



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Esperimentazioni di Biofisica

2021-3-E3001Q063

Aims

The course will be focused on the characterization of biomolecules and nanoparticles through spectroscopic techniques. Moreover The students will learn basic principles related to confocal microscopy.

Contents

Absorbance, Fluorescence, Dynamic Light Scattering, Infrared Spectroscopy, Circular Dichroism, Microscopy, Nanoparticles

Detailed program

The 8 CFU comprises 2 CFU of introductory lessons in which the different instruments and spectroscopy/microscopy techniques will be illustrated together with data analysis methods. The remaining 6 CFU are related to the Laboratory lessons.

The main topics are reported in the following:

Absorbance and fluorescence spectroscopy of biomolecules and fluorophores.
Evaluation of the secondary structure of proteins and study of the folding-unfolding processes through optical techniques (circular dichroism, fluorescence and infrared spectroscopy).
Study of biomolecules-small ligands interactions through fluorescence techniques.

Estimate of the proteins dimension and the aggregation state of gold nanoparticles by means of quasi-elastic light scattering.

Hyperthermic effect induced on metallic nanoparticles by an infrared laser and its measurement through a thermal camera.

Fluorescence confocal microscopy applied to image acquisition of cells and biological tissues: image analysis, measurement of the optical resolution of the system.

Prerequisites

knowledge of classical electromagnetism, optics, elements of biophysics

Teaching form

Frontal lessons related to the theoretical part of the experiments.

Laboratory part in which each group of students will perform the experiments described in the program section

During the Covid-19 emergency, experiments will be held in attendance on rotation supported by video aids in asynchronous mode.

Textbook and teaching resource

Textbooks:

Cantor and Schimmel "Biophysical Chemistry"

Robert Pecora, Bruce J. Berne, "Dynamic Light Scattering"

Joseph R Lakowicz, "Principles of fluorescence spectroscopy"

Slides provided on the e-learning site

Semester

Second semester

Assessment method

Oral examination with a written report related to the performed experiments

During the Covid-19 emergency period, oral exams will be held only online. 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 students have to prepare a written report related to the experiments.

Office hours

Usually the teacher is always available for reception, however the presence is guaranteed only if previously arranged, either in classroom or by e-mail.

During the Covid-19 emergency period, an online reception slot will be determined, after previous arrangements with the teacher by e-mail.
