

MSE-483

Advanced phase transformations

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Cursus	Sem.	Type
Materials Science and Engineering	MA1, MA3	Opt.

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

Summary

This course provides an overview of the phenomenological concepts and mathematical tools that have been developed to study the thermodynamics, kinetics and mechanics of solid-state phase transformations.

Content

- Review of the mathematical structure of thermodynamics and kinetics
- Thermodynamics of first-order and second-order phase transitions
- Order parameters for phase transformations
- Thermodynamic descriptions of inhomogeneous systems
- Kinetics of phase transformations
- Mechanics of phase transformations

Learning Prerequisites**Required courses**

Basic courses in thermodynamics, phase transformations, physics and mathematics

Learning Outcomes

- Analyze the thermodynamics and kinetics of phase transformations

Teaching methods

Ex cathedra and exercises

Assessment methods

Final written exam

Resources**Bibliography**

- Theory of Structural Transformations in Solids, Khachatryan, Dover.

- Kinetics of Materials, Balluffi, Allen, Carter, Wiley 2005
- Phase Transformations in Metals and Alloys, Porter and Easterling

Ressources en bibliothèque

- [Theory of Structural Transformations in Solids / Khachaturyan](#)
- [Kinetics of Materials / Balluffi, Allen, Carter](#)
- [Phase Transformations in Metals and Alloys / Porter and Easterling](#)