Biomedical Optics

Programme course

6 credits

Biomedicinsk optik

TBMT36

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Replaced by
TBMT57

Main field of study
Biomedical Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Computer Science and Engineering, M Sc in Engineering
-
- Engineering Biology, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Biomedical Engineering, Master's programme
- Information Technology, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Anatomy and Physiology, Biomedical Engineering, Biomedical Signal Processing, Medical Images and basic knowledge in electromagnetic radiation and optics.

Intended learning outcomes

The course should provide a possibility for the student to acquire knowledge about the physical properties of light and its impact and interaction with biological tissue. After passing the course the student should be able to

- describe and choose suitable light sources, detectors and wavelengths applicable to specific medical applications and demands.
- derive and apply fundamental processes of light interaction with biological tissue.
- describe analytical and statistical light interaction models.
- describe, model, value and verify light-tissue interaction models.
- apply light-tissue interaction models for diagnostic and therapeutic use.
- describe, apply and value coherent and incoherent light source applications and dynamic light scattering applications.

Course content

Optical properties of biological tissue.
Measurement of tissue optical properties.
Light transport in tissue.
The therapuetic window.
Light transport modelling and simulation.
Applications with: diffuse reflectans spectroscopy, hyperspectral imaging, flourescense spectroscopy, molecular imaging, multiphoton excitation, optical coherence tomography, photoacoustic imaging, laser Doppler imaging, etc.

Teaching and working methods

The course has a strong student-centered focus. This includes tutorial sessions, seminars, lectures, workshops and laboratory work.

Examination

LAB1	Laboratory Work	1.5 credits	U, 3, 4, 5
TEN1	Written and Oral Examination	4.5 credits	U, 3, 4, 5

Grades

Alternative-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses: Biomedical Engineering - Project Course (CDIO).

Department
Institutionen för medicinsk teknik

Director of Studies or equivalent
Linda Rattfält

Examiner
Göran Salerud

Course website and other links
https://www.imt.liu.se/en/edu/courses/TBMT36/

Education components
Preliminary scheduled hours: 50 h
Recommended self-study hours: 110 h

Course literature
Boas D.A., Pitris C. and Ramanujam N.: Handbook of Biomedical Optics. CRC Press 2011, eBook ISBN: 978-1-4200-9037-6 Splinter R. and Hooper B.A.: An Introduction to Biomedical Optics. Taylor & Francis Group, 2006, ISBN10: 0750309385 Litteraturlista och länklista med artiklar och bokkapitel på kursens hemsida.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.