KF1165 Materials Chemistry and Properties 9.0 credits

Materialens kemi och egenskaper

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

Establishment

Course syllabus for KF1165 valid from Autumn 2015

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Knowledge in chemistry (mainly organic and physical) acquired in the lower school years of the Degree Programme in Engineering Chemistry.

Language of instruction

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

Intended learning outcomes

- Identify and describe what a material is and how polymers, fiber-based materials, composites, hybrid materials, optical and electronic materials are built-up.

- Describe chemical bonds in materials.

- Account for the relationships between chemical structure and material properties.

- Account for the different morphologies that occur in materials and analyse how different morphologies influence the properties of the materials.

- Describe which mechanical, rheological, electric, magnetic, and elastic properties that are used to characterise a material.

- Describe how stepwise and chain polymerisation reactions occur in solids and how the modification of the material progresses, which structures and reaction mechanisms are involved in the polymerisations and which results are obtained for these different techniques.

- Review the general processes for recycling different materials.

- Describe different methods for characterisation of material properties and materials structures and analyse the results of the characterisation.

- Describe composite materials and organic/inorganic hybrid materials and how they can be used.

- Account for different industrial processes- e.g. paper- and pulp production.

- Starting from a desired product, be able to choose a suitable processing method and describe how it functions.

- For a given simple application be able to choose an appropriate material and argue the material selection considering function, formability. environmental impact, and economic aspects.

- Review different environmental aspects of the raw materials used and the resulting material.

- To be able to apply statistical tools in calculation of average molecular weight, crystallisation, the size distribution of nanoparticles, and substitution on the cellulose molecules.

- Describe organic materials that come from nature and how they can be used as materials and starting resources.

- Compile literature and present orally/in writing in groups.

Course contents

The course has as general aim to give a broad and basic knowledge of materials chemistry including polymers, fiber-based materials, composites, hybrid materials, optical and electronic materials.

The course provides advanced knowledge in creating, developing and analysing the structure and properties of the materials, and includes both practical and theoretical parts.

Course literature

Granted no later than four weeks before the start of the course in the course webpages.

Examination

- TEN1 - Written exam, 7.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.0 credits, grading scale: P, F
- OVN1 - Study Visits, 1.0 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.

Other requirements for final grade

Pass in all parts of the course

TEN1: Pass examination

OVN1: Compulsory attendance for study visits

LAB1: Compulsory attendance for laboratory sessions

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.