

Mini-course on Elliptic Partial Differential Equations  
Prof. Pierluigi Cesana, IMI

**Essential Syllabus.**

Lecture 1 (90min). Introduction and motivations. Examples: Laplace Equation, Poisson Equation. Superposition Principle. Separation of variables.

Lecture 2 (90min). Maximum principle (weak form). harmonic functions. Definition and main properties. The Mean Value Theorem. Maximum principle (strong form).

Lecture 3 (90min). More exercises on the Separation of Variables method.

**Keywords.** Elliptic PDEs, Harmonic functions, Fourier Series, Maximum principle.

**Project.** Based on the Separation of Variable method and on theorems seen during the mini-course.

**Exercises.** Exercises may be given during the course (optional).

**Course material.** Essential lecture notes will be provided.

**Reference books** Partial Differential Equations, 2nd ed., AMS, Lawrence C. Evans  
<https://tinyurl.com/y42vlj9z>