

**MATH 131P: Partial Differential Equations**  
**Winter 2019**

**Schedule (updated February 23, 2019)**

- 01/07: Introduction and Diffusion-type problems (Lessons 1 and 2)
- 01/09: Heat equations and derivation (Lessons 2 and 4)
- 01/11: Boundary conditions for diffusion-type problems (Lessons 3)
  
- 01/14: Separation of variables (Lesson 5)
- 01/16: Transforming nonhomogeneous BCs into homogeneous ones (Lesson 6)
- 01/18: Solving more complicated problems by separation of variables (Lessons 7)
  
- 01/21: Holiday, no classes.
- 01/23: Solving nonhomogeneous PDEs (eigenfunction expansions) (Lesson 9)
- 01/25: Transforming equations (Lesson 8); Integral transforms (Lessons 10).
  
- 01/28: Fourier series, spectrum (Lessons 11 and 25).
- 01/30: Fourier transform (Lesson 12)
- 02/01: Laplace transform (Lessons 13)
  
- 02/04: More on Laplace transform (Lesson 13)
- 02/06: Duhamel's principle (Lessons 14)
- 02/08: The convection term  $u_x$  in diffusion problems (Lessons 15)
  
- 02/11: **Midterm** (in class)
- 02/13: The wave equation and boundary conditions (Lessons 16 and 19)
- 02/15: The finite vibrating string (standing waves) (Lessons 20 and 25)
  
- 02/18: Holiday, no classes.
- 02/20: The vibrating beam (4th order PDE) (Lesson 21)
- 02/22: The d'Alembert solution of the wave equation (Lesson 17)
  
- 02/25: More on d'Alembert solution (Lesson 18); Classification of PDEs (Lesson 23)
- 02/27: The wave equation in two and three dimensions (Lesson 24)
- 03/01: Superposition principle (Lesson 26)
  
- 03/04: First order equations (Lesson 27)
- 03/06: The Laplacian and boundary value problem (Lesson 31 and 32)
- 03/08: Interior Dirichlet problem for a circle (Lesson 33)
  
- 03/11: Dirichlet problem in an annulus (Lesson 34)
- 03/13: The vibrating drumhead (Wave equations in polar coordinates) (Lesson 30)
- 03/15: Final review