

UE Optics



Level
Baccalauréat
+4



ECTS
6 credits



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



Semester
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX7NQAD

Presentation

Description

Laser and nonlinear optics - 20h

The laser aspects will focus on the study of the gain medium and the resonator including the notions of oscillation threshold, Gaussian optics, stability, cavity modes and the different temporal regimes. Concerning nonlinear optics, it will deal with laser frequency synthesis and mixing like second harmonic generation, optical parametric amplification and optical parametric oscillation. Notions of crystal optics will be given in this framework.

Optical spectroscopy – 20h

This lecture concerns itself with the interaction between light and matter. In this part, we present a theoretical framework to discuss the absorption, emission, and luminescence properties of, principally, gas phase molecular systems. Experimental techniques will be discussed, including modern and state-of-the-art techniques used in the environmental (e.g., infrared trace gas detection) and life sciences (such as Raman non-linear spectroscopies).

Guided optics – 10h

The objective of this part of the course is to give an insight into guided wave optics. Starting from Maxwell's equations, guided waves in planar (1d) structures will be presented. The notions of effective index and modal distribution will be explained and practical tools to compute them will be given. An overview of guided modes in bidimensionnal structures will also be given. The effective index method will be used to obtain a first approximation of the modes supported by these structures.



Course parts

CM	Lectures (CM)	50h
TP	Practical work (TP)	8h

Period : Semester 7

Useful info

Campus

› [Grenoble - Saint-Martin d'Hères](#)