Guia docent
32050 - CPHOT - Fotònica Computacional

Última modificació: 13/05/2015

Unitat responsable: Escola Tècnica Superior d'Enginyeria de Telecomunicació de Barcelona
Unitat que imparteix: 748 - FIS - Departament de Física.

Titulació: DOCTORAT EN FOTÒNICA (Pla 2007). (Assignatura optativa).
DOCTORAT EN ENGINYERIA ÒPTICA (Pla 2007). (Assignatura optativa).
MÀSTER UNIVERSITARI EN FOTÒNICA (Pla 2009). (Assignatura optativa).
MÀSTER UNIVERSITARI ERASMUS MUNDUS EN ENGINYERIA FOTÒNICA, NANOFOTÒNICA I BIOFOTÒNICA (Pla 2010). (Assignatura optativa).

Curs: 2015 **Crèdits ECTS:** 2.5 **Idiomes:** Anglès

PROFESSORAT

Professorat responsable: ARTUR CARNICER

Altres: RAMON HERRERO
CRISTINA MASOLLER

METODOLOGIES DOCENTS

Presencial teaching + activities

OBJECTIUS D'APRENENTATGE DE L'ASSIGNATURA

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.

CONTINGUTS

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 QUALIFICACIÓ

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%

NORMES PER A LA REALITZACIÓ DE LES PROVES.

The usual in university teaching

BIBLIOGRAFIA

Bàsica:
- 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.

Complementària:
- 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.