26921 - Quantum Physics I

Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	447 - Degree in Physics
ECTS	7.0
Year	3
Semester	First semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process of this subject has been designed on the following bases:

The suggested teaching-learning methodologies in order to reach the proposed objectives and acquiring the competences are:

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* Master classes, present to the students the basic theoretical knowledge to reach themselves the associated technical competences (CE1, CE2, CE3, CE4, CE5, CE6, CE10).

* Solving problems. That allows the acquistion of the technical competences from a practical point of view (CE1, CE2, CE3, CE5, CE6, CE10).

* Laboratory experiments. That allows the acquistion of the technical competences from a practical point of view (CE7, CE8, CE9).

* Examination covering the whole matter, to evaluate the degree of acquisition of all competences and objectives.

The competences CE are defined in the "memoria de verificación" (verification memory) for the "Grado en Física" (Grade in Physics), what can be seen in

http://ciencias.unizar.es/aux/generalDcha/EEES/MemVerifFisicaANECA.pdf

5.2.Learning tasks

5.3.Syllabus

0. Introduction. ¿What is, and why to study Quantum Physics?

1. Origin of the Quantum Theory. Corpuscular properrties of waves.

2. Wave properties of free particles. Atomic models and the de Broglie hypothesis.

3.Particles under external conservative forces. The Srödinger equation.. Some simple examples in 1D.

4. The quantum harmonic oscillator.

5. The Dirac formalism. Soace of states. Kets and bras. The posutulates of Quantum mechanics.

6. Physical contents of the formalism.

7. Angular moment. Central potentials. Hydrogen atom.

8. Addition of angular momenta. Clebsch-Gordan coeficients.

5.4.Course planning and calendar

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The distribution of the different programmed activities, acocordint to the credits is as follows:

Face sessions. 60 face sessions will be held. 45of them corresponding the activity "Acquisition of knowledge on the subject",

and 15 corresponding to thefarmtive activity "Solving problems related to the contents of the subject.". 3 laboratory sessions

will be held, corresponding to the formative activity "Observation, analysis and experimental measurement of quantum phenomena",

including 10 hours of non-face work. The prpeparation of report about the experiments in the laboratory will take 14 hours approximately.

The remaining non-face work of the subject (solving problems and studying) is estimated in about 87 total hours. The examination will be held on the date selected by the "Facultad de Ciencias" (Faculty of Science).

5.5.Bibliography and recommended resources

- BB Cohen-Tannoudji, Claude. Quantum mechanics / Claude Cohen-Tannoudji, Bernard Diu, Franck Laloë ; translated from the French by Susan Reid Hemley, Nicolo Ostrowsky, Dan Ostrowsky New York [etc.] : John Wiley [etc.], cop. 1977
- BB Eisberg, Robert M.. Física cuántica : átomos, moléculas, sólidos, núcleos y partículas / Robert Eisberg y Robert Resnick . - 1a ed., 14a reimp. México : Limusa, cop. 1999
- BB Física cuántica / Carlos Sánchez del Río (Coodinador) Madrid : Pirámide, D.L. 2008
- BC Gasiorowicz, S.. Quantum Physics. 3rd. ed. John Wiley and Sons, 2003