

MSE-600

**Effects of radiation on materials**

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Cursus	Sem.	Type
Materials Science and Engineering		Opt.

Contact language	English
Credits	2
Session	
Exam	Oral
Workload	60h
<b>Hours</b>	<b>28</b>
Lecture	28
<b>Number of positions</b>	

**Frequency**

Every 2 years

**Remark**

Next time: Fall 2023

**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