Study Programme: BSc in Biology

Degree level: First cycle (Bachelor)

Course Title: INSTRUMENTAL METHODS OF ANALYSIS IN BIOLOGY

Professor: Milan Borišev, 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 methabolism.

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:

Theoretical part 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. O2 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). Practical part 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 tempereture. Electron microscopy. Potentiometry: Determination of plant CO2 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 40K isotope half- time by measuring of absolute radioactivity by GeigerMüller counter. Quantitative methods in detection of biomolecules.

Reading List:

Marjanović, N. J., Krstić, B. (1998): Instrumentalne metode u biološkim istraživanjima. Tehnološki i Prirodnomatematički fakultet, Univerzitet u Novom Sadu, Novi Sad. Marjanović, N. J., Jankovitš, 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.