MSE-300

Theory of materials: from structures to properties

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Cursus	Sem.	Type
Materials Science and Engineering	BA6	Obl.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

Macroscopic properties of solids are addressed using symmetry arguments, tensors, thermodynamics, and simple phenomenological models.

Content

1. The tools of phenomenological descriptions: symmetry, tensors, and thermodynamics
2. Description of static equilibrium properties:dielectric response,elasticity,piezoelectricity, pyroelectricity and thermal dilatation
3. Description of dynamic equilibrium properties and transport properties: dielectric relaxation, sound propagation, electrical conductivity, heart conductivity, and thermoelectric phenomena
4. Light propagation in anisotropic materials
5. Landau theory of structural phase transitions

Learning Prerequisites

Recommended courses

General physics

Learning Outcomes

By the end of the course, the student must be able to:

- Apply the symmetry arguments,tensors and thermodynamics for a description of the physical properties of materials.

Teaching methods

Ex cathedra and exercises

Assessment methods

Written exam during the exam session

Resources

Ressources en bibliothèque

- Introduction to solid state physics / Kittel
- Physical properties of crystals / Nye

Prerequisite for

Elecroceramic components