Math 422/522, Partial Differential Equations: Fourier Analysis II, Spring 2013

Class Time:	MWF 10–10:50a.m. in 209 Deady Hall
Instructor:	Dr. Marcin Bownik
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Office Hours:	12–1p.m. Mon. and Fri., 10–11a.m. Tue., or by appointment
Textbook:	*Partial Differential Equations and Boundary-Value Problems with Applications,* by Mark A. Pinsky, 3rd ed., A.M.S.

1. **Background and Goals.** This is the second term of a two term introductory course in Partial Differential Equations (PDEs). Standard processes in nature such as propagation of heat, diffusion through a porous solid, vibrating strings, membranes, and solids, lead to certain differential equations involving one to three spatial variables and one time variable. In the above examples, these equations are known as the "heat equation" and the "wave equation" though there are many versions of these equations depending on the details of the situation. Typically in applications, one might be interested in the solutions to these equations, subject to conditions at the boundary of the object under consideration. An example is the equation of a vibrating string (a version of the wave equation), subject to the constraint that the endpoints of the string remain fixed in place. The goal of this course is to learn how to solve such equations subject to constraints at the boundary of some region. Because so many physical phenomena are governed by equations like this, considerable effort has gone into developing techniques of solution.

   The second term of this course focuses on boundary-value problems in polar and spherical coordinates, Green's functions, and solutions of heat equation using Gauss-Weierstrauss kernel, 3D wave equation, and Laplace's equation in the upper half-space.

2. **Exams.** There will be a midterm in-class exam on Wed. May 8 and a final exam on Tue. June 11 10:15a.m.–12:15p.m.

3. **Homework.** Homework problems will be assigned every week and are due in class on Wednesday on the material of the previous week. No late homework will be accepted.

4. **Grading.** The grading distribution will be as follows:

Homework:	30%
Midterm Exam:	25%
Final Exam:	45%