

Syllabus for MTH G 202
Partial Differential Equations 1
Fall 2005

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Required text: Robert McOwen, *Partial Differential Equation: Methods and Applications*, 2nd Edition, Prentice Hall, 2002.

Supplementary text: Fritz John, *Partial Differential Equations*, 4th Edition, Applied Mathematical Sciences, Vol. 1, Springer Verlag, 1995

The course introduces partial differential equations, their theoretical foundations and applications, which include optics, propagation of waves, diffusion etc.

Topics include: 1st-order linear, quasi-linear and non-linear PDE's using the method of characteristics; Classifications of 2nd-order linear equations: hyperbolic, parabolic and elliptic equations; Real-analytic solutions and the Cauchy-Kovalevsky theorem; The wave equation: explicit formulas for initial value problem in various spaces; conservation of energy and uniqueness; Fourier series solutions; Duhamel's principle; Huygen's principle; The Laplace equation: eigenfunction expansions, Fourier series solutions, maximum principle, Gaussian kernel, regularity of solutions and Sobolev spaces.