INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

3rd YEAR IMACS_SEMESTER 6_ORIENTATION GP

Practical info

Location(s)

Toulouse

Thermodynamics and Diffusion

ECTS
5 crédits

Hourly volume
54h

Introducing

Objectives

At the end of this module, the student should have understood and be able to explain (main concepts):
- The laws of thermodynamics, the notions of work, heat, energy associated with a transformation,
- The application to thermal machines, thermodynamic cycles, and the calculation of efficiency.
- This course is intended to provide students with an understanding of the laws of thermodynamics and the concepts of work, heat and energy associated with a transformation,
- simple phase diagrams and binary materials.
- This course is intended to provide students with the opportunity to learn more about the following topics: - The concepts of diffusion and heat/matter transport.

The student will have to integrate notions, contextualise them and then be able to decontextualise them to be able to project them into an adidactic situation.

Necessary prerequisites

Basics of mathematical analysis: functions of several variables, derivatives, integrations, differential equations.
General notions of thermodynamics of physical-chemical systems

Practical info

Location(s)

Toulouse

Material Physics

ECTS
4 crédits

Hourly volume
85h

Introducing

Objectives

At the end of this module the student should be able to:
- structurally characterize and orient a crystal: employ of basic X-ray and electron diffraction techniques, then analysis of the results.
- describe dislocations and their interactions from a geometric and energetic point of view, and relate them to the mechanical properties of the crystalline material: fragility and ductility
- calculate and predict electrical, thermal and mechanical effects resulting from electrical, thermal and mechanical solicitations applied to the crystal in particular directions.
- master the piezoelectric effect for applications of sensors and micro-actuators, and acousto-optical and electro-optical effects for applications of filtering, modulation or optical addressing and optoelectronic components.

Practical info

Location(s)

Toulouse

Applied material physics

ECTS
5 crédits

Hourly volume
64h

Introducing

Objectives

This UF constitutes an experimental approach to the physics of materials. The educational objectives are:
- acquire scientific knowledge relating to the techniques used in material science
- acquire practical skills on these techniques,
- acquire an experimental work method in physics (how to choose the experimental parameters, carry out the experiment, analyze the results)

The student should be able to:
- reproduce and apply techniques for the development and characterization of materials among the techniques mentioned in the program.

Necessary prerequisites

- UF Physics of materials must be completed before the practicals.
- Thermodynamic prerequisite : The following notions must be seen before the practicals: enthalpy, heat capacity and phase diagram.

Location(s)

Toulouse

Practical info

Quantum and statistical physics

ECTS
6 crédits

Hourly volume
57h

Practical info

Location(s)

Toulouse