KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI
Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego
UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ SPOŁECZNY

Course title	ECTS code
Spectrochemistry	13.3.0849

Name of unit administrating study

Faculty of Chemistry

Studies

faculty	field of study		
Wydział Chemii	Chemia	type	drugiego stopnia
		form	stacjonarne
		specialty	chemia biomedyczna, analityka i diagnostyka chemiczna, chemia i technologia środowiska, chemia obliczeniowa
		specialization	wszystkie

Teaching staff

prof. dr hab. Sylwia Rodziewicz-Motowidło; dr Maria Dzierżyńska; mgr Agnieszka Kowalczyk; dr hab. Zbigniew Kaczyński, profesor uczelni; dr Julia Witkowska; mgr Nikola Szpakowska; mgr Sandra Skibiszewska; dr Marta Orlikowska; dr Katarzyna Guzow; dr Katarzyna Kuncewicz; dr hab. Emilia Sikorska, profesor uczelni

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes, Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 15 hours, Laboratory classes: 30 hours

ECTS credits

4
classes 45 h
Tutorial classes 10 h
Student's own work 45 h
TOTAL: 100 h - 4 ECTS

The academic cycle

2022/2023 summer semester

Type of course

obligatory

Language of instruction

polish

Teaching methods

- conducting experiments
- designing experiments
- multimedia-based lecture
- problem solving

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

- Graded credit
- Examination

Assessment methods

- written exam with open questions
- written exam (test)
- graded course credit based on individual grades obtained during the semester

The basic criteria for evaluation

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

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements

none

B. Prerequisites

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 organicz-nych, 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:
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-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, War-szawa 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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