



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Laboratorio di Biofotonica I

2021-1-F1701Q120

Aims

To learn to exploit advanced spectroscopic techniques to characterize nanomaterials, biomolecules and biological samples.

Contents

Time-resolved spectroscopic techniques applied to biosystems. Fluorescence lifetimes of typical fluorophores used in optical microscopy. Fluorescence anisotropy. Polarized and depolarized dynamic light scattering. Fluorescence correlation spectroscopy.

Detailed program

Fluorescence lifetimes measurements of typical fluorophores used in optical microscopy. Dyes in solution and mixtures of dyes. Fluorophore-protein binding constant evaluation from lifetimes measurements. Proteins size and aggregation studies by means of fluorescence polarization anisotropy. Polarized and depolarized dynamic light scattering. Temperature and salt concentration effects on protein diffusion dynamics. Aggregation kinetics. Fluorescence correlation spectroscopy (FCS): calibration of the optical setup, experiments versus excitation power and concentration. Green Fluorescent Protein photophysics. Gold nanoparticles FCS. Molecular crowding experiments.

Prerequisites

The topics covered in the different courses of the Bachelor Degree in Physics.

Recommended: the Biophotonics course of the Master Degree in Physics and/or the Experiments of Biophotonics course of the Bachelor Degree in Physics.

Teaching form

Practical training activities in presence on rotation (within the limits imposed by the available spaces and by the constraints on the overall presence of students in the university) supported by video aids in the research labs of the Biophysics group, rooms 4054-4052-4051.

Textbook and teaching resource

C.R.Cantor and P.R.Schimmel, "Biophysical Chemistry", W.H. Freeman & Co, 1980;

J.R.Lackowicz, "Principles of Fluorescence Spectroscopy", Springer, 2006;

A.Diaspro, "Confocal and two photon microscopy: foundations, applications and advances" edited by Alberto Diaspro, Wiley, 2002.

Semester

I semester.

Assessment method

Students are required to write in English a relation describing the experiments performed and it will be the object of the discussion during the final oral exam.

During the Covid-19 emergency period, oral exams will be held online only. They will be carried out using the WebEx or Google Meet platforms and a public link will be published on the course e-learning page for virtual access to the examination of interested students.

The final score will be determined by the evaluation of the relation, of the knowledge of the different topics covered in the lab, of the experimental data analysis and of the student's behavior overall the lab course.

Office hours

On appointment.
