Math 220 – Partial Differential Equations of Applied Mathematics
András Vasy, Autumn 2015: PRELIMINARY SYLLABUS, AS OF NOVEMBER 10, 2015

September 22. Introduction, classification of PDEs (Lecture notes, Strauss 1.1, Evans 1.1-1.3)
September 24. Where do PDE come from? (Lecture notes) and
                    First order PDEs: characteristics (Lecture notes, Strauss 1.2, Evans 2.1)
September 29. Quasilinear first order PDEs (Lecture notes, Evans 3.2, John 1.4-1.5)
October 1. Distributions (Lecture notes, Strauss 12.1, John 3.6)
October 6. Distributions, weak solutions, shocks (Lecture notes, Strauss 12.1, Strauss 14.1, John 3.6, Evans 3.4)
October 8. Distributions; Classification of second order equations
                    (Lecture notes, Strauss 1.5, Evans 2.4, John 2.4)
October 13. The wave equation on \( \mathbb{R} \), domain of dependence, propagation of singularities
                    (Lecture notes, Strauss 2.1-2.2)
October 15. Energy conservation for the wave equation; the maximum principle for Laplace’s equation (Lecture notes, Strauss 2.2-2.3, John 4.2)
October 20. Energy conservation for the wave equation; the maximum principle for Laplace’s equation (Lecture notes, Strauss 2.2-2.3, John 4.2)
October 22. The maximum principle and energy decay for the heat equation;
                    energy estimates for Laplace’s equation; the Fourier transform
                    (Lecture notes, Strauss 2.3, 12.3, Evans 4.3.1)
October 27. The Fourier transform and solutions of PDE’s (Lecture notes, Strauss 12.3-12.4)
October 29. Midterm
November 3. Convolutions, solutions of PDE’s by Fourier transform
                    (Lecture notes, Strauss 12.3-12.4)
November 5. Tempered distributions, convolutions, solution of Laplace’s equation
                    and the wave equation in terms of convolutions (Lecture notes)
November 10. Heat and wave equations in half space and on intervals
                    (Lecture notes, Strauss 3.1-3.2, John 5.1)
November 12. Inhomogeneous PDE: Duhamel’s principle (Lecture notes, Strauss 3.3-3.4, Evans 2.4.2, John 5.1)
November 17. Separation of variables, eigenvalue problems (Lecture notes, Strauss 4.1-4.3)
November 19. Inner product spaces and symmetric boundary conditions; Fourier series
                    (Lecture notes, Strauss 5.1-5.3)
December 1. Fourier series (Lecture notes, Strauss 5.1-5.5)
December 3. Convergence of Fourier series (Lecture notes, Strauss 5.4-5.5), Laplace’s equation on the disk (Lecture notes, Strauss 6.3, John 4.3)

Note: The schedule is still subject to change.