Biomedical Optics

Programme course

6 credits
Biomedicinsk optik
TBMT36
Valid from: 2019 Spring semester

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

Date determined
2018-08-31
Main field of study
Biomedical Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Master's Programme in Biomedical Engineering
- Engineering Biology, M Sc in Engineering
- Biomedical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, 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 therapeutic window.
Light transport modelling and simulation.
Applications with: diffuse reflectance spectroscopy, hyperspectral imaging, fluorescence 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

<table>
<thead>
<tr>
<th>TEN1</th>
<th>Written examination</th>
<th>U,3,4,5</th>
<th>4.5 credits</th>
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<tbody>
<tr>
<td>LAB1</td>
<td>Laboratory work</td>
<td>U,G</td>
<td>1.5 credits</td>
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Grades

F, 3, 4, 5

Other information

Supplementary courses

Biomedical Engineering - Project Course (CDIO)
Subject area

Other Subjects within Technology

Disciplinary domain

Medicine

Department

Department of Biomedical Engineering (IMT)

Director of Studies or equivalent

Marcus Larsson

Examiner

Göran Salerud

Education components

Preliminary scheduled hours: 54 h
Recommended self-study hours: 106 h

Course literature

Books

ISBN: 9781420090376,9781420090369
ISBN: 9780750309387,0750309385