

A.A. 2011/12

## **Applied Partial Differential Equations (6 cfu)**

LAUREA MAGISTRALE IN INGEGNERIA MATEMATICA

**Linear first order PDE's.** Method of characteristics. Nonlinear transport. The Burgers' equation. Shocks and rarefaction waves. Riemann problem for scalar conservation laws.

**Partial differential equations of second order.** Well posed problems, IBV problems.

**The heat equation.** Derivation, maximum principle, fundamental solution. The Fourier transform method.

**Laplace's and Poisson's equations.** Maximum principle, fundamental solution and Green's functions.

**The wave equation.** One dimensional equation, fundamental solution and D'Alembert formula. Fundamental solution in three dimension and strong Huygens' principle, Kirchoff's formula.

**Exam:** Written and oral

### **Books**

Lawrence C. Evans, *Partial Differential Equations*, Graduate Studies in Mathematics, Volume 19. American Mathematical Society

S. Salsa. *Partial Differential Equations in Action. From Modelling to Theory*, Springer, 2008.

### **Teaching material**

[http://www.mathmods.eu/downloads/cat\\_view/221-university-of-laquila/225-ronghua-pan](http://www.mathmods.eu/downloads/cat_view/221-university-of-laquila/225-ronghua-pan)