

# UE Solid State Physics I



Level  
Baccalaureate  
+4



ECTS  
3 credits



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



Semester  
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX7NQAC

## Presentation

### 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 theorem.
- Vibrations in solids: acoustic and optical phonons, sound velocity.

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

*Bibliography:*

Introduction to solid state physics, 8th edition, Charles Kittel.

Solid state physics, Neil Ashcroft and David Mermin.

---

## Course parts

CMTD

Lectures (CM) & Teaching Unit (UE)

24h

**Period** : Semester 7

## Useful info

---

### Campus

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