

MSE-477

**Advanced nanomaterials**

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

Language of teaching	English
Credits	2
Session	Winter
Semester	Fall
Exam	During the semester
Workload	60h
Weeks	14
<b>Hours</b>	<b>2 weekly</b>
Courses	2 weekly
<b>Number of positions</b>	

**Summary**

The course gives a detailed explanation of the physical, chemical and thermodynamic effects which are unique for nanostructured materials. In a second part, different methods for synthesis and processing will be explained and important applications of nanomaterials will be presented.

**Content**

We will discuss the use of nanomaterials in electronics, optics, ceramics, magnetic and catalytic applications. We will attempt to relate properties of materials with respect to size of the building blocks.

1. Introduction
2. Atoms, clusters and nanomaterials
3. Preparation, synthesis
  - chemical
  - physical
  - biomimetic
4. Properties of nanomaterials
  - mechanic
  - chemical
  - magnetic
  - optic
  - electronic
5. Future applications

**Keywords**

nanotechnology, nanomaterial, nano

**Learning Prerequisites****Required courses**

material science (Introduction, bachelor level)

**Learning Outcomes**

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

- Assess / Evaluate the different nanoeffects
- Elaborate the difference between bulk and nanosized materials
- Identify potential application of nanomaterials

- Discuss potential danger in handling nanomaterials

### Transversal skills

- Make an oral presentation.
- Collect data.
- Give feedback (critique) in an appropriate fashion.

### Teaching methods

Ex cathedra and seminars

### Expected student activities

oral presentation

### Assessment methods

during the semester, based on the presentation

### Supervision

Office hours	No
Assistants	No
Forum	No

### Resources

#### Ressources en bibliothèque

- [Copies d'articles](#)

#### Notes/Handbook

<http://ltp.epfl.ch/files/content/sites/ltp/files/shared/Teaching/Master/04-AdvancedNanomaterials/lectures/index.html>