

UE Solid state physics I



Niveau d'étude
Bac +4



ECTS
3 crédits



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



Période de
l'année
Toute l'année

- > **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.
- 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

UE Solid state physics I - CM-TD

Cours magistral - Travaux dirigés

24h

Période : Semestre 7

Infos pratiques

Lieu(x) ville

> Grenoble

Campus

> Grenoble - Domaine universitaire