
COURSE: Applied Biochemistry

ACADEMIC YEAR: 2019-2020

TYPE OF EDUCATIONAL ACTIVITY: Basic

TEACHER: Angelo Bracalello

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website:

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mobile

Language: **ITALIAN**

ECTS: 6

(5 of lessons end 1 of laboratory)

n. of hours: **52**

(40 of lessons end 12 of laboratory)

Campus: **Potenza**Dept./School: **Science**Program: **Biotechnology (L2)**Semester: **II**

(expected dates of course beginning and end:

10.01.2019/12.20.2019, 01.20.2020.)

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES**Purposes**

Provide students with the theoretical and practical bases of the main techniques used in the Biochemistry and Molecular Biology laboratories.

Knowledge on:

- main electrophoretic techniques
- principles of absorption photometry
- main centrifugation techniques
- main chromatographic techniques
- radioactive decay mechanisms and methods used for the detection and measurement of radioactivity
- basic molecular cloning techniques

Ability :

- ♣ Identify the most appropriate technique for purifying a biological macromolecule and knowing how to determine concentration and molecular weight
 - ♣ Knowing how to design or evaluate experimental procedures used in biochemistry research
 - ♣ Knowing how to design a simple molecular cloning experiment
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PRE-REQUIREMENTS

Not required but they are recommended solid knowledges of Biochemistry and Molecular Biology, General and Organic Chemistry, as well as some principles of physics in order to reaching a comprehensive understanding of the proposed topics

SYLLABUS:

Electrophoretic techniques : general principles , supporting materials. Polyacrylamide and agarose gel. Protein electrophoresis : SDS -PAGE . Electrophoresis under native conditions . Gradient electrophoresis . Two-dimensional electrophoresis . Isoelectrofocusing . Electrophoresis of nucleic acids: electrophoresis on agarose gel , electrophoresis on polyacrylamide gel . Western , Southern and Northern blotting. PFGE

Radioisotopic techniques : atomic structure . Stability and atomic radiation . Types of radioactive decay. Measure of radioactivity. Main isotopes used in biotechnology . Detection and measurement of radioactivity . Methods based on the ionization of gases: the Geiger-Muller counter . Methods based on the excitation : the scintillation counters . Methods based on the exposure of photographic emulsions : autoradiography , dosimeters . Fluorescence and fluorochromes : physic-chemical and spectral characteristics.

Centrifugation techniques : basic principles of sedimentation , the sedimentation coefficient . Types of centrifuges. Preparative and analytical ultra-centrifuge . Types of rotors. Clearing Factor. Isopycnic and zonal centrifugation . Differential centrifugation . Density gradient centrifugation .

Chromatographic techniques : general principles . Low-pressure chromatography on a column. High performance

liquid chromatography (HPLC , FPLC) . Partition chromatography : normal -phase liquid chromatography and reverse phase . Molecular exclusion chromatography . Ionic-exchange chromatography. Affinity chromatography.

Analysis of nucleic acids: Northern and Southern blotting . Restriction and modification enzymes . The polymerase chain reaction . Cloning and expression vectors.

TEACHING METHODS

Theoretical lessons, laboratory activities

EVALUATION METHODS

Oral examination which involves the formulation of at least three questions. The rating is assigned depending on the maturity and skills demonstrated by the student in the answers exposure.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

K. Wilson , J. Walker Biochimica e Biologia Molecolare, principi e tecniche Ed. R. Cortina

Susan J. Karcher Laboratorio di Biologia Molecolare Ed. Zanichelli

M. Maccarone Metodologie Biochimiche e Metodologie Biomolecolari Ed. Zanichelli

Slides of the course.

INTERACTION WITH STUDENTS

Reception hours: Tuesdays 'and Thursday' from 14.30 to 16.30.

Outside of these hours you can always have a talk with the teacher by appointment.

EXAMINATION SESSIONS (FORECAST)¹

23 January 2020; 06 February 2020; 05 March 2020; 15 June 2020; 14 July 2020; 15 September 2020; 16 December 2020.

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

¹ Subject to possible changes: check the web site of the Teacher or the Department/School for updates.