UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Laboratorio di Biochimica

2021-3-E1301Q077-E1301Q084M

Aims

This module aims at providing students with skills for the basic biochemical techniques: protein purification, qualitative and quantitative characterization, enzymatic activity assays.

- Knowledge and understanding.

At the end of the course, the student should be able to apply the knowledge acquired in the field of biochemistry, with particular emphasis on enzyme purification and functional characterization.

- Applying knowledge and understanding

At the end of the course the student is expected to

correctly interpret the experimental protocols already used, recognize their salient aspects, collect and process experimental data.

- Making judgment

Students must be able to recognize the opportunity to apply specific experimental methods, to process the data and to present the procedures.

- Communication skills

At the end of the course the student will be able to express himself appropriately in the description of the topics addressed, and will be able to present the experimental data in the most appropriate way (graphs, tables, numerical indexes, etc.).

- Learning skills

At the end of the course the student will be able to reproduce the techniques adopted in similar contexts, and will have useful tools to help understanding similar issues (i.e. other courses in the field of Protein science, or the scientific literature in this subject area).

Contents

The laboratory work (5 practical lessons) is aimed at the purification of a recombinant enzyme and its biochemical and kinetics characterization. The experimental data will be analyzed by basic tools, interpreted and discussed.

Detailed program

The biological chemistry module includes the employment of these techniques:

a) protein extraction from bacterial cells;

b) protein purification by affinity and size-exclusion chromatography;

c) protein electrophoresis under denaturing conditions (SDS-PAGE);

d) measure of protein concentration and enzyme activity;

e) enzyme kinetics. The data will be reported in a “purification table” containing parameters like specific activity, yield and purification fold. The enzyme kinetics will be aimed at determining main parameters, such as KM, vmax and kcat. Finally, the biochemical characterization will be aimed at defining the residual activity upon heat pretreatment of the enzyme. Experimental data will be analyzed and interpreted using basic statistics tools, such as average, standard deviation and Pearson correlation coefficient.

Prerequisites

Basic notions of mathematics, chemistry and biochemistry.

Teaching form

Experimental activities performed by groups of 3-4 students in equipped labs. Each activity is introduced by a theoretical lesson, showing the goals and the experimental design. Slides and experimental protocols will be provided to students at the beginning of the teaching activity, and uploaded on the moodle teaching platform.

Textbook and teaching resource

Slides and experimental protocols will be provided to students at the beginning of the teaching activity, and uploaded on the moodle teaching platform.

Semester

First semester

Assessment method

Written test focused on all teaching modules: the exam will be aimed at the evaluation of acquired competences in all disciplines involved. The ability to elaborate and integrate the experimental work with the theoretical basis of the experiments, and the development of interdisciplinary links will be evaluated. The assessment will be organized in six sections, with open questions and multiple choice tests. In order to pass the exam it is necessary that the student has an evaluation greater than or equal to 18 in all the disciplines. In the event that the student does not achieve sufficiency even in one discipline, the test must be re-supported in full. The

duration of the assessment will be 2 hours.

Office hours

The teachers will receive by appointment requested by e-mail.