UE Solid State Physics I

Niveau d'étude
Bac +4

ECTS
3 crédits

Composante
UFR Physique, Ingénierie, Terre, Environnement, Mécanique (PhITEM)

Période de l'année
Automne (sept. à dec./janv.)

Diplômes intégrant cet élément

- Master Nanosciences et nanotechnologies

Langue(s) d'enseignement: Anglais

Ouvert aux étudiants en échange: Oui

Code d'export Apogée: PAX7NQAC

Présentation

Description

Goal: This solid-state physics class aims at providing the basics theories that allow to understand the properties of materials, and in particular their electronic and vibrational properties. Why are some solids metallic and other semiconducting ? How can we describe their electrical and thermal properties ? Applications to low-dimensional systems (including graphene and nanotubes) will serve as a bridge to nanosciences.

Content: Presentation of simple models and calculations of solids properties:

- Free electrons : classical Drude model.
- Quantum model: Sommerfeld model.
- Metals and insulators : nearly-free quantum model, tight-binding model, Bloch therorem.
- Vibrations in solids: acoustic and optical phonons, sound velocity.

*Prerequisites:*Electromagnetism, waves and vibrations, basic quantum mechanics.
Bibliography:

Informations non contractuelles.
Dernière mise à jour le 30 juin 2026

Introduction to solid state physics, 8th edition, Charles Kittel.
Solid state physics, Neil Ashcroft and David Mermin.

Heures d'enseignement

CM	CM	18h
TD	TD	10h

Période : Semestre 7

Infos pratiques

Campus

Grenoble - Domaine universitaire

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