# MATH 400: Applied Analysis

## Topics

- Method of Characteristics for First Order Equations: Traffic Flow; Shocks; Eikonal Equation, Modeling.
- Sturm Liouville Theory, Separation of Variables, Eigenfunction Expansions, Special Functions (Bessel functions, etc.)
- Diffusion Equation and Modeling: Analysis by Eigenfunction Expansion, Laplace and Fourier Transform, Max-Min principle.
- Wave Equation and Modeling: Analysis by Eigenfunction Expansion, Laplace and Fourier Transform; D'Alembert's formula in 1-D and multi-dimensions.
- Laplace's Equation: Qualitative Properties, Eigenfunction Expansions, Fourier Transforms.

## Prerequisites

- Differential Equations: Math 215/316 or 255/257;
- Complex variables: One of M300 or M305.
- Some exposure to Physics is helpful. M301 is also very helpful.

## References: Recommended Text

- Strauss: Partial Differential Equations: An Introduction.

## Other References:

- Haberman: Applied Partial Differential Equations
- Carrier and Pearson: PDE's
- Pichover and Rubinstein; Introduction to Partial Differential Equations, Cambridge U. Press.

## Instructor and Office Hours

Michael Ward, Room 1217 Math Annex building: 822-5869.
Office Hours: to be arranged

## Grading

There will be 1 midterm and (roughly) weekly homework assignments. The grading scheme is 30% for the midterm, 20% for the homework, and 50% for the final exam. The Midterm date will be in late October.