



IM2656 Bio-Nanoteknik 7,5 hp

Bio-Nanotechnology

Fastställande

Kursplan för IM2656 gäller från och med HT08

Betygsskala

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

Utbildningsnivå

Avancerad nivå

Huvudområden

Teknisk fysik

Särskild behörighet

Good knowledge about the physics and chemistry courses according to the study plan or corresponding background

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

This course will provide the basic elements of the interface concepts between biology and nanotechnology. The course will focus on the living systems at the nano and micro level as

well as the role of genes, proteins and other macromolecules as the building elements of nano structured devices.

After successful completion of the course, the students should be able to:

- Understand the basic concept in cell biology and cell organelles
- Capable to define biological macromolecules
- Understand the basic concept in molecular recognition
- Give an example and explain the function and potential application of protein based structures
- Give an example and explain the function and application of DNA based nanostructures
- Perform in-vitro laboratory tests on the interaction of nanoparticles with cells.
- Assess the toxic effects of nanoparticles based on in-vitro laboratory tests.
- Identify pathogenic organisms by magnetic nanoparticle-based techniques.
- Present the result of the laboratory exercise as written report
- Present and interpret the laboratory exercise as presentation

Kursinnehåll

The molecular machinery of the cell, as well as the physico-chemical interactions between the cells characterizes the living systems. Understanding the assembly of the cell opens some exciting possibilities to construct artificial structures in applied nanotechnology, which will mimic the functions of the biological systems. A major challenge is to exploit the structures and processes of biomolecules at the cellular and organ-specific levels in order to design novel functional materials, biosensors and bioelectronic components. At the same time, the functionalized nanodevices show a strong potential for applications in medicine including imaging and diagnostic techniques, improved biomimetic materials, drug design and drug delivery. Lab Basic sterilization techniques; delivery of molecules/nanoparticles by endocytosis; identification of pathogenic organisms by magnetic nanoparticles-based techniques.

Kurslitteratur

Lecture notes and reference literature Essential cell biology, Alberts et al. Garland Science, New York 2004 Bio-nanotechnology, Goodsell Wiley-Liss, New Jersey, 2004 Nanobiotechnology, CM Niemeyer and CA Mirkin, Wiley-VCH, 2004

Examination

- INL1 - Inlämningsuppgifter, 1,0 hp, betygsskala: P, F

- TEN1 - Tentamen, 5,0 hp, betygsskala: A, B, C, D, E, FX, F
- LAB1 - Laborationer, 1,5 hp, betygsskala: P, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enskilda studenter.

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Övriga krav för slutbetyg

TEN1: 5 hp TUT1: 1 hp LAB1: 1,5 hp

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.