


**KAPITAŁ LUDZKI**  
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez  
 Unię Europejską w ramach  
 Europejskiego Funduszu  
 Społecznego

**UNIA EUROPEJSKA**  
 EUROPEJSKI  
 FUNDUSZ SPOŁECZNY


<b>Course title</b>		<b>ECTS code</b>	
Spectrochemistry		13.3.0849	
<b>Name of unit administrating study</b>			
Faculty of Chemistry			
<b>Studies</b>			
<b>faculty</b>	<b>field of study</b>	<b>type</b>	drugiego stopnia
Wydział Chemii	Chemia	<b>form</b>	stacjonarne
		<b>specjalty</b>	chemia biomedyczna, analityka i diagnostyka chemiczna, chemia i technologia środowiska, chemia obliczeniowa
		<b>specialization</b>	wszystkie
<b>Teaching staff</b>			
prof. dr hab. Sylwia Rodziewicz-Motowidło; dr Maria Dzierżyńska; mgr Agnieszka Kowalczyk; dr Julia Witkowska; mgr Sandra Skibiszewska; dr hab. Emilia Sikorska, profesor uczelni; dr hab. Zbigniew Kaczyński, profesor uczelni; mgr Nikola Szpakowska; dr Katarzyna Guzow; dr Katarzyna Kuncewicz; dr Marta Orlikowska			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b>	
<b>Forms of classes</b>		4	
Laboratory classes, Lecture		classes 45 h	
<b>The realization of activities</b>		Tutorial classes 10 h	
classroom instruction		Student's own work 45 h	
<b>Number of hours</b>		TOTAL: 100 h - 4 ECTS	
Lecture: 15 hours, Laboratory classes: 30 hours			
<b>The academic cycle</b>			
2022/2023 summer semester			
<b>Type of course</b>		<b>Language of instruction</b>	
obligatory		polish	
<b>Teaching methods</b>		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
<ul style="list-style-type: none"> <li>- conducting experiments</li> <li>- designing experiments</li> <li>- multimedia-based lecture</li> <li>- problem solving</li> </ul>		<b>Final evaluation</b>	
		<ul style="list-style-type: none"> <li>- Graded credit</li> <li>- Examination</li> </ul>	
		<b>Assessment methods</b>	
		<ul style="list-style-type: none"> <li>- written exam with open questions</li> <li>- written exam (test)</li> <li>- graded course credit based on individual grades obtained during the semester</li> </ul>	
		<b>The basic criteria for evaluation</b>	
		Individual and/or team work on research tasks; positive grades from tests and written reports from laboratory exercises; the final grade will be determined based on the partial grades (arithmetic average); failure to execute the laboratory exercises means failure to achieve a pass. A student who has completed laboratory exercises with the positive grade can take the exam	
<b>Method of verifying required learning outcomes</b>			
<b>Required courses and introductory requirements</b>			
<b>A. Formal requirements</b>			
none			
<b>B. Prerequisites</b>			

**Aims of education**

Practical application of spectroscopic methods; consolidation of the knowledge on mass spectrometry, oscillation spectroscopy (IR) and nuclear magnetic resonance NMR spectroscopy; basics of Raman spectroscopy, fluorescence spectroscopy and spectrofluorimetry, optical rotatory dispersion and circular dichroism and their elementary applications; deepening of knowledge about 1D and 2D NMR spectroscopy to the extent necessary for spectra interpretation of compounds up to ~300 D; familiarize the students with the use of spectroscopic methods in identification of topology of compounds, hydrogen bonds, stereochemistry, dynamics etc. including the advantages and disadvantages of the methods; introduction to the analysis of biomolecules.

**Course contents**

A. Lecture: Short overview of techniques: MS, IR, and NMR necessary for solving structures of organic compounds with reference to the Spectroscopy course at the first-degree studies; UV/VIS spectrophotometry, Raman spectroscopy, fluorescence spectroscopy and spectrofluorimetry; circular dichroism; multidimensional NMR spectroscopy; analysis of spin systems (AB-AX, ABC-AMX, AA'BB'-AA'XX', etc); identification of molecules up to ~300 Da; configuration, conformation and dynamic of the molecules; elements of conformational analysis of biomolecules; integrated use of the spectroscopic methods for the most effective achievement of the goals.

B. Laboratory exercises: The basics of spectroscopic methods; methodology; apparatus construction; advantages and disadvantages of the spectroscopic methods. Measurements and analysis of MS, IR, NMR, UV/VIS spectra. Practical aspect of spectroscopic methods for conformational and dynamic studies of molecules up to ~300 D. Analysis of intra- and intermolecular interactions. Study of the effect of concentration, solvent, temperature on the spectra. Dynamic effects in the NMR spectroscopy. Elements of analysis of the structure and conformation of biomolecules.

**Bibliography of literature**

Literature required to pass the course

-Zbiorowa pod 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: Spektroskopowe metody identyfikacji związków organicznych, PWN W-wa 2007

-H. Barańska, A. Łabudzińska, J. Terpiński: Laserowa spektrometria ramanowska, zastosowania analityczne, 1981, PWN, Warszawa,

A.1. literaturę used during classes:

-B. Wojtkowiak, Martial Chabanel: Spektroskopia molekularna, PWN W-wa 1984.

Extracurricular readings

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

-R.A.W. Johnstone, M.E. Rose: Spektrometria mas, PWN W-wa 2001

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

-H. Barańska, A. Łabudzińska, J. Terpiński: Laserowa spektrometria ramanowska, zastosowania analityczne, PWN, Warszawa 1981.

-S. Paszyc.

**The learning outcomes (for the field of study and specialization)****Knowledge**

Student knows and understands the theoretical basis for various molecular spectroscopy with their advantages and disadvantages. Student is able to use spectroscopy methods to analyze the structure and properties of organic compounds. Characterizes and distinguishes selected aspects of structure and interactions, such as topology, geometric and optical isomerization, tautomerism, and hydrogen bonds. Knows the basic aspects of the construction and operation of measuring devices. Has the knowledge to quantitative description of chemical phenomena and processes.

**Skills**

Student plans and / or performs measurements; interprets the results; presents the results in the form of a written report

**Social competence**

Student appreciates the need for continuous education in the "information" society of the 21st century; shows creativity, criticism in using the Internet; complies with the principles of ethics and copyright; follows safety procedures in laboratory work; works in a team (leader / group relationship).

**Contact**

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