

Study Programme : BSc in Biology			
Degree level: Bachelor degree			
Course Title: Instrumental Methods of Analysis in Biology			
Professor: Slobodanka Pajević			
Required/Elective Course: Required			
Number of ECTS: 7			
Prerequisites: -			
Course Objective: Theoretical and practical basis of implementation some instrumental methods in biological, biochemical and physiological investigations of cell structure and metabolism.			
Course Outcome: By application of instrumental methods to different analysis including electrochemical, spectroscopic, spectrophotometric, chromatographic, students learn techniques for methods development, sample preparation, optimization of operating conditions to obtain accurate, reproducible results, and data analysis.			
Course Content:			
<i>Theoretical part</i>			
Chromatography: qualitative and quantitative analysis, preparative and analytical chromatography, column and thin layer chromatography, gas and liquid chromatography, affinity chromatography, ion-exchange and size exclusion chromatography. Electrophoresis, Polyacrylamide gel electrophoresis, protein detection on gel. Optical methods of analysis, UV, V spectrophotometry, flame spectrophotometry, atomic absorption spectrophotometry, spectrum analysis. Microscopy - electron microscopy (TEM, SEM). Electroanalytical methods of analysis: potentiometry and polarography - amperometry. Principles of pH measurements. O ₂ electrode. Manometric analysis, different type of manometric measurements, Warburg manometric techniques. Isotope methods of qualitative and quantitative analyses. Using of isotopes in biological research. Radioimmunoassay analysis. Enzyme-Linked Immunosorbent Assay (ELISA).			
<i>Practical part</i>			
Column and thin layer chromatography: Determination of β carotene by column chromatography; thin layer chromatography of industrial food colours. Gel electrophoresis. Spectrophotometry: Determination of peroxidase activity by colorimeter, Qualitative and quantitative analysis of photosynthetic and respiratory pigments, spectra analysis. Flame photometry: Membrane permeability of yeast cells for Na, depending of temperature. Electron microscopy. Potentiometry: Determination of plant CO ₂ compensation point by pH measurement. Polarographic measurement of plants photosynthesis and dark respiration. Manometry: Determination of plants dark respiration rate by Warburg manometer. Isotope methods: Determination of ⁴⁰ K isotope half- time by measuring of absolute radioactivity by Geiger-Müller counter. Quantitative methods in detection of biomolecules.			
Reading List:			
Marjanović, N. J., Krstić, B. (1998): Instrumentalne metode u biološkim istraživanjima. Tehnološki i Prirodno-matematički fakultet, Univerzitet u Novom Sadu, Novi Sad.			
Marjanović, N. J., Jankovič, I. (1983): Instrumentalne metode analize. Tehnološki fakultet, Novi Sad, Zavod za izdavanje udžbenika, Novi Sad.			
Mišović, J., Ast, T. (1981): Instrumentalne metode hemijske analize. Tehnološko-metalurški fakultet, Beograd.			
Arsenijević-Maksimović, I., Pajević, S. (2002): Praktikum iz fiziologije biljaka, Poljoprivredni fakultet, Prirodno-matematički fakultet, Novi Sad, s. 240.			
Total hours:			
Lectures: 2	Practicals: 4	Other:	Student research work:
Methods of instruction: Theoretical and practical			
Assessment (maximum number of points 100)			
Requirements	points	Final exam	points
Active participation in lectures	10	Practical exam	40
Active participation in practicals		Oral exam	50
Test(s) or			
Pre-exam testing			