УНИВЕРЗИТЕТ У БАЊОЈ ЛУЦИ
UNIVERSITY OF BANJA LUKA
ПРИРОДНО-МАТЕМАТИЧКИ ФАКУЛТЕТ
FACULTY OF NATURAL SCIENCES AND MATHEMATICS

CHEMISTRY DEPARTMENT	PhD STUDIES

Course name	**Advanced Separation Methods**			
Course code	**Course status**	**Semester**	**Hours of instruction**	**ECTS**
DHEM23NMR	**elective**	**II or IV**	**5+0**	**10**
Teacher(s)	**Prof. Ivan Špánik, PhD**			

Prerequisite course(s)	**Entry requirements**
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Course goals

The subject aims to provide a course dealing with advanced instrumentation and modern approaches in the hyphenation of mass spectrometry and separation methods. The applications in environmental analysis, food quality and safety as well as metabolomics and analysis of body fluids will be discussed.

Learning outcomes

Students will obtain knowledge from state-of-the-art techniques of mass spectrometry hyphenated to separation analytical methods, as well as, identification of compounds based on obtained mass and high-resolution mass spectra.

Course content

Fundamentals of mass spectrometry
Instrumentation in mass spectrometry
Ionization techniques in mass spectrometry (EI, CI, ESI, APCI, MALDI, etc.)
Mass analyzers (quadrupole, TOF, magnetic sector, ion trap)
MS-MS techniques (QQQ, TOF-TOF, Q-TOF)
Isotope ratio mass spectrometry (IRMS)
High-resolution mass spectrometry (HRMS)
Hyphenation GC and MS, HRMS and MS-MS
Hyphenation HPLC and ICP s MS, HRMS, and MS-MS
Interpretation of mass spectra and identification of compounds based on MS
Quantitative analysis using MS and MS-MS

Teaching methods

Lectures, Study research work

Books and other learning materials

Oral exam

Course activities and grading method

POOLE, C F. The essence of chromatography. Amsterdam: Elsevier, 2003.
Jürgen H. Gross: Mass spectrometry, Springer, 2017

Research work	**30**		
Class attendance	**10**	**Final exam**	**60**

Additional course notes

Name of the teacher who prepared this form	**Ivan Špánik**

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