Math 220/CME 303 – Partial Differential Equations of Applied Mathematics

András Vasy, Autumn 2018: PRELIMINARY SYLLABUS, AS OF SEPTEMBER 7, 2018

September 25.	Introduction, classification of PDEs (Vasy 1.1-2, Strauss 1.1, Evans 1.1-1.3)
September 27.	Where do PDE come from? (Vasy 2.1-2) and First order PDEs: characteristics (Vasy 3, Strauss 1.2, Evans 2.1)
October 2.	Quasilinear first order PDEs (Vasy 4, Evans 3.2, John 1.4-1.5)
October 4.	Distributions (Vasy 5, Strauss 12.1, John 3.6)
October 9.	Distributions, weak solutions, shocks (Vasy 5, Strauss 12.1, Strauss 14.1, John 3.6, Evans 3.4)
October 11.	Distributions; Classification of second order equations (Vasy 5,6.1, Strauss 1.5, Evans 2.4, John 2.4)
October 16.	The wave equation on $\mathbb{R}$, domain of dependence, propagation of singularities (Vasy 6.2, 7.1, Strauss 2.1-2.2)
October 18.	Energy conservation for the wave equation; the maximum principle for Laplace's equation (Vasy 7.2-3, Strauss 2.2-2.3, John 4.2)
October 23.	Energy conservation for the wave equation; the maximum principle for Laplace's equation (Vasy 7.2-3, Strauss 2.2-2.3, John 4.2)
October 25.	The maximum principle and energy decay for the heat equation; energy estimates for Laplace's equation; the Fourier transform (Vasy 7.3-4, Strauss 2.3, 12.3, Evans 4.3.1)
October 30.	The Fourier transform and solutions of PDE's (Vasy 8.1-2 Strauss 12.3-12.4)
November 1.	Midterm
November 6.	Convolutions, solutions of PDE's by Fourier transform (Vasy 8.3, Strauss 12.3-12.4)
November 8.	Tempered distributions, convolutions, solution of Laplace's equation and the wave equation in terms of convolutions (Vasy 9)
November 13.	Heat and wave equations in half space and on intervals (Vasy 10, Strauss 3.1-3.2, John 5.1)
November 15.	Inhomogeneous PDE: Duhamel's principle (Vasy 11, Strauss 3.3-3.4, Evans 2.4.2, John 5.1)
November 27.	Separation of variables, eigenvalue problems (Vasy 12, Strauss 4.1-4.3)
November 29.	Inner product spaces and symmetric boundary conditions; Fourier series (Vasy 13, Strauss 5.1-5.3)
December 4.	Fourier series (Vasy 13.3, 14.1-3, Strauss 5.1-5.5)
December 6.	Convergence of Fourier series (Vasy 14, Strauss 5.4-5.5), Laplace's equation on the disk (Vasy 14.4, Strauss 6.3, John 4.3)

Note: The schedule is still subject to change.