MSE-204

Thermodynamics for materials science

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Cursus	Sem.	Type
Materials Science and Engineering	BA3	Obl.

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

Summary

This course establishes the basic concepts of thermodynamics and defines the main state functions. The concepts are then applied to the study of phase diagrams of various systems.

Content

1. Thermodynamic system and the laws of thermodynamics. Work and Heat. Reversibility.
2. Auxiliary functions and their relationships. Chemical potential.
3. Treatment of mixtures. Molar and partial molar variables.
4. Thermodynamics of gases. Ideal and real solutions
5. Introduction to phases
6. Single component phase diagrams.
7. Binary phase diagrams.
8. Metastability of phases.
9. Reacting systems.

Learning Prerequisites

Required courses

Introduction to Materials Science and Engineering

Recommended courses

Various courses of the Materials science and engineering section

Learning Outcomes

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

- Analyze a thermodynamics problem
- Compute the changes in entropy, enthalpy and Gibbs free energy
- Construct a phase diagram
- Interpret the chemical potential

Teaching methods

Ex cathedra, videos, et exercises

Resources

Moodle Link

- https://go.epfl.ch/MSE-204