Course Unit Descriptor

Study Programme: Food Engineering

Course Unit Title: Inductively Coupled Plasma Mass Spectrometry

Course Unit Code:DSPI14

Name of Lecturer(s): Prof. Jaroslava Švarc-Gajić, PhD; Prof. Zvonimir Suturović, PhD; Ass. Prof. Zorica Stojanović, PhD

Type and Level of Studies: Doctoral Academic Studies

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: English

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

Number of ECTS Allocated: 10

Prerequisites:

Course Aims:

Inductively coupled plasma mass spectrometry (ICP MS) has an important place in chemical analysis and quality control of different samples. During the course the students will learn basic principles of the technique, and will be introduced to instrumentation. The course focuses on plasma sources, types and configurations, upgrading also the knowledge on mass spectroscopy.

Learning Outcomes:

The students will be fully familiar with the principles, use, advantages and limitations of this hyphenated optical technique. They will be able to apply this technique for quantification of trace quantities of elements in different samples, and to individually solve interferences problems.

Syllabus:

Theory

Sources of plasma and plasma properties. Nebulizer types. Comparison with electrothermal atomization and inductively coupled atomic emission spectroscopy. Quantification approaches in ICP MS, advantages and limitations of the technique. Plasma source positioning depending on the analyte. Ion focusing. Types of the interfaces: interface role. The detector types: quadrupole, double focusing, time-of-flight, orbitrap and iontrap mass analysers. Advantages of ICP MS in comparison to other spectroscopic techniques. Interferences: occurrence and minimization. Sample preparation prior ICP MS.

Practice

Preparation of different plan, food and environmental samples for ICP MS: microwave-assisted digestion, dry ashing. Quantification of elements in prepared samples by different quantitation approaches. Comparison of the calculated concentrations with other instrumental techniques.

Required Reading:

1. G. Holand, S.C. Tanner: Plasma Source Mass Spectrommetry. Application and Emerging Techniques. Royal Society of Chemistry, 2003.
2. J.A.C. Brekaert: Analytical Atomic Spectrommetry with flames and Plasmas. Wiley-VCH, 2002.

Weekly Contact Hours:	**Lectures:** 4	**Practical work:** 2

Teaching Methods:

Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	**Final exam**	points
Active class participation	10	written exam	
Practical work		oral exam	40
Preliminary exam(s)	50		
Seminar(s)			
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			