Super-Resolution fluorescence microscopy (3 Hp, SK3514)

The course aims to provide all participants with training in the fundamental theoretical and experimental aspects of super-resolution fluorescence microscopy.

Scientific tutorials will introduce fundamental and advance aspects of super-resolution fluorescence microscopy. Experimental hands-on session will further deepen the understanding and applicability of super-resolution microscopy.

As the name implies, super-resolution fluorescence microscopy is a field in which novel optical approaches and single molecule sensitive fluorescence methods are applied to answer question in cellular biology via nanoscale biological imaging.

Syllabus

Lectures / seminars:
Introduction to available super-resolution fluorescence microscopy techniques (STED/PALM/STORM/SIM) and their applicability. Practical hands-on sessions on commercial super-resolution microscopy platforms, including advance imaging analysis.

Prerequisites
Registered as PhD-student and submission of ALM access proposal (see link below)
www.scilifelab.se/facilities/alm/

Requirements
Literature study (1 university credit)
Laboratory work (1 university credit)
Examination (1 university credit)

Required reading
Scientific articles (distributed)

Contact: Docent Hans Blom, Email: hblom@kth.se, 08-52481214
Department of Applied Physics, Royal Institute of Technology, Stockholm

The lectures of the course will be carried out at Karolinska Institute campus in Solna (Lecture hall Inghesalen; floor 2, Tomtebodav 18A). Session with meet the experts and demos will be at the Advance Light Microscopy facility at Science for life laboratory, Tomtebodav 23A in Solna.

Last application date: 2014-05-05
Goals
After the course all participants should have acquired the following knowledge/skills:

- Fundamentals of super-resolution microscopy
- Practical implementation of each super-resolution technique
- Analysis approaches in advanced imaging
- Necessary conditions regarding sample preparations
- Initial acquaintance of using commercial super-resolution microscopes
- Present and critically discuss own scientific work and how to apply super-resolution fluorescence microscopy to individual projects

Selection
In the case of an over-booked course (max 20) selection will be based on the proposals.

Exam (grades)
The super-resolution fluorescence microscopy course ends with a take-home exam (project proposal writing) where each PhD-student addresses how to apply the techniques to their own research.

The grade of the course is either pass or fail.
**Time table**

**Week 1:** Take-home studies of super-resolution microscopy background (review articles)

**Week 2:** Lecturing and practical sessions, including demos with commercial microscopes

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<th>Thursday JUNE 5th</th>
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<td>09:00-09:10 Welcome</td>
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<td>13:45 -14:15 Meet your expert</td>
<td>13:00-16:00 Image analysis</td>
<td>13:00-15:30 Demo(s)</td>
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<td>14:15 -14:45 Meet your expert</td>
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**Lecturers**
- SIM super-resolution; Prof. Rainer Heintzmann - Jena University, Germany
- PALM super-resolution; Prof. Suliana Manley - EPFL Lausanne, Switzerland
- STORM super-resolution; Dr. Mark Bates - Harvard/MPI-BPC Göttingen, Germany
- STED super-resolution; Dr. Lars Kastrup – Abberior/MPI-BPC Göttingen, Germany
- Image analysis; Dr. Vincent Schoonderwoert - SVI Hilversum, the Netherlands

**Week 3:** Examination – to pass the course each participant need to hand in a written ALM access proposal where they motivate the use and suitability of super-resolution microscopy in their own research, with the know-how of pros and cons acquired during the course. This project proposal will (after evaluation) also be given project support from the national Advanced Light Microscopy facility. Send to hblom@kth.se

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![Cobolt High performance lasers](image)