



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Biotechnologie in Diagnostica

2021-1-F0901D029

Aims

The course is aimed at acquiring specific competences in the field of basic and advanced biotechnology-based biochemical diagnostics. It will provide principles of classical and innovative diagnostic techniques for molecular investigation on biological fluids and human tissues, focusing on advanced diagnostic techniques for specific diseases and tumors.

The course will provide biomarker definition, discovery and clinical application, and usefulness of biomarkers in disease prevention, screening and diagnosis. Students will learn concepts about clinical laboratory organization, purposes, practice of analysis, interpretation and patient management.

Contents

The aim of the biotechnologies in the diagnostic field is to create and develop new, rapid and efficient diagnostic tools, using the immunochemistry and nucleic acid hybridization techniques. To reach this objective, it is necessary to have a good knowledge of the basics of Laboratory Medicine (clinical biochemistry and clinical molecular biology).

Detailed program

- General principles of laboratory medicine. Biotechnology in laboratory medicine.
- The laboratory diagnostic process: pre-analytical, analytical and post-analytical aspects.

- The medical laboratory management: quality control; automation and LIS; point of care testing.
- Methodological approaches to clinical biochemistry. Enzyme-, immunometry-, and pcr-based assays; signal detection and amplification; different analytical formats; advantages and disadvantages; 1d and 2d electrophoresis; western blotting; protein arrays.
- Biomarkers definition and relative concepts: functional and lesion markers, biomarkers release, diagnostic windows, biomarkers specificity; innovative biomarker discovery, biomarkers in organ and tissue diseases and inborn errors of metabolism: cardiovascular disease risk, myocardial infarction, hepatic diseases and diabetes. Tumour markers.
- Clinical diagnosis of celiac disease; molecular diagnosis of solid tumors, as lung and colon cancer; molecular diagnosis of multiple myeloma.
- Practical laboratory training: 1D and 2D electrophoresis to separate and study biological samples. During this training, students are given the basics for the use of small instrumentation and for practical operations in the laboratory (preparation of aqueous solutions, solvent mixtures, and biological samples).

Prerequisites

Basic knowledge in the field of chemistry, biochemistry, molecular biology, human physiology and pathology

Teaching form

Lectures and laboratory training

Textbook and teaching resource

Material and bibliographic references supplied by the professor

Semester

Second semester

Assessment method

The examination consists of a written and an oral part. No in itinere tests are foreseen.

The exam subjects cover the entire program of the lectures and the laboratory training. The written test consists of 23 closed questions with a single exact answer, 2 with two exact answers (clearly marked) and 3 open questions, totally 28 questions. Each quiz is awarded 1 point if it is answered correctly, 0 points if it is wrong. Questions with 2 exact answers are worth 2 points, one for each correct answer; if at least one wrong answer is selected, the question will be ranked 0 points. Open questions give a maximum of 2 points. In addition, there is an application

exercise of the formulas commonly used in the laboratory to calculate quantities of reagents to be weighed, taken or diluted, in order to prepare solutions or samples; this exercise aims to evaluate the acquisition of some practical skills achieved or not during laboratory training. This exercise gives a maximum of 2 points. The total score is the starting point for the final mark after the oral test. The oral exam is compulsory and includes the discussion of the written exam, with comments on the wrong answers, and ranges over the topics covered during the lessons.

From the academic year 2011-2012 (when the course was included in the degree course) to date, the average score obtained is 28/30. Interestingly, the average has risen in the last 3 academic years, with an average of 28.7/30 for 2016-2017. The average percentage of overrun per exam is around 77.7%. Most students (81%) pass the exam at first attempt, 14.9% pass at the second, 3.7% pass the third one, and less than 1% need more attempts. Students who repeat the exam, in most cases refused the score obtained on the first attempt; on the next one, they often achieved excellent results. The average % of refusals per exam is less than 4%.

Office hours

Upon request: francesca.raimondo@unimib.it
