Table 5.2 Course specification

Type and level of studies: Bachelor Academic Studies, 1st level

Course name: Application of AAS and ICP-MS in Environmental Analysis

Course status: Elective

Number of ECTS credits: 6

Requirement: None

Course aim

Understanding the principles and possibilities of application of AAS and ICP-MS for the analysis of metals in environmental samples (water, air, soil, and sediment).

Course outcome

After completing the course, students should be able to define the basic principles of AAS and ICP-MS spectrometry; describe the instrumentation in AAS and ICP-MS spectrometry; analyze samples from the environment using AAS and ICP-MS spectrometer, process and interpret the results of the analysis performed.

Course content

Theory

Selection of appropriate analytical techniques for inorganic analysis. Introduction to the basic principles of atomic absorption spectroscopy, the basic instrumentation (equipment needed for the analysis of liquid, gaseous and solid samples), an overview of techniques for the determination of trace metals. Introduction to the basic principles of ICP-MS, mass spectrometry, the types of analysis (semi-quantitative scans, quantitative, isotope ratio), analytes that can be analyzed with satisfactory control of interference. Advantages and disadvantages of ICP-MS and AAS.

Practice: Practical classes, OFT, SRW

Techniques for the preparation of standards and environmental samples for the analysis of metals. AAS instrumentation, introduction to the software for analyzing and processing data. Application of AAS for determination metals in the environmental samples - Analysis of selected metals by flame absorption spectrometry; Determination of mercury by cold vapour technique (FIAS flow injection system); Analysis of K and Na in environmental samples by atomic emission spectrometry. Determination of metal traces in environmental samples by atomic absorption spectroscopy in a graphite furnace. Instrumentation ICP-MS, instrument optimization. Semi-quantitative scanning of environmental samples. Quantitative determination of boron, manganese, iron and arsenic in traces. Data processing, reporting and calculation results related to the application of ICP-MS and AAS.

Literature

1. Teaching material, PMF Novi Sad, PMF moodle
2. B. Dalmacija (Ed.): Kontrolna kvalitativna voda, Prirodno-matematički fakultet, Departman za hemiju, 2001.
3. B. Dalmacija, I. Ivančev-Tumbaš (Ed.): Analiza vode - kontrolna kvaliteta, rezultati rezultata, Prirodno-matematički fakultet, Departman za hemiju, 2004.
4. J. Mišović, T. Ast: Instrumentalne metode hemijske analize, Beograd, 1994.
5. M. Todorović, P. Đurđević, V. Antonijević: Optičke metode instrumentalne analize, Beograd, 1997.
6. C. Feldman: Atomic Absorption Spectroscopy, Aplications in Agriculture, Biology, and Medicine, Robert E. Krieger Publishing Company Huntington, New York, 1979.
7. R. Thomas: Practical Guide to ICP-MS, 2004.
8. R. Reeve: Introduction to environmental analysis, John Wiley & Sons, 2002.
9. S.M. Nelms: Inductively Coupled Plasma Mass Spectrometry Handbook, 2005.

Number of classes of active teaching				Other classes
Lectures: 2(30)	Practice: 3(45)	OFT:	SRW:	

Teaching methods Lectures, practice, consultation

Assessment of knowledge (maximum of 100 points)

Pre-exam obligations	**Points**	**Final exam**	**points**
activity during lecture classes	**5**	written exam	**30**
practical teaching	**25**	oral exam	**20**
colloquia	**20**	/	/