

**Mathematical Tools**

Code: 103302  
ECTS Credits: 8

Degree	Type	Year	Semester
2501922 Nanoscience and Nanotechnology	FB	2	A

**Contact**

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**Use of languages**

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: Yes  
Some groups entirely in Spanish: No

**Teachers**

Vicenç Mendez Lopez  
Josep Triguier García

**Prerequisites**

The content and the methods introduced in this course presuppose knowledge of the first year Mathematic courses *Fonaments de Matemàtiques* and *Càlcul*.

**Objectives and Contextualisation**

The aim of the course is to enable the student to use some mathematical tools which are necessary for the study and modeling of nanosystems: analysis and resolution of ordinary and partial differential equations, and some basic tools of probability calculus and statistics.

**Content**

**I. ORDINARY DIFFERENTIAL EQUATIONS**

1. **General properties. First order Equations.**
2. **Second order linear Equations.**
3. **Systems of equations. Stability.**

**II. PARTIAL DIFFERENTIAL EQUATIONS**

1. **Fourier series and Fourier transforms.**
2. **Separation of variables.**
3. **Numeric solution schemes.**

**III. INTRODUCTION TO PROBABILITY AND STATISTICS**

1. **Basic concepts. Conditional probability and Bayes Theorem.**
2. **Random variables and Central Limit Theorem.**
3. **Estimators and sampling distributions.**
4. **Hypothesis testing.**