SSM
Scuola Superiore Meridionale

Course title:

Partial Differential Equations

Duration [number of hours]**: 24**

PhD Program [MERC/MPHS/SPACE]**: MPHS**

Name and Contact details of unit organizer(s):

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Course Description [max 150 words]**:**

The course is meant to be a basic introduction to PDE's with two main purposes:
- Provide an insight to some of the most important PDE's arising in mathematical modelling of physical systems (ranging from gas dynamics to groundwater flows, from soap bubble to wave propagation).
- Review some basic notion of solutions and employ modern mathematical techniques to deal with nonlinearity and/or degeneracy.
- When necessary, functional spaces and their properties will be introduced, but no prerequisite of Functional Analysis is required.
- The course is addressed to any PhD Student with standard mathematical background from Bachelor's and Master's Degree in Science and Engineering.

Syllabus [itemized list of course topics]**:**

- Burger's equation
- Porous media equation
- Eikonal equation
- Minimal surfaces
- Distributional, viscosity and entropy solutions

Assessment [form of assessment, e.g., final written/oral exam, solutions of problems during the course, final project to be handed-in, etc.]**:**

As a final assessment, students will explore one of the topics of the course or a topic related to them, perhaps an equation close to their area of interests, and give a seminar.

Suggested reading and online resources:

Notes: Notes will be released after each lecture

Suggested books:
1. Evans, Partial Differential Equations
2. Tichonov & Samarskij, Equation of Mathematical Physics – (Equazioni della Fisica Matematica [Italian Edition])
3. Strauss, Partial Differential Equations: An Introduction