

60042 - Quantum theory of condensed matter

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	538 - Master's in Physics and Physical Technologies
ECTS	5.0
Course	1
Period	First semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The course is based on a series of classes on the basic issues of the subject and also in the personal work of the students (mainly in expanding their knowledge through the study of selected and the resolution of the proposed exercises). These classes will be complemented with one-hour seminars, run by renowned researchers in the field.

5.2.Learning activities

1. Classes on the main topics of the course (3 ECTS).
2. Problem resolution (1 ECTS).

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3. Knowledge and use of computational tools in the field of the subject (1 ECTS).

5.3.Program

1. Introduction: Problems in the treatment of many-body physics. From particles to fields. Quasiparticles.
2. The second quantification. Fock space.
3. Systems of interacting fermions: metals. Fermi gas, Fermi liquid, screening and the random phase approach. Wigner crystal.
4. Theory and applications of functional density (DFT).
5. Boson systems. Bose-Einstein condensation: ideal gas of bosons and weak interacting bosons. Microscopic theory of superconductivity and superfluidity.
6. Low-dimensional systems. Graphene. One-dimensional interacting systems: Luttinger liquid.
7. The theory of linear response: correlation functions.

5.4.Planning and scheduling

The final schedule has yet to be established. It was announced well in advance.

5.5.Bibliography and recommended resources