KF2140 Polymer Physics 7.5 credits

Polymerfysik

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

Establishment

Course syllabus for KF2140 valid from Autumn 2018

Grading scale

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

Education cycle

Second cycle

Main field of study

Chemical Science and Engineering, Chemistry and Chemical Engineering

Specific prerequisites

Admission requirements for programme students at KTH:
At least 150 credits from grades 1, 2 and 3 of which at least 110 credits from years 1 and 2, and bachelor's work must be completed, within a programme that includes:
50 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and in computer science or corresponding.

Admission requirements for independent students:
50 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics, computer science or corresponding. Documented proficiency in English corresponding to English B.

Language of instruction

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

Intended learning outcomes

Objectives: After the course the student should be able to:

- Describe the structure of polymer chain through the concepts of conformation, configuration and end-to-end distance
- Define, calculate and measure the average molecular weight
- Describe the production, structure and behavior of cross linked polymers and quantify this with help of the rubber elasticity equation
- Understand the behavior as well as the thermodynamics behind polymer solutions and polymer blends, miscible and immiscible
- Identify the different phase transitions that polymers undergo and summarize their cause and effect
- Describe the models for amorphous and semicrystalline polymers and relate these to the structure and properties of polymers
- Understand the life-cycle aspect in evaluating sustainability of materials
- Understand the basic relationships between chemical and physical structure, environment and degradability and degradation mechanisms of polymers
- Understand the basics of modeling and simulations of polymers
- Introduce and evaluate laborative work

Course contents

Conformation and configuration. Molecular weight and its determination. The behavior of polymers in solution. Blends and multicomponent systems. Crosslinked polymers and rubber elasticity. Amorphous state and glass transition. Morphology and crystalline state. Modeling and simulation of polymers. Sustainability of materials. Degradation of polymers.

Course literature

Sperling: Introduction to Physical Polymer Science

Examination

- ÖVN1 - Practical Course, 0.8 credits, grading scale: P, F

- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Course, 3.7 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

Passed examination
Passed exercise course
Passed laboration course

The final grade is given based on results of the 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.