# Medical Optics, 7,5 hp, VT 2016; FAFN35/FYST22

## Course Program

### Homepage
http://www.atomic.physics.lu.se/education/elective-courses/afnn35-fyst22-medical-optics/

### Course responsible
- Cord Arnold, cord.arnold@fysik.lth.se, office A218
- Edouard Berrocal, edouard.berrocal@forbrf.lth.se, office E304

### Literature
Course book: Fundamentals of Biomedical Optics by Caroline Boudoux (available at the student book shop located at LTH Studiecentrum)

### Lectures
Cord Arnold (CLA) and Edouard Berrocal (EB).

### Computer skills
We will utilise MatLab for computations during the computer exercises. The campus area is equipped with wifi. You can get access via your STIL identity. Thus you may use your own laptop during the computer exercises.

### Project
The students will in the very beginning of the course assign to a **compulsory** project. Two students should work together on each project. This project is a **central part** throughout the course. Each student is supposed to spend 80 hours on the project. At the end of the course, each project will be presented both in a written report and as an oral presentation for the other students participating. The students are supposed to perform literature searches on the specific topic of interests for their projects. In every project description, please find suggestions on relevant key-words for the literature searches. It is advised that the students should use at least two databases of interest, Web of Science and PubMed. The use of the function LibGuide for the course “Medicinsk Fysik” ([http://libguides.lub.lu.se/physics2013/medicinsk_fysik](http://libguides.lub.lu.se/physics2013/medicinsk_fysik)) will facilitate an efficient use of the resources at Lund University Library, and is thus strongly recommended. Before copying and ordering more than a few articles, you are welcome to consult the course leader for review of the material. Much of the material can also be found as PDF-files on internet.

You will decide for a project and a project partner within the first two weeks of the course. You have to email the teachers about your choice latest March 30th.

### Computer exercises
Three **compulsory** computer exercises **without** written reports are included in the course: one on diffusion and two on different aspects of Monte-Carlo simulations. Your understanding of the material included is checked through discussions during the exercise. Necessary material will be available on the homepage. You are responsible to come prepared to the lab occasion and have the instructions at hand. Sign-up lists will be available during the first week of the course.

### Laboratory exercises
In the course there are two **compulsory** experimental laboratory exercises **with** written reports: Photon Time-of-Flight Spectroscopy and Fluorescence Imaging. Necessary material will be distributed at the homepage. You are responsible to come prepared to the lab occasion and have the instructions at hand. You hand in the report directly to the lab supervisor.

Reporting sick is made before the laboratory exercise to one of the course responsible.

Sign-up lists will be available during the first week of the course.

### Examination
Requirements for passing the course:
- approved laboratory exercises (preparation, performance, and reporting (experimental labs)): Diffusion, 2x Monte Carlo, photon time-of-flight and fluorescence imaging

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Stefan Andersson Engels (Fysik)
Instructors

- approved project (written report and oral presentation)
- written exam will be required for higher grade than G or 3.

The written exam is scheduled for May 28th, 8.00-13.00 (Sparta B). You need to sign up for the exam.

Cord Arnold, cord.arnold@fysik.lth.se, office A218
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Ivan Sytsevich
Mengqiao Di, 18817583009@163.com
Xueying Li, fyk35xli@student.lu.se
## FAFN35 Schedule

<table>
<thead>
<tr>
<th>V</th>
<th>Lecture</th>
<th>Day</th>
<th>Time</th>
<th>Instructor</th>
<th>Room</th>
<th>Content</th>
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<tbody>
<tr>
<td>12</td>
<td>L1</td>
<td>Mo 19/3</td>
<td>8-10</td>
<td>CA</td>
<td>H322</td>
<td>Lecture: Introduction to course / Light-tissue interaction</td>
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<td>L2</td>
<td>We 21/3</td>
<td>8-10</td>
<td>EB</td>
<td>H322</td>
<td>Lecture: Light propagation and scattering in tissue</td>
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<td>L3</td>
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<td>CA</td>
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<td>Lecture: Diffusion</td>
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<td></td>
<td>CE1</td>
<td>Tue 27/3</td>
<td>8-13</td>
<td>CA</td>
<td>K204</td>
<td>Computer exercise: Diffusion</td>
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<td>L4</td>
<td>We 28/3</td>
<td>8-10</td>
<td>EB</td>
<td>H322</td>
<td>Lecture: Imaging in scattering media</td>
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<td></td>
<td>CE1</td>
<td>Thu 29/3</td>
<td>13-18</td>
<td>CA</td>
<td>K204</td>
<td>Computer exercise: Diffusion</td>
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<td></td>
<td>Fri 30/3</td>
<td>12</td>
<td>CA/EB</td>
<td>None</td>
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<td>By 12 o’clock that day you must have notified the teachers by email of what project you choose and who you work together with.</td>
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<td>Easter break</td>
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<td>L5</td>
<td>Mo 16/4</td>
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<td>EB</td>
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<td>Lecture: Monte-Carlo simulation</td>
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<td>Mo 18/4</td>
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<td>Lecture: Microscopy</td>
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<td>CE2</td>
<td>Thu 19/4</td>
<td>13-17</td>
<td>EB</td>
<td>E421</td>
<td>Computer exercise: Introduction to Monte Carlo simulation (group 1)</td>
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<td>CE2</td>
<td>Fri 20/4</td>
<td>13-17</td>
<td>EB</td>
<td>E421</td>
<td>Computer exercise: Introduction to Monte Carlo simulation (group 2)</td>
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<td>The time-of-flight spectroscopy lab should happen this week</td>
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<td>L7</td>
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<td>Lecture: Nonlinear laser tissue interaction</td>
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Stefan Andersson Engels (Fysik)
### Laboratory Exercises (to be filled)

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