or consent of the instructor.

• **Goals** To expose students to the techniques of the modern theory of functional analysis with applications arising in the theory of optimizations and partial differential equations.

• **Text:**

• **Topics:**
  – Hilbert and normed linear spaces, Banach spaces (Chapters 5 and 6, brief introduction)
  – Weak and Weak* topologies on Banach spaces and applications to: divergence of Fourier series; Galerkin’s method for solving PDE’s and the representations of analytic functions with positive real part. (Chapters 10, 11, parts of Chapter 12).
  – Bounded linear operators (Chapter 15 and parts of 16)
  – Commutative Banach algebras and (analytic) functional calculus (Chapters 17, 18, 19)
  – Compact symmetric operators in Hilbert space (Chapters 28, 29).
  – Spectral theory of Symmetric, normal and unitary operators (Chapter 31)
    - properties of the spectrum, functional calculus and spectral resolutions.

  Time permitting, we might look into the theory of semigroups of operators and applications to PDE’s (Chapters 34, 36).

• **Homework:** There will be three homework assignments covering specific portions of the material.