32057 - QP - Quantum Physics

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
Teaching unit: 1022 - UAB - (ANG) pendent
Academic year: 2015
Degree: MASTER'S DEGREE IN PHOTONICS (Syllabus 2009). (Teaching unit Optional)
ERASMUS MUNDUS MASTER'S DEGREE IN PHOTONICS ENGINEERING, NANOPHOTONICS AND
BIOPHOTONICS (Syllabus 2010). (Teaching unit Optional)
DOCTORAL DEGREE IN PHOTONICS (Syllabus 2007). (Teaching unit Optional)
ECTS credits: 5  Teaching languages: English

Teaching staff
Coordinator: ALBERT BRAMON PLANAS
Others: JOHN CALSAMIGLIA
ANNA SANPERA

Teaching methodology
Presencial teaching + activities

Learning objectives of the subject
This is an introductory course to standard Quantum Mechanics (QM) addressed to
students (generally, non-physicists) who have not taken a regular course on QM or
Quantum Physics.
### Content

- **The physical basis of Quantum Mechanics (QM). The photon.**  
  Degree competences to which the content contributes:

- **Heisenberg’s uncertainty principle. Qualitative examples.**  
  Degree competences to which the content contributes:

- **Mathematical interlude: vectors and operators. Dirac’s notation.**  
  Degree competences to which the content contributes:

- **The formalism of QM. Matrix (Heisenberg) and wave (Schroedinger) mechanics.**  
  Degree competences to which the content contributes:

- **Spin 1/2. Pauli matrices and spinors. Qubits. Photon polarization.**  
  Degree competences to which the content contributes:

- **Harmonic oscillator. Creation and annihilation operators. Simple molecules.**  
  Degree competences to which the content contributes:

- **Orbital angular momentum. Hydrogen atom.**  
  Degree competences to which the content contributes:

- **Two-particle and multiparticle systems. Entanglement. Statistics.**  
  Degree competences to which the content contributes:

- **Stationary perturbation theory.**  
  Degree competences to which the content contributes:
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Qualification system

- Exercises solved by students during the semester or
- Conventional, written exam at the end.
- Or a combination of the two points above to agree with other courses within this master.

Regulations for carrying out activities

The usual in University teaching

Bibliography

Basic:


Complementary: