

Math 131P – Partial Differential Equations I

András Vasy, Autumn 2012: SYLLABUS, AS OF DECEMBER 8, 2012

- September 25. Introduction and Diffusion-type problems (Lessons 1 and 2)
- September 27. Boundary conditions for diffusion-type problems and Derivation of the heat equation (Lessons 3 and 4)
- October 2. Separation of variables (Lesson 5)
- October 4. Transforming nonhomogeneous BCs into homogeneous ones and Solving more complicated problems by separation of variables (Lessons 6 and 7)
- October 9. Solving nonhomogeneous PDEs (eigenfunction expansions) (Lesson 9)
- October 11. Transforming hard equations into easier ones and Integral transforms (Sine and cosine transforms) (Lessons 8 and 10)
- October 16. Fourier series and transform (Lesson 11)
- October 18. The Fourier transform and its application to PDEs and The Laplace transform (Lessons 12 and 13)
- October 23. Duhamel's principle and The convection term u_x in diffusion problems (Lessons 14 and 15)
- October 25. Midterm
- October 30. The one-dimensional wave equation (hyperbolic equations) and The d'Alembert solution of the wave equation (Lessons 16 and 17)
- November 1. More on the d'Alembert solution and Boundary conditions associated with the wave equation (Lessons 18 and 19)
- November 6. The finite vibrating string (standing waves) (Lesson 20)
- November 8. The vibrating beam (4th order PDE) and Dimensionless problems (Lessons 21 and 22)
- November 13. Classification of PDEs (canonical form of the hyperbolic equation) (Lesson 23)
- November 15. The wave equation in two and three dimensions (free space) (Lecture 24)
- November 27. First order equations (the method of characteristics) (Lesson 27)
- November 29. Interior Dirichlet problem for a circle and The Dirichlet problem in an annulus (Lessons 33 and 34)
- December 4. The vibrating drumhead (The wave equation in polar coordinates) (Lesson 30)
- December 6. Systems of PDE and Nonlinear first order equations (conservation equations) (Lessons 28 and 29)

Note: The schedule is still subject to change.