

## 152 – PARTIAL DIFFERENTIAL EQUATIONS

GIGLIOLA STAFFILANI, FALL 2004  
SYLLABUS, AS OF SEPTEMBER 9, 2004

- September 9. Introduction and basic facts about PDE's (Strauss 1.1)  
September 14. First-order linear PDE's (Strauss 1.2, John 1.4-1.5)  
and PDE's from physics (Strauss 1.3-1.4)  
September 16. Initial and boundary values problems (Strauss 1.4-1.5)  
September 21. Types of PDE's (Strauss 1.6, John 2.1)  
and Distributions (Strauss 12.1, John 3.6)  
September 23. Distributions, continued (Strauss 12.1, John 3.6)  
September 28. The wave equation (Strauss 2.1-2.2, John 2.4)  
September 30. The heat/diffusion equation (Strauss 2.3-2.4)  
October 5. The heat/diffusion equation, continued (Strauss 2.3-2.4)  
and Review (Strauss 2.5)  
October 7. First midterm  
October 12. Fourier transform (Strauss 12.3, with lecture notes)  
October 14. Solution of the heat and wave equations in  $\mathbb{R}^n$   
via the Fourier transform (Strauss 12.3, with lecture notes)  
October 19. The inversion formula for the Fourier transform,  
tempered distributions, convolutions,  
solutions of PDE's by Fourier transform (Strauss 12.3-12.4)  
October 21. Tempered distributions, convolutions, solutions of PDE's  
by Fourier transform, continued (Strauss 12.3-12.4)  
October 26. Heat and wave equations in half space and in intervals (Strauss 3.2)  
October 28. Inhomogeneous PDE's (Strauss 3.3-3.4, John 5.1)  
November 2. Inhomogeneous PDE's, continued (Strauss 3.3-3.4, John 5.1)  
November 4. Spectral methods – separation of variables (Strauss 4.1-4.3)  
November 9. Spectral methods – separation of variables, continued (Strauss 4.1-4.3)  
and review  
November 11. Veterans Day–Holiday  
November 16. Second midterm  
November 18. (Generalized) Fourier series (Strauss 5.1-5.3)  
November 23. (Generalized) Fourier series, continued (Strauss 5.1-5.3);  
November 25. Thanksgiving–Holiday  
November 30. Convergence of Fourier series and  $L^2$  theory (Strauss 5.4-5.5, John 4.5)  
December 2. Inhomogeneous problems (Strauss 5.6)  
December 7. Laplace's equation and special domains (Strauss 6.1-6.2, John 4.1-4.2)  
December 9. Poisson formula (Strauss 6.3, John 4.3)