FKD3240 Functional Materials and Surfaces, Theory 5.5 credits

Funktionella material och ytor, teori

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

Establishment

Course syllabus for FKD3240 valid from Spring 2011

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

M.Sc. in a natural or technical field of science

Language of instruction

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

Intended learning outcomes

The overall aim of this course is to provide an overview of functional materials and surfaces. Primarily, the course deals with advanced materials and surfaces which have, or are expected to get, great industrial importance. In addition to an understanding of the material itself,

a description of the synthesis or design of each material will be undertaken. Since the technology is fast evolving, the topics of interest may vary from year to year.

Course contents

After the course you should be able to

1. Explain the concepts of superhydrophobicity/superhydrophilicity, discuss manufacturing processes of such materials, and identify examples in nature and industrial applications.
2. Explain the principles and identify applications of conducting polymers.
3. Describe and discuss the properties, fabricating processes, and applications of Langmuir-Blodgett films, functionalized surfaces, and layer by layer assemblies.
4. Discuss various types of surface modification of cellulose and paper.
5. Describe responsive materials (polymers, drug delivery etc.), the behavior of colloidal systems, and explain the fundamental concepts, preparation methods, and applications of mesoporous materials.
6. Discuss biosurfaces, including model biomembranes and their interaction with other molecules, and anti-bacterial coatings. Exemplify surface treatments of biomedical materials, discuss interactions between the human body and implants.
7. Deduce the effect of surface contaminants and choose proper cleaning techniques.
8. Search information in the scientific literature and present the results in a written literature report.

Disposition

Schema Functional materials and surfaces, Theory

Moment	**Antal föreläsningar**
Superhydrophobic/ Superhydrophilic surfaces	2
Conducting polymers	1
Langmuir-Blodgett films/ biomimetic membranes	1
Corrosion inhibition	1
Treatment of metals for biosystems	1
Surface modification of cellulose	1
Responsive polymers	1
Surface functionalization	1

Layer-by-layer assembly	1
Surface cleaning	1

Literature project, 1 hp

Course literature

The literature and will be found on the Bilda homepage.

Examination

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.

The course will be examined by a written report and an exam.

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.