## **Partial Differential Equations**

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Lectures Wednesdays 9–10 and also 3–4 in Synge, Fridays 4–5 in Salmon.

Homework There will be five homework assignments, roughly one every two-three weeks.

**Topics** We will cover the following topics, yet not necessarily in the order listed.

- Terminology (order, linear, Cauchy problem, well-posed problem).
- Separation of variables, method of characteristics.
- Second-order equations: parabolic, hyperbolic and elliptic.
- Heat/diffusion equation: heat kernel, maximum principle.
- Wave equation: d'Alembert's formula, energy, finite speed of propagation.
- Boundary value problems: Dirichlet, Neumann and Robin conditions.
- Fourier series and convergence, theory of distributions, Lebesgue spaces  $L^p$ .
- Laplace equation: Poisson's formula, maximum principle.
- Nonlinear PDEs: Burger's equation and possibly Korteweg-de Vries (KdV).

**Textbook** A large part of the course will follow the textbook

▶ Partial differential equations, an introduction by Walter A. Strauss.

Marks The marking policy for the course is: 20% homework and 80% final exam.

Web page Homework assignments, solutions and lecture notes will be posted at

http://www.maths.tcd.ie/~pete/pde