DESCRIPTION OF THE COURSE OF STUDY

Course code		**0531-2CHEM-C12-MIZO**
Name of the course in	Polish	**Metody identyfikacji związków organicznych**
	English	**Methods of identifying organic compounds**

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	**Chemistry**
1.2. Mode of study	**Full-time studies**
1.3. Level of study	**First-cycle studies**
1.4. Profile of study*	**General academic**
1.5. Person/s preparing the course description	**dr hab. Mariusz Urbaniak**
1.6 Contact	**mariusz.urbaniak@ujk.edu.pl**

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1 Language of instruction	**English**
2.2 Prerequisites*	**Physical Chemistry, Organic Chemistry**

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes		Lectures, exercises
3.2. Place of classes		Classes in the teaching room of the UJK
3.3. Form of assessment		Lecture - exam, exercises - credit with grade
3.4. Teaching methods		Lecture, discussion, demonstration, experiments, project
3.5. Bibliography	**Required reading**	• R. Silverstein, F. Webster, D. Kiemle, Spectrometric identififcation of organic compounds,John Wiley&Sons, Inc., 2005 • J. Lambert, E. Mazzola, Nuclear Magnetic Resonance Spectroscopy, Pearson Education Inc., Upper Saddle River, New Jersey, 2004
	Further reading	• M. Hesse, H. Meier, B. Zeeh, Spektroscopic Methods in Organic Chemistry, Thieme, Stuttgrad, 2008.

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

4.1. Course objectives (including form of classes)

Lecture

The course is focused on analysing and interpreting spectral data of organic compounds

Exercises

After having completed the course, the student should be able to: explain principles of NMR spectroscopy, demonstrate knowledge of the principles of MS spectrometry, explain constructions of spectrometers, use spectral data to elucidate an unknown structure, or solve a structure-related problem

4.2. Detailed syllabus (including form of classes)*)*

Lecture

Magnetic properties of nuclei, , excitation of spin, relaxation, instrumentation, NMR experiments, solvents, chemical shift, spin coupling, multiplets, spin systems, protons on oxygen and nitrogen, exchangeable protons, nuclear Overhauser effect, 13C spectrometry, chemical shift and range, 13C-1H sping coupling, decoupling techniques, DEPT, Correlation NMR spectrometry (2-D NMR) 1H-1H correlation (COSY), Carbon detected 13C-1H HECTOR, proton detected 1H-13C HMQC, mass spectrometry, instrumentation, ionization method, mass analyzers, fragmentation, determination of a molecular formula

Exercises

Developing an ability in the combined use of mass spectrometry and spectroscopic techniques for structure elucidation of organic compounds.

4.3. Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of KNOWLEDGE:		
W01	Understands the principles of spectroscopy and spectrometry enabling the determination of the structure of chemical compounds	CHEM2A_W04
W02	Knows modern methods and equipment for examining the structure of organic compounds	CHEM2A_W04
within the scope of **ABILITIES:**		
U01	The student should select an appropriate method to determine the structure of specific chemical compounds	CHEM2A_U01
U02	The student should demonstrate the ability to interpret simple spectroscopic and spectrometric spectra and use them to determine the structure of compounds.	CHEM2A_U02

4.4. Methods to verify the achievement of the learning outcomes

Teaching outcomes (code)	Method of verification (+/-)								
	Exam written*			Test*			Effort in class*		
	Form of classes			*Form of classes*			*Form of classes*		
	L	*C*	*...*	*L*	*C*	*...*	*L*	*C*	*...*
W01	+				+			+	
W02	+				+			+	
U01	+				+			+	
U02	+				+			+	

4.5. Criteria of assessment of the intended learning outcomes

Form of classes	Grade	Criterion of assessment
ecture (L) (including e-learning)	**3**	Exam : the student must earn at least 60% of the total points.
	3,5	Exam : the student must earn 70% of the total points
	4	Exam : the student must earn 80% of the total points.
	4,5	Exam : the student must earn 90% of the total points.
	5	Exam : Student gain more than 95% of total points
classes (C)* (including e-learning)	**3**	Tests : the student must earn at least 60% of the total points.
	3,5	Tests : the student must earn 70% of the total points.
	4	Tests : the student must earn 80% of the total points.
	4,5	Tests : the student must earn 90% of the total points.
	5	Tests : Student gain more than 95% of total points.

5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	Student's workload	
	Full-time studies	Extramural studies
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/	**50**	
*Participation in lectures**	20	
*Participation in classes, seminars, laboratories**	30	
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	**50**	
*Preparation for the classes, seminars, laboratories**	25	
*Preparation for the exam/test**	25	
TOTAL NUMBER OF HOURS	**100**	
ECTS credits for the course of study	4	

Accepted for execution *(date and legible signatures of the teachers running the course in the given academic year)*

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