MSE-477 **Nanomaterials**

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

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

Summary

This course is an introduction to the concepts and associated relevant physics and materials science principles of what makes inorganic nanomaterials outperform their bulk counterparts. It covers their synthesis and characterization as well as the physical and chemical properties at the nanoscale.

Content

1. Emergence, definitions, challenges
2. Sythesis & characterization
3. Nano - thermodynamic/thermal/mechanical properties
4. Nanoelectronics, nanooptics, and nanomagnetism
6. Nano for energy and nano for environment
7. Nanomedicine, nanotoxicology, and safety issues in nano

Keywords

nanomaterials, nanoscale

Learning Prerequisites

Required courses

Intoduction to Materials Science

Recommended courses

Crystallography
Inorganic chemistry

Learning Outcomes

- Contextualise physical properties of nanomaterials
- Choose synthesis and characterization method
- Choose the nanomaterial for a specific application

Teaching methods

Ex cathedra, videos, clickers

Assessment methods

Grouped project with presentation and written report and Final exam

Resources

Bibliography

1. Fundamentals of Nanotechnology, G.L. Hornyak, J.J. Moore, H.F. Tobbals & J. Dutta, CRC press, 2009
2. Nanostructures and Nanomaterials –Synthesis, Properties and Applications, C. Guozhong & W. Ying,World Scientific Publishing, 2nd edition, 2011

Ressources en bibliothèque

- Fundamentals of Nanotechnology / Hornyak
- Nanostructures and Nanomaterials - Synthesis, Properties and Applications / Guozhong

Moodle Link

- https://go.epfl.ch/MSE-477