

SYLLABUS

Introduction to Biophysics

7.5 credits F0016T

Biofysik

Course syllabus admitted: Autumn 2007 Sp 1 - Spring 2008 Sp 4

DECISION

The syllabus was established by the Department of Applied Physics and Mechanical Engineering 2007-02-28, and remains valid from autumn 2007.

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Biofysik

First cycle, F0016T

| Education level | Grade scale | Subject | Subject group (SCB) |
|-----------------|-------------|---------|---------------------|
| First cycle | G U 3 4 5 | | Physics |

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and The basic physics and mathematics courses for Master of Engineering programs (or equivalent).

Selection

The selection is based on 1-165 credits.

Examiner

Alexander Soldatov

Course Aim

The aim of this introductory course is to give basic insight into the field of biophysics. The student should gain an overview of modern biophysics. Studies of biological phenomena are based on an interdisciplinary approach with emphasis on physics. The physical aspects are incorporated into phenomena associated with biological structure and functionalities of biomolecules. A special focus in this course is made on acquaintance with principles and capabilities of modern experimental methods in biophysics, following life process by microscopy and spectroscopic methods. This course is a basis for more advanced studies in biophysics.

Contents

The course integrates physics, biology, physical experimental methods and biochemistry. The basic biological concepts are introduced: the cell, biological structures and principles of physics in biology. Basic biochemistry/physics, explaining function and structure of biological molecules, membranes and whole cells are briefly reviewed. Fundamental molecular biophysics: peptides, macromolecules, proteins, protein dynamics, biopolymers, DNA and nucleic acids. The intra- and inter-atomic forces between biomolecules and their biological relevance. Energy. Cellmechanics, movement, nerve cells and signals are briefly overviewed and discussed. Biological membranes and ion channels. Practical applications in several fields as well as prospectives of biomaterials and micro/nano technology are discussed. An introduction to modern experimental methods in biophysics (NMR, fluorescence, confocal microscopy and laserspectroscopy, SPM and AFM) will be given.

Realization

Class lectures, compulsory lab demonstrations and one mandatory seminar assignment.

Examination

Compulsory homework assignments, completed laboratory work and a special assignment with oral presentation at a seminar. There can be alternative examination methods with a written exam.

Remarks

On request, the course will be given in english.

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Overlap

The course F0016T is equal to MTF129

Literature. Valid from Autumn 2007 Sp 1

Rodney M. J. Cotterill Biophysics: An Introduction, latest edition ISBN 0-471-48538-1. Complementary lecture notes, laboratory guides and recommended reading.

Course offered by

Department of Applied Physics and Mechanical Engineering

Items/credits

| Number | Type | Credits | Grade |
|--------|--------------------------------|---------|-----------|
| 0001 | Assignment report/written exam | 5.3 | G U 3 4 5 |
| 0002 | Seminar assignment | 1.5 | U G# |
| 0003 | Laboratory work | 0.7 | U G# |

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