

MATH 401: GREEN'S FUNCTIONS AND VARIATIONAL METHODS

Topics

- Green's function for ODEs. (Distributional calculus with delta functions, BVPs for ODEs, Solvability Conditions, Generalized Green's functions). (2.5 weeks)
- Green's function for Elliptic, Parabolic, and Hyperbolic PDEs. (Method of Images, Separation of Variables, Integral representations, and applications to Electromagnetics) (3.5 weeks)
- Eigenfunction Expansions, Distribution of Eigenvalues, and Approximation of Eigenvalues (3 weeks).
- Calculus of variations and the optimization of functionals for ODEs and PDEs (3.5 weeks).

Prerequisites

- Differential Equations: Math 215/316, 255/257, and Math 400.
- Some exposure to Physics is an asset.

References There is no official text for the course as I will provide a detailed set of online notes. However, the following references may be helpful.

- Zauderer: Partial Differential Equations of Applied Math
- Stakgold: Green's Functions and Boundary Value Problems
- Courant and Hilbert: Methods of Math. Physics Vol. 1 and 2.
- Gelfand and Fomin: Calculus of Variations

Instructor and Grading

- Michael Ward, Room 1217 Math Annex, 604-822-5869. Office Hours TBA
- There will be 1 midterm and (roughly) weekly homework assignments. The grading scheme is 30% for the midterm, 20% for the homeworks and 50% for the final exam.