

Study Programme: Bachelor Academic Studies in Biochemistry
Course Unit Title: Experimental Biochemistry
Course Unit Code: B-304
Name of Lecturer(s): Associate Professor Ivana Beara
Type and Level of Studies: Bachelor of Science Degree
Course Status (compulsory/elective): compulsory
Semester (winter/summer): summer
Language of instruction: English
Mode of course unit delivery (face-to-face/distance learning): Face-to-face
Number of ECTS Allocated: 7
Prerequisites: none
<p>Course Aims:</p> <p>The goal of the course is to provide students with the fundamental knowledge of contemporary methods used in biochemical laboratories for isolation, purification and characterization of biomolecules from natural sources. Furthermore, the goal of the course is to develop students' ability to choose the appropriate experimental procedure by applying gained knowledge and understanding of the fundamental physicochemical properties of biomolecules, as well as to acquire a wide range of practical (experimental) skills related to biochemical techniques.</p>
<p>Learning Outcomes:</p> <p>Students will be able to (1) understand the fundamental principles of isolation, purification and characterization of biomolecules from natural sources, (2) understand the dependence between the selection and sequence of biochemical techniques used for the isolation, purification and characterization of biomolecules and their physicochemical characteristics, (3) properly handle basic equipment in biochemistry laboratory, handle chemicals safely and recognize potential hazards and risk assessment during practical work, (4) apply appropriate experimental procedures for isolation, purification and characterization, (5) interpret experimental results and write reports.</p>
<p>Syllabus:</p> <p><i>Theory</i></p> <p>Homogenization. Extraction. Lyophilization. Precipitation: isoelectric, salting in/out, with organic solvents. Preparative centrifugation of biomolecules and cell organelles. Size-based separation of biomolecules: dialysis and electro dialysis, ultrafiltration and reverse osmosis. Chromatographic methods: size exclusion, adsorption, hydrophobic, ion-exchange, affinity and partition chromatography. High performance liquid chromatography. Gas chromatography. Chosen spectroscopic methods (UV-VIS spectrometry, spectrofluorimetry, circular dichroism) in experimental biochemistry. Immunochemical and radioisotope methods. Electrophoresis (SDS, PAGE, disc). Electrophoresis of proteins and nucleic acids (blotting). Polymerase chain reaction (PCR). Cell cultures in biochemistry.</p> <p><i>Practice</i></p> <p>Isolation and purification of amino acids, proteins, lipids, enzymes, vitamins, polysaccharides, cellular components, DNA, and RNA from natural sources. Western blott. PCR.</p>
<p>Required Reading:</p> <ol style="list-style-type: none"> 1. A. Pingoud, C. Urbanke, J. Hoggett, A. Jeltsch: Biochemical Methods, Wiley-VCH Verlag, 2010. 2. A. Ninfa, D. Ballou, M. Benore: Fund. Laboratory Approaches for Biochem. and Biotechn., Wiley, 2010.

3. R. Boyer: Biochemistry Laboratory: Modern Theory and Techniques, Pearson Education, 2006.
4. K. Wilson, J. Walker: Principles and Techn. of Biochem. and Molec. Biol., Cambridge Univ. Press, 2005.
5. Journals: Journal of Pharmaceutical and Biomedical Analysis, Journal of Biochemical and Biophysical Methods, Methods in Enzymology, Journal of Microbiological Methods, Laboratory Animals, etc.

Weekly Contact Hours: 8 (120) | **Lectures:** 3 (45) | **Practical work:** 5 (75)

Teaching Methods:

Lectures, laboratory work, seminar(s)

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	Final exam	points
Active class participation	10	written exam	60
Practical work	20	oral exam	
Preliminary exam(s)		
Seminar(s)	10		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.