

# Master Physique fondamentale et applications

## Physics for photonics 2

### Informations

Composante : Faculté des Sciences

### Responsable

Voicu octavian DOLOCAN

### Langue(s) d'enseignement

Anglais

### Contenu

Photonics is based on the interaction between light and matter. A knowledge of the microscopic structure and materials physics is needed to understand different types of interaction processes. The main objective of this course is to give students an introduction to the fundamental physics behind different materials, what gives materials their properties, and what are the models that explain these properties. The link between microscopic and macroscopic properties will be detailed for various systems in condensed matter.

1. Introduction to the properties of solids. Crystal structures and bonding in materials. Beyond the crystalline state: soft matter (polymers, liquid crystals). (4h)
2. Momentum-space analysis and diffraction probes. (4h)
3. Lattice dynamics, phonon theory and measurements, thermal properties.(4h)
4. Electronic band theory, classical and quantum; free, nearly-free, and tight-binding limits. (8h)
5. Electron dynamics and basic transport properties. (4h)
6. Optical properties of solids.(4h)

### Compétences à acquérir

- Understanding of solids and of their characteristic properties
- Conceptualize the different kinds of matter and the relation between materials properties and the microscopic structure
- Understand the importance of different materials in various applications based on their electronic structure

### Modalités d'organisation

Two hours sessions of mixed courses and tutorials.

### Bibliographie, lectures recommandées

M. P. Marder - Condensed Matter Physics

J. M. Ziman - Principles of the Theory of Solids

N. W. Ashcroft and N. D. Mermin - Solid State Physics

### Pré-requis obligatoires

Physics for Photonics 1

Fundamentals in Optics and Photonics

### Prérequis recommandés

electromagnetism, thermodynamics, quantum mechanics

### VOLUME HORAIRE

- Volume total: 28 heures
- Cours magistraux: 18 heures
- Travaux dirigés: 10 heures

### Codes Apogée

- SPFBU31J [ELP]

### Pour plus d'informations

[Aller sur le site de l'offre de formation...](#)



Dernière modification le 18/06/2024