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

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