


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
 Europejskiego Funduszu
 Społecznego

UNIA EUROPEJSKA
 EUROPEJSKI
 FUNDUSZ SPOŁECZNY


Course title		ECTS code	
Chemical spectroscopy		13.3.0727	
Name of unit administrating study			
Faculty of Chemistry			
Studies			
faculty	field of study	type	first tier studies (BA)
Faculty of Chemistry	Chemical Business	form	full-time
		specialty	all
		specialization	all
Teaching staff			
prof. dr hab. Sylwia Rodziewicz-Motowidło; dr hab. Zbigniew Kaczyński, profesor uczelni; dr hab. Emilia Sikorska, profesor uczelni			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		4	
Auditorium classes, Lecture		classes - 45 h	
The realization of activities		tutorial classes – 10 h	
classroom instruction		student's own work – 45 h	
Number of hours		Total: 100 h - 4 ECTS	
Auditorium classes: 30 hours, Lecture: 15 hours			
The academic cycle			
2024/2025 winter semester			
Type of course		Language of instruction	
obligatory		polish	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
<ul style="list-style-type: none"> - multimedia-based lecture - In the auditorium classes students will learn combined interpretation of the mass, IR, 1H and 13C NMR spectra of compounds of M.W. up to ~300 D by solving problems designated by the teacher (in-class on the board and in a group-/home-work. 		Final evaluation	
		<ul style="list-style-type: none"> - Graded credit - Examination 	
		Assessment methods	
		<ul style="list-style-type: none"> - written exam with open questions - (mid-term / end-term) test - Assessment methods 	
		Lecture	
		<ul style="list-style-type: none"> •written exam, 5-10 tasks to solve, including spectra with medium degree of difficulty 	
		Auditorium classes	
		<ul style="list-style-type: none"> •4-5 obligatory 10 minutes tests from previously trained material •current knowledge control based on spectroscopic problems previously given for practice by the teacher •quizzes on the fastest correct solution of spectroscopic problems given by the teacher during seminars 	
		The basic criteria for evaluation	

. The basic criteria for evaluation or exam requirements

Lecture:

• pass the written exam

91-100%: 5.0

81-90%: 4.5

71-80%: 4.0

61-70%: 3.5

51-60%: 3.0

Less than 51% 2.0

Auditorium classes:

• completed all tests, additional problems and quizzes

91-100%: 5.0

81-90%: 4.5

71-80%: 4.0

61-70%: 3.5

51-60%: 3.0

Less than 51% 2.0

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

Organic and physical chemistry

Aims of education

Aims of education

Presenting the physical basics of the interactions of electromagnetic radiation with matter and the theoretical basis of spectroscopic methods to students

Familiarize the students with the fundamentals of mass spectrometry (MS), oscillation spectroscopy (IR) and 1D and 2D nuclear magnetic resonance (NMR) spectroscopy;

Familiarize the students with interpretation of MS, IR and NMR spectra of compounds up to ~ 300 D to identify the topology, hydrogen bonds, stereochemistry, dynamics etc. including the advantages and disadvantages of the used methods.

Course contents

Course contents

A. Topics of the lecture: The properties of the electromagnetic radiation and its interactions with molecular systems: absorption, emission, dispersion. Overview of techniques: MS, IR, and NMR, including 2D NMR methods such as: COSY, TOCSY, HSQC/HMQC, NOESY; spin systems analysis, identification of molecules up to ~ 300 D; configuration, conformation, dynamic of the molecules; integrated usage of the spectroscopic methods; elements of conformational analysis of biomolecules.

B. Auditorium classes: Interpretation of the spectra; practical use of spectroscopic methods in structural and dynamics studies of molecules up to ~300D; to familiarize of the students with the probability of several different solutions of the same problem and verification of the correct solution; learning of the correct description of the spectra; to know the disadvantages and advantages of the particular spectroscopic methods, complementarity of the spectroscopic methods.

Bibliography of literature

Bibliography of literature

Literature required to pass the course

Collective red.. W. Zieliński i A. Rajca: Metody spektroskopowe ich zastosowanie do identyfikacji związków organicznych, WNT W-wa 1995, 2000.

R.M. Silverstein, F.X. Webster, D.J. Kiemle: Spectrometric Identification of Organic Compounds, John Wiley & Sons, 2005, 2014.

Internet: independent study, verified by the teacher.

B. Extracurricular readings

S. Płaziak: Spektrometria masowa związków organicznych, Wydaw. Naukowe UAM Poznań 1997

R.A.W. Johnstone, M.E. Rose: Mass spectrometry for chemists and biochemists. Cambridge University, 1982, 1996

Z. Kęcki: Podstawy spektroskopii molekularnej, PWN Warszawa 1998.

I.Z. Siemion: Biostereochemia, PWN Warszawa 1985.

K. Wüthrich: NMR in biological research: peptides and proteins, North-Holland, Amsterdam 1976.	
The learning outcomes (for the field of study and specialization)	Knowledge Knowledge Students know theoretical basis for spectroscopic methods utilized in identification of simple organic compounds Students know the advantages and disadvantages of spectroscopic methods Students have basic knowledge about conformational analysis of biomolecules using spectroscopic methods Students can present the current trends in the development of spectroscopic methods
	Skills Skills Students are able to interpret MS, IR, NMR spectra of simple organic compounds, Students have skills of drawing correct conclusions based on available data.
	Social competence Social competence Individually and/or in a team-work: -Students can establish and realize a defined action plan setting priorities for its implementation. -Students can identify their level of knowledge and skills and understand the necessity of life-long learning in chemical spectroscopy and personal development.
Contact	
s.rodziewicz-motowidlo@ug.edu.pl	