MSE-600

Effects of radiation on materials

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Cursus	Sem.	Type
Materials Science and Engineering		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Oral
Workload	60h
Hours	**28**
Courses	28
Number of positions	

Frequency

Every 2 years

Remark

Next time: Fall 2027

Summary

The purpose of this course is to provide the necessary background to understand the effects of irradiation on pure metals and on alloys used in the nuclear industry. The relation between the radiation-induced defects and the evolution of the mechanical properties is highlighted.

Content

1. Fundamentals of radiation damage

- Defect production
- Defect accumulation
- Irradiation modes (electrons, ions, neutrons)

2. Investigation tools

- Numerical tools (molecular dynamics, kinetic rate theory, Monte Carlo methods, dislocation dynamics)
- Experimental tools (transmission electron microscopy, small angle neutron scattering, positron annihilation spectrometry, field ion microscopy, internal friction)

3.Materials for fission reactors

4.Materials for thermonuclear fusion reactors

Keywords

Radiation, mechanical properties, fission reactors, fusion reactors, nuclear reactors, irradiated materials

Learning Prerequisites

Recommended courses

Theory of point defects and dislocations

Assessment methods

Oral