Study Programme: Master Academic Studies in Chemistry

Course Unit Title: Speciation Analysis

Course Unit Code: IHA-512

Name of Lecturer(s): Assistant Professor Jasmina Anojčić

Type and Level of Studies: Master of Science Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Winter

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 6

Prerequisites: None

Course Aims:

Broadening knowledge about the physical, physico-chemical, biochemical, and instrumental principles of speciation analysis. Introduction to the role, importance, application and design of methods and techniques in the speciation analysis. Training of practical skills which enable for students professional and independent handling of instrumentation and measurement techniques for speciation analysis. Developing students ability to independently solve problems of speciation analysis.

Learning Outcomes:

Applying the knowledge of the methods of speciation analysis during execution of the analysis. Selecting the appropriate measurement technique, simple or sophisticated equipment, and methodology for solving complex problems in speciation analysis. Independently and completely handling the instruments in speciation analysis of different samples. Select, optimize, modify and adapt appropriate methods when performing speciation analysis. Objectively evaluate and present research results.

Syllabus:

Theory

Definition of species and speciation analysis. Distribution of the target element between various species. Different methodological approach to speciation (isotopic composition, oxidation stage, inorganic molecules and complexes, organic complexes, organometallic compounds, macromolecules and macromolecular complexes). Sampling, storage and sample preparation for speciation analysis. Reference materials for speciation analysis. Overview of instrumental aspects of speciation analysis (element-specific detection, chromatographic, spectroscopic, electrochemical, radiochemical, and coupled methods). Speciation of the selected elements (arsenic, mercury, lead, tin, iron, chromium, halogens, etc.) through concrete examples and problems. Quality control in speciation analysis and legal regulation. Trends in speciation analysis.

Practice

Speciation analysis of the selected elements (arsenic, mercury, lead, tin, iron, chromium, halogens, etc.).

Required Reading:

1. Rita Cornelis, Joe Caruso, Helen Crews, Klaus G. Heumann (eds.): Handbook of Elemental Speciation: Techniques and Methodology, Wiley, 2003, ISBN: 0-471-49214-0.

2. R. Cornelis, J. Caruso, H. Crews, K. G. Heumann (eds.): Handbook of Elemental Speciation, II**:** Species in the Environment, Food, Medicine and Occupational Health, Wiley, 2005, ISBN: 0-470-85598-3.

3. E. Hywel Evans: New concepts in speciation analysis, Anal. Bioanal. Chem. 376 (2003) 311.

4. J. A. Caruso, M. Montes-Bayon, Elemental speciation studies - new directions for trace metal analysis, Ecotox. Environ. Safe. 56 (2003) 148.

Weekly Contact Hours:	**Lectures:** 3 (45)	**Practical work:** 2 (30)

Teaching Methods:

Lectures, laboratory work, seminar(s)

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Active class participation	10	oral exam	60
Practical work	20		
Seminar(s)	10		