Table 5.2 Course specification

Type and level of studies: Bachelor

Course name: UV/VIS and IR spectroscopy in environmental analysis

Course status: Elective

Number of ECTS credits: 6

Requirement: None

Course aim

Understanding the principles and possibilities of UV/VIS and IR spectroscopy in the qualitative and quantitative analysis of environmental samples (water, air, soil, and sediment).

Course outcome

After completing the course, students should be able to define the basic principles of UV/VIS and IR spectroscopy; describe the instrumentation in the UV/VIS and IR spectroscopy; analyze environmental samples using UV/VIS and IR spectrophotometer, process and interpret the results of analysis and report the results of the analysis performed.

Course content

Theory

Introduction to the basic principles of UV/VIS spectroscopy, the basic instrumentation (equipment needed for the analysis of liquid, gaseous and solid samples). The absorption of UV radiation. The intensity of absorption. Recording the spectrum. The choice of solvent. Selection rules. Chromophores. Introduction to the basic principles of IR spectroscopy, the basic instrumentation (equipment needed for the analysis of liquid, gaseous and solid samples). The absorption of IR radiation. Frequency of vibration. The factors that determine the positions of the absorption maxima of the functional groups. The interpretation of the IR spectrum. Quantitative Analysis.

Practice:

Preparation techniques for solid, liquid and gaseous samples. UV/VIS instrumentation. Application of UV/VIS spectroscopy for the quality control of the environmental - Determination of selected environmental pollutants (nitrogen and phosphorus substances, vapor pollutants, etc.). Determination of specific UV absorbance in water. IR instrumentation, introducing Omnic Software 6.2. Application of IR spectroscopy for quality control of the environment - Determination of petroleum hydrocarbon content by IR spectroscopy in environmental samples. Determination of gaseous pollutants by IR spectroscopy. Data processing.

Literature

1. Grupa autora (Urednici: Dalmacija B., Ivančev-Tumbas I.) Analiza vode – kontrola kvaliteta, tumačenje rezultata, Prirodno-matematički fakultet, Departman za hemiju, 2004. (In Serbian language)
2. Grupa autora (Urednici: Dalmacija B.) Kontrola kvaliteta voda, Prirodno-matematički fakultet, Departman za hemiju, 2001. (In Serbian language)
3. J. Mišović T. Ast: Instrumentalne metode hemijske analize, Beograd, 1994. (In Serbian language)
4. M. Todorović, P. Đurđević, V. Antonijević: Optičke metode instrumentalne analize, Hemijski fakultet, Beograd, 1997. (In Serbian language)
5. S. M. Milosavljević: Strukturne instrumentalne metode, Hemijski fakultet, Beograd, 1997. (In Serbian language)

Additional literature

1. J.M. Chalmers, P.R. Griffiths: Handbook of Vibrational Spectroscopy, Vol 1, John Wiley & Sons, ltd, 2002.
2. J.M. Chalmers, P.R. Griffiths: Handbook of Vibrational Spectroscopy, Vol 2, John Wiley & Sons, ltd, 2002.
3. J.M. Chalmers, P.R. Griffiths: Handbook of Vibrational Spectroscopy, Vol 3, John Wiley & Sons, ltd, 2002.
4. J.M. Chalmers, P.R. Griffiths: Handbook of Vibrational Spectroscopy, Vol 4, John Wiley & Sons, ltd, 2002.
5. J.M. Chalmers, P.R. Griffiths: Handbook of Vibrational Spectroscopy, Vol 5, John Wiley & Sons, ltd, 2002.

Number of classes of active teaching: 5(75)				Other classes
Lectures: 2	Practice: 3(45)	OFT:	SRW:	

Teaching methods

Lectures, laboratory work and colloquia

Assessment of knowledge (maximum of 100 points)

Pre-exam obligations	**Points**	**Final exam**	**points**
activity during lecture classes	5	written exam	30
practical teaching	15	oral exam	30
colloquia	20		