PHOTONICS

Degree in Physical Engineering
Subject: Photonics
Course: Photonics (6 credits ECTS)
Professors: Ramón Vilaseca; Jose Trull

Course Program

PART I  FUNDAMENTALS OF PHOTONICS

I.1 FUNDAMENTAL PROPERTIES OF LIGHT
   I.1.1 Historical introduction
   I.1.2 Basic magnitudes and properties from a classical approach
   I.1.3 Basic magnitudes and properties from a quantum approach

I.2 MODELS AND BASIC EQUATIONS
   I.2.1 Electromagnetic Optics. Geometrical optics limit
   I.2.2 Fourier Optics
   I.2.3 Quantum Optics

I.3 GENERATION AND EMISSION
   I.3.1 Dipolar radiation
   I.3.2 Basic models of light-matter interaction
   I.3.3 Light sources
   I.3.4 Laser

I.4 PROPAGATION
   I.4.1 Propagation in homogeneous media
   I.4.2 Crystal optics
   I.4.3 Short pulse propagation
   I.4.4 Propagation in structured media

I.5 DETECTION
   I.5.1 Temporal characterization
   I.5.2 Spatial characterization
   I.5.3 Spectral characterization
PART II  APPLICATIONS OF PHOTONICS

II.1 MICROSCOPY AND IMAGE PROCESSING (BIOPHOTONICS)
II.2 NANOPHOTONICS
II.3 QUANTUM OPTICS
II.4 NONLINEAR OPTICS
II.5 OPTICAL COMMUNICATIONS
II.6 METROLOGY AND MATERIAL PROCESSING

Bibliography

Basic:


Complementary:


Evaluation system

The students evaluation will consist of a final exam (EF), a partial exam (EP) and an evaluation of the student's participation in the exercise classes and in the realization of an assigned task (P). The final mark will be given by:

Max(EF,0.55*EF+0.30*EP+0.15*P)