Course Unit Descriptor

Study Programme: Chemistry, Biochemistry

Course Unit Title: Bioanalytical Chemistry

Course Unit Code: IHA-406

Name of Lecturer(s): Assistant Professor Jasmina Anojčić

Type and Level of Studies: Bachelor Academic Studies

Course Status (compulsory/elective): Elective

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: 6

Prerequisites: 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 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

Theoretical instruction.

Specificities of the sampling of biological materials and sample preparations for analysis. Miniaturization in separation techniques. Analysis of DNA. Sensors. Biosensors. Enzymatic biosensors for determination of glucose, and other target analytes. Immunosensors. DNA sensors. Oligonucleotide sensors. Biosensors chips. Miniaturization of sensors. *On line* and *in vivo* 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 biological materials. Determination of mycotoxines and medicaments in the environment.

Practical instruction.

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.

Required Reading:

1. Susan R. Mikkelsen, Eduardo Corton, Bioanalytical Chemistry, Wiley, 2004
2. Jon Cooper, Tony Cass, Biosensors, Oxford Univ, 2004.

Weekly Contact Hours: 75	**Lectures:** 45	**Practical work:** 30

Teaching Methods:

Lectures and laboratory work

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Activities	10	Written exam	
Lab. work	20	Oral exam	70