



KF2430 Functional and Nanostructured Polymers 7.5 credits

Funktionella och nanostrukturerade polymerer

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

Establishment

Course syllabus for KF2430 valid from Autumn 2008

Grading scale

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

Education cycle

Second cycle

Main field of study

Specific prerequisites

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 the concepts and methods, developed mainly by chemists, for synthesizing a range of nanoscale building blocks with strictly controlled size, shape and surface functionality, structure, composition and properties;

explain how these nanoscale construction units can be organized and integrated into functional architectures, both simple and complex, using a combination of self-assembly and directed self-assembly using chemical lithography and template based methods, polymer synthesis, polymer mixing and nanocomposites approaches.

Course contents

A predominantly polymer science approach to nanomaterials is presented. The goal is to provide a leading-edge description of the emerging and exciting field of nanostructured polymer systems. The content of the course has been selected and organized to establish the basic principles of nanoscience. Nanostructured polymer systems will be a valuable course for students planning an academic or industrial research career in any area related to nanoscience and nanotechnology.

Content

1. Nanochemistry basics
2. Chemical patterning and lithography
3. Layer-by-layer self-assembly
4. Nanocontact printing and writing - stamps and tips
5. Nanorod, nanotube, nanowire self-assembly
6. Nanocluster self-assembly
7. Microspheres - colors from the beaker
8. Microporous and mesoporous materials from soft building blocks
9. Copolymers
10. Polymer blends
11. Self-assembling block copolymers
12. Biomaterials and bioinspiration
13. Self-assembly of large building blocks
14. Hydrogels
15. Nanocomposites
16. Nano and beyond

Course literature

Nanochemistry: A Chemical Approach to Nanomaterials, Geoffrey A. Ozin and Andre Arsenault, Royal Society of Chemistry, 2005

Examination

- HUP5 - Homework, 0.5 credits, grading scale: P, F
- HUP3 - Homework, 0.5 credits, grading scale: P, F
- TEN2 - Examination, 2.5 credits, grading scale: A, B, C, D, E, FX, F
- HUP4 - Homework, 0.5 credits, grading scale: P, F

- TEN1 - Examination, 2.5 credits, grading scale: A, B, C, D, E, FX, F
- HUP1 - Homework, 0.5 credits, grading scale: P, F
- HUP2 - Homework, 0.5 credits, grading scale: P, 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.

Examination, TEN1 2.5 c - Grading scale: A-F Examination, TEN2 2.5 c - Grading scale: A-F

Homework, HUP1-5 0.5c per set of homework, a total of 2.5 c - Grading scale: P-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.