# Teaching guide

## IDENTIFICATION DETAILS

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| Degree: | Diploma in Quantum Computing (Awarded Degree associated with Mathematical Engineering) |

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| Faculty/School: | Higher Polytechnic School |

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| Course: | Introduction to Quantum Mechanics |

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| Type: | Compulsory Internal | ECTS credits: | 2 |

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|---|---|---|---|
| Year: | 2 | Code: | 49511 |

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| Teaching period: | Fourth semester |

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| Teaching type: | Classroom-based |

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| Language: | English |

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| Total number of student study hours: | 50 |

| Teaching staff | E-mail |
|---|---|
| Pablo Fernández Blanco | p.fblanco.prof@ufv.es |

## SUBJECT DESCRIPTION

This course covers the experimental basis of quantum physics. It introduces wave mechanics, Schrödinger's equation in a single dimension, and Schrödinger's equation in three dimensions.

This will teach you the basic principles of Quantum Mechanics. You will learn theoretical principles and problem solving skills applied to the quantum world of atoms, molecules and photons. The knowledge obtained in this class will serve as a foundation for further advanced classes such as Quantum Chemistry.

## GOAL

The basic concepts of Physics and Mathematics are addressed for understanding quantum mechanics, the experiments that originated it and its main postulates.

## PRIOR KNOWLEDGE

Álgebra y Cálculo

## COURSE SYLLABUS

- Double slit experiment
- Black body
- Potential
- Wave function of a particle
- Quantum state
- Observables and eigenvalues
- Representation in the space of states
- Hermitian space
- Potential well
- Wave – particle duality
- Planck's constant
- De Broglie wavelength
- Schrödinger equation
- Heisenberg uncertainty principle
- Tunnel effect
- Probability density
- Probability function
- Wave mechanics vs matrix mechanics

## EDUCATION ACTIVITIES

Master class and research activities at home.

## DISTRIBUTION OF WORK TIME

| CLASSROOM-BASED ACTIVITY | INDEPENDENT STUDY/OUT-OF-CLASSROOM ACTIVITY |
|---|---|
| 20 hours | 30 hours |
| Clases presenciales en el aula. 20h | Estudio y trabajo personal. 30h |

## SKILLS

Acquire the basic notions of quantum physics.

## SPECIFIC LEARNING RESULTS

Understand the fundamental principles of quantum physics

## LEARNING APPRAISAL SYSTEM

There will be a written exam that will account for 75% of the grade and an individual assignment that will account for the other 25%.

## BIBLIOGRAPHY AND OTHER RESOURCES

### Basic

FEYNMAN, Richard P. Física.III,Mecánica cuántica /  México :Addison Wesley,1998.

Nielsen, Michelle. Quantum Computation and Quantum Information /  Cambridge :Cambridge University Press.,2021.

### Additional

Peña, Luis de la. Introducción a la mecánica cuántica /

Landau, L. Mecánica cuántica no relativista.vol. III /