SUBJECT TEACHING GUIDE

G1997 - Fundamentals of Quantum Physics

Double Degree in Physics and Mathematics
Degree in Physics

Academic year 2021-2022

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Physics		Type and Year	Compulsory. Year 2 Compulsory. Year 2	
Faculty	Faculty of Sciences				
Discipline	Subject Area: Quantum Physics and the Structure of Matter Central Module				
Course unit title and code	G1997 - Fundamentals of Quantum Physics				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. FISICA MODERNA
Name of lecturer	DIEGO HERRANZ MUÑOZ
E-mail	diego.herranz@unican.es
Office	IFCA - Edificio Juan Jordá. Planta: + 1. Despacho (116)
Other lecturers	PATRICIA DIEGO PALAZUELOS

3.1 LEARNING OUTCOMES
- To know the experimental bases of Quantum Physics: black body radiation, atomic spectra, photoelectric effect, etc.
- To understand the relevance of quantum physics in the microscopic explanation of physical phenomena
- To understand the quantum view of electromagnetic radiation and its interaction with matter
- To know the basic principles of Quantum Physics: wave-corpuscle duality and Heisenberg uncertainty
- To understand the concepts of wave function, eigenvalues, stationary states and constants of motion; to know the Schrödinger equation, and its application to simple systems (free particle, square potential well, potential barrier, oscillator)

4. OBJECTIVES

The student must come to understand, learn and be able to apply the knowledge acquired on:
The origins of Quantum Physics.
Wave-corpuscle duality of light and matter.
The wave function. Probabilistic interpretation.
Observables, commutation relations, the uncertainty principle.
The Schrödinger equation and its physical content.
Stationary states. Constants of motion.
One-dimensional potentials. Tunnel effect.
Quantum harmonic oscillator.

6. COURSE ORGANIZATION

CONTENTS	
1	Experimental facts that give rise to Quantum Physics: thermal radiation and Planck's hypothesis
2	Bohr's atomic model and atomic spectra. Franck-Hertz experiment
3	Corpuscular properties of light. Photoelectric effect and Compton. Wave-particle duality
4	Wave properties of matter. Postulate of L. de Broglie. Heisenberg's indeterminacy principle
5	Schrödinger equation. Expected values. Schrödinger equation independent of time. Eigenvalues and eigen states
6	Application of the Schrödinger equation to simple one-dimensional problems
7	Final exam

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Final exam	Written exam	Yes	No	0,00
Partial exam 1	Written exam	No	Yes	40,00
Partial exam 2	Written exam	No	Yes	30,00
Partial exam 3	Written exam	No	Yes	30,00
TOTAL				100,00

Observations

The evaluation will be continuous and will be carried out through partial tests distributed throughout the course. The partial tests will allow the elimination of the subject matter of the test, if the grade obtained is greater than or equal to 5.00. The final grade will be calculated by adding (weighted according to the percentage) of the partial and final grades. For any of the tests to enter this calculation, the minimum mark of 3.50 must be passed in each test. In the event that this minimum grade is not exceeded or in the event that the student appears as 'not presented', the partial test will not score for the average and the student must attend the corresponding part of the subject in the final exam. The evaluation modality will be face-to-face whenever possible. In the event that for external reasons this is impossible, the evaluation test calendar will be maintained, using the remote means available by the University for this purpose.

Observations for part-time students

Part-time students, if any, must take only one Final Exam, which, if applicable, will last 5 hours and have a structure similar to that of the Final Exam for the rest of the students.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
R.Eisberg y R.Resnick. "Física Cuántica". Ed.Limusa (1978)