

Study Programme: Bachelor of Science in Biology (and Bachelor of Science in Ecology)			
Course Unit Title: Instrumental Methods of Analysis in Biology			
Course Unit Code: OB029			
Name of Lecturer(s): Prof. Slobodanka Pajević, PhD; Prof. Milan Borišev, PhD			
Type and Level of Studies: Bachelor's studies			
Course Status (compulsory/elective): Compulsory for BSc in Biology (elective for BSc in Ecology)			
Semester (winter/summer): Summer			
Language of instruction: English or Serbian			
Mode of course unit delivery (face-to-face/distance learning): Face-to-face			
Number of ECTS Allocated: 7			
Prerequisites: None			
Course Aims: Theoretical and practical basis of implementation some instrumental methods in biological, biochemical and physiological investigations of cell structure and metabolism.			
Learning Outcomes: 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.			
Syllabus: <i>Theory</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>Practice</i> Column and thin layer chromatography: Determination of β carotene by column chromatography; thin layer chromatography of industrial food colors. 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 GeigerMüller counter. Quantitative methods in detection of biomolecules.			
Required Reading: Marjanović, N. J., Krstić, B. (1998): Instrumentalne metode u biološkim istraživanjima. Tehnološki i Prirodnomatematički 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, Prirodnomatematički fakultet, Novi Sad, s. 240. References in English...			
Weekly Contact Hours: 6	Lectures: 3		Practical work: 3
Teaching Methods: Lectures, practical laboratory work in student groups			
Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class participation	5	written exam	40
Practical work		oral exam	55