**Summary**

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

**Content**

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

**Keywords**

nanomaterials, nanoscale

**Learning Prerequisites**

**Required courses**
- Introduction to Materials Science

**Recommended courses**
- Crystallography
- Inorganic chemistry

**Learning Outcomes**

By the end of the course, the student must be able to:
- Contextualise physical properties of nanomaterials
- Choose synthesis and characterization method
- Choose the nanomaterial for a specific application

**Assessment methods**

1. Grouped project with presentation
2. Individual written essay
3. Final exam
Resources

Bibliography
1. Fundamentals of Nanotechnology, G.L. Hornyak, J.J. Moore, H.F. Tobbals & J. Dutta,
CRC press, 2009

Ressources en bibliothèque
• Nanostructures and Nanomaterials - Synthesis, Properties and Applications / Guozhong
• Fundamentals of Nanotechnology / Hornyak