



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Esperimentazioni di Biofisica

2021-3-E3001Q063

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#### 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.

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