



# KF2490 Biocomposite Materials

## 7.5 credits

### Biokompositer

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

If the course is discontinued, students may request to be examined during the following two academic years

### Establishment

Course syllabus for KF2490 valid from Spring 2011

### Grading scale

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

### Education cycle

Second cycle

### Main field of study

Biotechnology, Chemical Science and Engineering, Chemistry and Chemical Engineering

### Specific prerequisites

#### **Admission requirements for independent students:**

75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding. Documented proficiency in English corresponding to English B.

#### **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: 75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding.

## 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 existing biobased engineering materials from renewable plant and wood resources
- describe existing biological composites in tissue and biomedical materials used in implants
- understand the relation between composite structure on the micro- or nanoscale, and the macroscale properties, including basic composite micromechanics
- delineate the function of a hierarchical material structure in biological composites such as wood and bone
- explain the concepts of biomimetics and its possible role in design of engineered materials
- conduct a limited literature survey and critically assimilate new knowledge on a given topic at the research forefront within the field of the course and present it orally and in written report with a good structure, format and language usage as well as clearly expressed.
- adopt the perspective of another's work and formulate relevant and constructive criticism.

## Course contents

Biocomposite materials consist of two or more distinct physical phases, and the structure can be tailored to provide a wide range of physical and chemical properties. Principles for processing and structure-property relationships are explained.

Biocomposites from biobased resources are important for the future needs of society. In addition, biomedical applications of composites are promising. Particular focus is placed on nanostructured biocomposites inspired by the load-bearing materials in nature. Engineered wood materials will also be treated from a composite mechanics view. Basic notions of composite micromechanics will be presented and discussed. The role of interfaces, matrix, fibre orientation, dispersion and concentration on properties will be covered. Case studies in mechanochemical functions, and chemical modification of cellulose-based composites.

## Disposition

The course consists of lectures, a literature seminar and a laboratory exercise. The examination is done by a combination of written examination, the literature survey and the report from the laboratory exercise.

## Course literature

Scientific papers divided during lectures.

## Examination

- LAB1 - Laboratory Work, 2.0 credits, grading scale: P, F
- LIT1 - Literature Assignment, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 4.0 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.

## Other requirements for final grade

Examination (TEN1; 4 hp)

Literature assignment (LIT1; 1.5 hp)

Laboratory work (LAB1; 2 hp)

## 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.