Syllabus for Partial Differential Equations

Preparatory Courses: Math 5233. The course “Partial Differential Equations” intends to familiarize students with the formulas and basic properties of solutions to the usual linear partial differential equations, and with some of the techniques in solving the first-order nonlinear partial differential equations.

1) Laplace’s equation: Fundamental solution, mean-value formulas, maximum principle, Liouville’s theorem, Green’s functions for a half-space and for a ball, energy methods.

2) Heat equation: Fundamental solution, solution formula for the initial-value problem in the whole space, energy methods.

3) Wave equation: D’Alembert’s formula, solution formulas for 2-D and 3-D wave equations, reflection method for half-line problems.


5) Other methods of solving partial differential equations: separation of variables, transformation methods (Fourier transform and Laplace transform).