SUBJECT TEACHING GUIDE

G1997 - Fundamentals of Quantum Physics

Double Degree in Physics and Mathematics
Degree in Physics

Academic year 2025-2026

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)	
Knowledge Field	Physics and astronomy				
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	PABLO AGUADO PUENTE MIGUEL RUIZ GRANDA

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. SUBJECT PROGRAM

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. Mathematical foundations of Quantum Mechanics: Hilbert spaces, inner product, operators, commuting relationships and uncertainty. 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. This partial exam can be resat during the ordinary final exam.	Written exam	No	Yes	40,00
Partial exam 2. This partial exam can be resat during the ordinary final exam.	Written exam	No	Yes	30,00
Partial exam 3. This partial exam can be resat during the ordinary final exam.	Written exam	No	Yes	30,00
TOTAL				100,00

Observations

The evaluation will be continuous through partial tests in three blocks: the first counts for 40% of the final grade and the other two count for 30% each. If the average of the three partial exams is equal to or greater than 5.00, the student passes the partial exams without having to take the ordinary final exam, although they can do so to improve their grade without risk of worsening. It is necessary to obtain a minimum of 3.50 in each partial; Otherwise, the average will not be calculated and it will not be possible to pass. If a student obtains less than 3.50 in any block, she must take that block in the ordinary or extraordinary final exam. The final exams, both ordinary and extraordinary, are structured the same as the partial exams and have the same weighting (40%, 30%, 30%), allowing students to take the entire exam or only the parts that need to be passed. cuts. In the extraordinary exam, students cannot appear to raise their grade. To pass, you need an average of 5.00 or more and a minimum of 3.50 in each part.

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)