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: PAX7NQAA

Présentation

Description

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 ? Can we calculate their specific heat ? What is their velocity of sound ? Applications to low-dimensional systems (including graphene and nanotubes) will serve as a bridge to nanosciences.

Content:
- The historical Drude model of conductivity
- Introducing quantum mechanics : non-interacting electrons in a box
- Density of states in several dimensions
- Translational properties and Bloch theorem : reducing the complexity
- Reciprocal space and Brillouin zone
- Tight-binding approximation and band structures
- Examples : graphene, Peierls distortion, the minimal cuprate, etc.

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

- Phonons ; acoustic and optical modes.

Bibliography:
- Introductory chapters of a basic book on Quantum mechanics
- Introduction to Solid-State Physics, Charles Kittel
- Solid-State Physics, Ashcroft and Mermin

Heures d'enseignement

CMTD	Cours magistral - Travaux dirigés	24h

Période : Semestre 7

Infos pratiques

Lieu(x) ville

Grenoble

Campus

Grenoble - Domaine universitaire

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