

Description of the Course Partial Differential Equations

Presented by Vladimir Georgiev in 2023-2024

The course has 48 hours. It is intended for student of Bachelor Course in Math and Master degree Course in Math.

Typically students that followed ANALISI III (involving basic Fourier transform and functional analysis) can follow this course.

This is a basic course to introduce students from both theoretical and applicative orientations to the basic properties of partial differential equations (PDE).

The main spaces where the solutions of PDE will be discussed are C^k , Holder spaces and Sobolev space defined via Fourier transform. The main equations studied are

- Laplace, Helmholtz equations as typical elliptic equation in the Euclidean space, half space or bounded domain;
- Heat equation as typical parabolic equation in in the Euclidean space, half space or bounded domain;
- Wave equation as typical hyperbolic equation having dispersive properties

Among most important properties of the solution we can list the following ones:

- Existence
- Uniqueness
- Regularity and eventually dispersive properties.

Examples and applications to linear, nonlinear models in math physics shall be discussed too.