

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 microscopy (Nobel Prize in 2014).

Scientific tutorials will introduce fundamental and advance aspects of super-resolution fluorescence microscopy. Experimental demo-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.

The course will be carried out at the national Science for Life laboratory in Solna.

Syllabus

Lectures / seminars:

Introduction to available super-resolution fluorescence microscopy techniques (e.g. STED/PALM/SIM/RESOLFT/DNA-PAINT etc.) and their applicability.
Demo-sessions on commercial super-resolution microscopy platforms.

Prerequisites

Registered as PhD-student and submission of project proposal (link below)

<http://nmisweden.se/events/srm.html>

Requirements

Literature study (1 university credit)

Laboratory work (1 university credit)

Examination (1 university credit)

Required reading

Scientific articles (distributed)

Contact: Hans Blom, hblom@kth.se or Ilaria Testa, testa@kth.se

Last application date: 2018-01-10

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Goals

After the course all participants should have acquired the following knowledge/skills:

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



Selection

In the case of an overbooked course (maximum 24 students) selection will be done on the submitted registration project proposals (i.e. necessity of super-resolution imaging). Link to form: <http://nmisweden.se/events/srm.html>

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Time table (2018 – week 1: Jan29-Feb1; week 3: Feb11-Feb15)

Week 1: Take-home studies on super-resolution microscopy (review articles)
Delivery of ‘want-to-discuss’ questions with the experts; one per technique
(PALM, DNA-PAINT, lattice light sheet, SIM, STED and RESOLFT)

Week 2: Lecturing & discussion sessions, including demos with commercial microscopes
At Scilifelab – Solna; Tomtebodav 23A

	Tuesday FEB 6 th	Wednesday FEB 7 th	Thursday FEB 8 th	
		AIR/FIRE lecture hall 09:00-09:05 Welcome 09:05-09:50 SR#1 09:50-10:35 SR#2 Coffee 10:55-11.40 SR#3 11:40-12.15 SR#4 12:15-13:00 SR#5	Microscope lab 09:00-10:30 Demo(s) 10:30-12:00 Demo(s)	
		Lunch in gamma-3 kitchen		
	Seminar room 13:00-14:00 Intro lecture Voluntarily	Seminar rooms 13:45 -14:15 Meet your expert 14:15 -14:45 Meet your expert 14:45 -15:15 Meet your expert 15:15 -15:45 Meet your expert 15:45 -16:15 Meet your expert	Microscope lab 13:00-14.30 Demo(s) 14:30-16.00 Demo(s)	

Lecturers

SR#1 PALM – Suliana Manley, EPFL Lausanne, Switzerland

SR#2 DNA-PAINT – Ralf Jungmann, MPI-BC Munich, Germany

SR#3 RESOLFT & STED – Ilaria Testa, KTH/Scilifelab Stockholm, Sweden

SR#4 N-SIM – NIKON company representative

SR#5 Lattice light-sheet – Wesley Legant, Janilia Farms, VA, USA

Demo-sessions: booked by doodle link distributed at course start.

Week 3: Examination – to pass the course each participant need to hand in a written project 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.

Exam (grades)

The super-resolution fluorescence microscopy course ends with a take-home exam, which is writing an improved project proposal <http://nmisweden.se/events/srm.html>

The grade of the course is either pass or fail.

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