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Foundations in Bioimaging - Course Syllabus

Course Number: B216

Course Title: Foundations in Bioimaging

Academic Semester:	Spring	**Academic Year:**	2015/ 2016
Semester Start Date:	Jan 24, 2016	**Semester End Date:**	May 19, 2016

Class Schedule: Sunday (13:00 – 14:30) and Wednesday (13:00 – 14:30)

Classroom Number: TBD

Instructor(s) Name(s):	Satoshi Habuchi, Carlo Liberale, Andrea Falqui, Christian Depeursinge
Email:	satoshi.habuchi@kaust.edu.sa
Office Location:	Bldg2/4277 (SH), Bldg2/4335 (CL), Bldg2/4334 (AF), Bldg2/4276 (CD)

COURSE DESCRIPTION FROM PROGRAM GUIDE

This course provides a comprehensive overview of bioimaging techniques including fundamental concepts and applications, which allow biology students to design imaging experiments for their own research. The course covers basic optics and spectroscopy, optical microscopy techniques, advanced fluorescence microscopy, and single-molecule imaging techniques. The course also introduces label-free optical imaging methods including Raman and infrared microscopy, and holographic microscopy. Introduction to advanced methods for manipulation of single cells and single molecules (optical and magnetic tweezers), and correlative light and electron microscopy (CLEM) will be also provided, together with some concept about the newest in-situ transmission electron microscopy (TEM) for biological applications

COMPREHENSIVE COURSE DESCRIPTION

The course covers basic optics and spectroscopy, optical microscopy techniques, advanced fluorescence microscopy, and single-molecule imaging techniques. The course also introduces label-free optical imaging methods including Raman and infrared microscopy, and holographic microscopy. Introduction to advanced methods for manipulation of single cells and single molecules (optical and magnetic tweezers), correlative light and transmission/scanning electron microscopy (TEM and SEM) an in situ liquid TEM will be also provided. Students also present an assigned paper that is related to imaging/microscopy.

GOALS AND OBJECTIVES

This course provides a comprehensive overview of advanced bioimaging techniques including fundamental concepts and applications, which allow biology students to design imaging experiments for their own research.

REQUIRED KNOWLEDGE

No prerequisite.

REFERENCE TEXTS

Principles of fluorescence spectroscopy (J. R. Lakowicz), Handbook of fluorescence spectroscopy and imaging (M. Sauer, J. Hofkens, J. Enderlein), Single particle tracking and single molecule energy transfer (C. Brauchle, D.C. Lamb, J. Michaelis Eds.), Optics (E. Hecht), Single molecule spectroscopy in chemistry, physics, and biology (A. Gräslund, R. Rigler, J. Widengren), Infrared and Raman Spectroscopic Imaging (R. Salzer, H. W. Siesler Eds.)

METHOD OF EVALUATION

Percentages %	Graded content
(10 %) **(10 %)** **(30 %)** **(25 %)** **(25 %)**	The class is graded by absolute standards. The graded item is: **Attendance** **Class participation** **Presentation** **Midterm exam** **Final exam**

COURSE REQUIREMENTS

Assignments

paper presentation

Course Policies

In accordance with the University policy and professional standards, the highest levels of academic integrity are expected in this class. The code of student conduct is strictly enforced. Academic dishonesty will result in reductions in grades and/or expulsions from this class and/or the University.

NOTE
The instructor reserves the right to make changes to this syllabus as necessary.