SK2756 Introduction to Nano-materials and Nanotechnology 7.5 credits

Introduktion till nanomaterial och nanoteknik

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SK2756 valid from Autumn 2017

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Engineering Physics

Specific prerequisites

Good knowledge about the physics and chemistry courses according to the study plan or corresponding background.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

This course will give a general but advanced introduction to the field and discuss paradigm shifts as scientific frameworks from physics, chemistry and biology as well as from materials science.

After a successfull completion of the course, students should be able to:

- Describe and explain Nanotechnology.
- Describe Nanomaterials based on their dimensionality.
- Explain the importance of reduction in materials dimensionality, and its relationship with materials properties.
- Give examples on size-dependant phenomena.
- Explain top-down approaches for Nanomaterial fabrication, and give some examples.
- Explain bottom-up approaches for Nanomaterial fabrication, and give some examples.
- Describe and discuss Nanotechnology tools
- Give examples on the use of Nanotechnology in biomedical applications.
- Give examples on the use of Nanotechnology in optical applications.
- Give examples on the use of Nanotechnology in microelectronics applications.
- Perform a literature survey on a chosen topic in the scientific literature.
- Write a scientific report with appropriate references and citations.
- Present results of a research in the form of an oral presentation.

Course contents

The course aims at providing you with a general and broad introduction to the multi-disciplinary field of nanotechnology. During the course you will acquire the basic knowledge of the physical phenomena, theoretical concepts and experimental techniques behind the recent vastly improved ability to observe, fabricate and manipulate individual structures on the nanometer scale. Another aim of the course is to familiarize with the on-going merge of the top-down approach of microelectronics and micromechanics with the bottom-up approach of chemistry/biochemistry; a development that is creating new and exciting cross-disciplinary research fields and technologies. The recent scientific and technology work in the nano world will be presented to demonstrate the potential of nanoscience and industrial applications of nanotechnology. A final goal is to give you an insight into complete systems where nanotechnology can be used to improve our everyday life. The course will also have a part for introducing the KTH library services and scientific information search on different databases. Introduction to scientific report writing is also an integral part of the library program.

Course literature

Introduction to Nanotechnology, by Frank J. Ovens

Lecture notes and reference literature.

Examination

- ANN1 - Project and Assignments, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

An oral project presentation (TEN1; 4,5 hp) on a selected topic. To pass the course it is necessary to pass the tutorial exercises (TUT1; 1,5 hp, TUT2; 1,5 hp). Further instructions about the examination and requirements are given at the course start.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.