Biomedical Optics

Programme course

6 credits

Biomedicinsk optik

TBMT57

Valid from: 2020 Spring semester

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

Date determined
2019-09-23
Main field of study

Biomedical Engineering

Course level

Second cycle

Advancement level

A1X

Course offered for

- Master's Programme in Biomedical Engineering
- Biomedical Engineering, M Sc in Engineering
- Engineering Biology, M Sc in Engineering
- Applied Physics and Electrical Engineering, 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 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>Code</th>
<th>Description</th>
<th>Grade</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAB1</td>
<td>Laboratory Work</td>
<td>U, 3, 4, 5</td>
<td>1.5 credits</td>
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<tr>
<td>TEN1</td>
<td>Written and Oral Examination</td>
<td>U, 3, 4, 5</td>
<td>4.5 credits</td>
</tr>
</tbody>
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Grades

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

Other information

Supplementary courses

Biomedical Engineering - Project Course (CDIO)
About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is Swedish, the course as a whole or in large parts, is taught in Swedish. Please note that although teaching language is Swedish, parts of the course could be given in English. Examination language is Swedish.
- If teaching language is Swedish/English, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English (depending on teaching language).
- If teaching language is English, the course as a whole is taught in English. Examination language is English.

Other

The course is conducted in a manner where both men's and women's experience and knowledge are made visible and developed.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

Department

Institutionen för medicinsk teknik

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