



LUNDS UNIVERSITET  
Lunds Tekniska Högskola

*Course syllabus*

# **Biomaterial - Interaktion mellan levande vävnad och syntetiska material**

## **Biomaterials - Interaction between Living Tissue and Synthetic Materials**

**EXTG05, 5 credits, G2 (First Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED BME

**Date of Decision:** 2023-04-13

### **General Information**

**Main field:** Technology.

**Compulsory for:** BME3

**Elective for:** N4

**Language of instruction:** The course will be given in English

### **Aim**

To acquire specific knowledge on materials with respect to the design parameters for selection or creation of materials to be used in contact with living tissue – biomaterials. To understand the processes and materials properties that govern the interactions over the interface between the material and the living tissue. To understand the process that is needed to develop a new biomaterial or medical device from concept to clinics. To understand medical device/biomaterial safety at the development and clinical stage. To have knowledge of the rules that govern medical products in Europe and other parts of the world.

### **Learning outcomes**

*Knowledge and understanding*

For a passing grade the student must

- account for the main characteristics of a number of clinically used biomaterial

- account for the concepts biomaterial, biological safety and biocompatibility
- account for the development process for a new biomaterial or a new medical device
- understand the concepts of contamination, sterility and cleanliness as applied to medical devices
- understand common failure mechanisms for biomaterials/medical devices.

#### *Competences and skills*

For a passing grade the student must

- be able to explain the basic concepts within the course area.
- be able to discuss the design factors and mechanisms that direct the development of new materials and medical devices,
- be able to perform a risk analysis of a medical application,
- be able to select between different material for particular applications.

#### *Judgement and approach*

For a passing grade the student must

- Understand the ethical and commercial issues in the development of a new biomaterial.
- identify the need of knowledge and to take responsibility for their own learning,
- participate actively as a member of a project group.

## **Contents**

The class is given as lectures that will include materials science, characterization and testing of biomaterials, decontamination methods, sterilization methods and cleanroom principles. Processes in the boundary zone between material and tissue will be covered, as well as ethics, clinical research and regulations concerning medical devices. Examples of various clinical uses of biomaterials is given in orthopedics, dentistry, cardiovascular system, neurology, ophthalmology, audiology aso.

Students will also do a group work that will be presented orally followed by a discussion and a written popular science summary (English).

Teachers at he Faculty of Medicine and LTH is responsible for teaching.

## **Examination details**

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** To pass the course the student must pass the final exam, which is given in the form of short-answer questions. Additionally the student successfully must implement a group work.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a

form of examination equivalent to that of a student without a disability.

### **Parts**

**Code:** 0116. **Name:** Written Examination.

**Credits:** 4. **Grading scale:** TH. **Assessment:** Written exam

**Code:** 0216. **Name:** Group Work.

**Credits:** 1. **Grading scale:** UG. **Assessment:** Passed group work which presents orally with discussion and a written report.

### **Admission**

**Assumed prior knowledge:** EITA01 Introduction to Biomedical Engineering KOKA20  
General and Organic Chemistry

**The number of participants is limited to:** No

### **Reading list**

- David Williams: Essential Biomaterials Science. Cambridge University, 2014, ISBN: 978-0-521-89908-6.

### **Contact and other information**

**Course coordinator:** Lucas Kumosa, lucas.kumosa@med.lu.se

**Course coordinator:** Lars Magnus Bjursten, lars\_magnus.bjursten@med.lu.se

**Course homepage:** <http://www.med.lu.se/nrc/courses/biomaterial>