

Level: Bachelor			
Course title: Bioanalytical chemistry			
Status: elective			
ECTS: 6			
Requirements: none			
Learning objectives Broadening the knowledge base about the specificities of sampling and preparing biological samples, as well as about methods of bioanalytical-chemical investigations. Expanding the understanding of the role, importance and application areas of bioanalytical chemistry. Training students in practical skills that enable professional and independent sample handling and equipment applications during bioanalytical-chemical investigations. Advanced training of students to solve problems/tasks using instrumental techniques adapted to methodology of bioanalytical chemistry.			
Learning outcomes Application of knowledge about techniques of bioanalytical-instrumental analysis and understanding the methodology for the selection of suitable measurement techniques and methods to solve complex bioanalytical /problems. Independent and critical application of knowledge and understanding of facts, concepts, principles and theories in solving the problem of unknown bioanalytical-chemical problems. Independent operation on instruments for bioanalytical chemical analysis of different samples. Selection, if necessary optimization/modification/adaptation and implementation of the appropriate laboratory procedures/methods in solving practical problems by applying chemical tests in bioanalytical-chemical investigations.			
Syllabus <i>Theoretical instruction.</i> Specificities of the sampling of biological materials and sample preparations for analysis. Miniaturization in separation techniques. Analysis of DNA (PCR). Sensors (electrochemical, optical, etc.). Biosensors. Enzymatic biosensors for determination of glucose, and other target analytes. Immunosensors. DNA sensors. Oligonucleotide sensors. Biosensors chips. Miniaturization of sensors. <i>On line</i> and <i>in vivo</i> measurements. Scanning electrochemical microscope. Highly sophisticated instruments in bioanalytical chemistry. Mass spectrometry in bioanalytical chemistry. Nuclear magnetic resonance in bioanalytical chemistry. Chromatographic techniques in bioanalytical chemistry. Electrophoresis in bioanalytical chemistry. Coupled techniques in bioanalytical chemistry. Analysis of characteristic biological materials (body liquids and gases, genetically modified materials, food etc.). Determination of mycotoxines and medicaments (antibiotics, hormones etc.) in the environment. <i>Practical instruction.</i> Analysis of mycotoxine. Voltammetric determination of lead and cadmium in blood / urine samples. Alco-test. Tests for hormones, blood sugar and drugs. Analysis of insecticides in foodstuffs. Analysis of bladder/gall stones. Thermometric biosensors. Measurements of oxygen.			
Weekly teaching load			Other:
Lectures: 2	Exercises: 1	Other forms of teaching: 3	