האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

Optical super resolution and applications - 77308

Last update 22-11-2018

HU Credits: *2*

Degree/Cycle: *1st degree (Bachelor)*

Responsible Department: *Physics*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Dr. Eilon Sherman*

Coordinator Email: *sherman@phys.huji.ac.il*

Coordinator Office Hours: *By appointment*

Teaching Staff:

Course/Module description:

Light microscopy is a key experimental tool. e.g. in solid state physics and biology. The resolution of such microscopy is limited by the diffraction of light to ~half of the wavelength. Over the past decade, a revolution in the field has allowed imaging with super-resolution down to nano-meters and to single molecules. In this course, we will learn about multiple techniques of microscopy, how to break the diffraction-limit of light, and new and exciting findings that have been enabled by super-resolution techniques.

Course/Module aims:

Introduction of microscopy techniques
Introduction of ways to break the diffraction limit of light
Presentation of technological advancements and exciting new findings, enabled by super-resolution microscopy

Learning outcomes - On successful completion of this module, students should be able to:

1. To study in depth a topic in microscopy, with an orientation toward advanced studies in the field.
2. Present the topic.

Attendance requirements(%):

90

Teaching arrangement and method of instruction: Seminar:
The student will give 1-2 presentations.

Course/Module Content:

The list of topics will include:
1. An introduction to basic concepts in microscopy
2. An introduction to various microscopy configurations, including near or far fields, wide or narrow fields, and more.
3. Approaches to breaking the diffraction limit of light, including:
Imaging single molecules
imaging fluctuations
Structured illumination
Stimulated emission-depletion
Near-field approaches

4. Related microscopy approaches, inc. electron microscopy, AFM, etc.
5. For each method, we will introduce the latest technological advancements and related new discoveries

Required Reading:
Multiple research studies that will be presented at the beginning of the course

Additional Reading Material:
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Grading Scheme:

Additional information:
None