

# A4 - Introduction to Partial Differential Equations

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**Abstract.** Many phenomena in physics, chemistry, biology, *etc.* are modeled by partial differential equations (PDE). This course provides a review of the most common PDE and their applications. Its main goal is to introduce the mathematical tools widely used in the theory of PDE.

## Table of contents:

1. Crash course: Functional analysis, distributions and Fourier transforms.
2. Sobolev spaces  $H^s(\mathbf{R}^N)$  and  $H^k(\Omega)$ , where  $\Omega$  is an open domain. For future applications we will also provide the definition of Sobolev spaces  $W^{k,p}(\Omega)$ .
3. The Laplace, heat and wave equations in  $\mathbf{R}^N$  : modeling, representation formulae and qualitative properties.
4. Introduction to evolution equations.

## References

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- [5] FRITZ JOHN, *Partial Differential Equations, 3rd ed.*, Springer-Verlag, 1978.
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