



Guía docente

32050 - CPHOT - Fotónica Computacional

Última modificación: 13/05/2015

Unidad responsable: Escuela Técnica Superior de Ingeniería de Telecomunicación de Barcelona
Unidad que imparte: 748 - FIS - Departamento de Física.

Titulación: DOCTORADO EN FOTÓNICA (Plan 2007). (Asignatura optativa).
DOCTORADO EN INGENIERÍA ÓPTICA (Plan 2007). (Asignatura optativa).
MÁSTER UNIVERSITARIO EN FOTÓNICA (Plan 2009). (Asignatura optativa).
MÁSTER UNIVERSITARIO ERASMUS MUNDUS EN INGENIERÍA FOTÓNICA, NANOFOTÓNICA Y BIOFOTÓNICA (Plan 2010). (Asignatura optativa).

Curso: 2015 **Créditos ECTS:** 2.5 **Idiomas:** Inglés

PROFESORADO

Profesorado responsable: ARTUR CARNICER

Otros: RAMON HERRERO
CRISTINA MASOLLER

METODOLOGÍAS DOCENTES

Presencial teaching + activities

OBJETIVOS DE APRENDIZAJE DE LA ASIGNATURA

This course introduces some numerical methods used in the description of the propagation of light through homogeneous and inhomogeneous media, and its interaction (linear and nonlinear) with matter. The main goal is to provide the students with some numerical techniques that will allow them to model optical and photonic systems. The course will be highly practical, with most of the time devoted to a computational project to be developed individually by the students.

This course aims to be introductory and is not suitable for students with good programming skills. Note that the implementation language is C.

CONTENIDOS

Introduction to C programming

Fourier transform based methods

Phase-retrieval iterative algorithms

Finite-difference time domain methods

Spectral methods



Split-step methods

Ordinary differential equations integration

Stochastic integration

SISTEMA DE CALIFICACIÓN

The specific grading distribution is divided in two parts:

- Classroom exercises: 30%
- Students are expected to develop an individual computation project of their choice. Any photonics/optics related topic is appropriate. Alternatively, the instructors can suggest a topic according to the students' interests and computational experience: 70%

NORMAS PARA LA REALIZACIÓN DE LAS PRUEBAS.

The usual in university teaching

BIBLIOGRAFÍA

Básica:

- Sadiku, M.N.O. Numerical techniques in electromagnetics with MATLAB. 3rd ed. Boca Raton [etc.]: CRC, 2009. ISBN 9781420063097.
- Jarem, J.M.; Banerjee, P.P. Computational methods for electromagnetic and optical systems. 2nd ed. Boca Raton [etc.]: CRC, 2011. ISBN 9781439804223.

Complementaria:

- Peterson, A.F.; Ray, S.L.; Mittra, R. Computational methods for electromagnetics. New York: IEEE Press, 1998. ISBN 0780311221.
- Taflove, A.; Hagness, S.C. Computational electrodynamics: the finite-difference time-domain method. 3rd ed. Boston [etc.]: Artech House, 2005. ISBN 1580538320.