SK2775 Nanomaterials for Sustainable Energy and Environment 7.5 credits

Nanomaterial för hållbar energi och miljö

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

Establishment

The course syllabus is valid from autumn 2023 according to the school principal's decision: S-2023-0144 Decision date: 2023-03-14

Grading scale

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

Education cycle

Second cycle

Main field of study

Engineering Physics

Specific prerequisites

English B / English 6

Bachelor's degree in Physics, Electrical Engineering, Materials science, Chemistry or equivalent, including courses in mathematics corresponding to at least 20 ECTS credits and courses in physics corresponding to at least 30 ECTS credits.

Language of instruction

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

Intended learning outcomes

After the course, the student should be able to:

- Describe nanostructures for energy-related applications such as solar cells, catalysis with a focus on photocatalysis, batteries, supercapacitors and water electrolysers
- Explain beneficial effects of sustainable nanotechnology on climate change, improving our quality of life and promoting sustainable functional materials
- Explain potential applications of nanomaterials for environmental improvement including air and water purification

Course contents

Nanomaterials have revolutionized our lives. They can be made by adding nanoscale components into existing materials or by designing them on their own. This course will present nanomaterials for a number of different applications related to for example energy and environmental mitigation techniques, to show the multidisciplinary possibilities of nanomaterials. This course intends to build around the multidisciplinary field to provide sufficient knowledge to the learner in order to understand the promising nanotechnology applications in the nexus between Energy, Environment and Sustainable Development. Main contents are:

- Environmental effects of energy extraction, conversion and use
- Sources of pollution from renewable and non-renewable energy technologies
- Systems- clean/green energy technologies
- Nanotechnology-Enabled Energy Harvesting for Self-Powered systems
- Nanomaterials in catalysis, photovoltaics, hydrogen exploitation, fuel cells, batteries, and thermoelectricity
- Insight into systems where nanotechnology are/can be used for sustainable development

Examination

- ANN1 - Project and quiz, 2.5 credits, grading scale: P, F
- TEN2 - Oral exam, 5.0 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.

• ANN1 - Project and Assignments, 2.5, grade scale: P, F

• TEN1 - Examination, 5.0, grade scale: A, B, C, D, E, FX, F

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.