FACULTY OF CHEMISTRY

SUBJECT CARD

Name in Polish: Spectroskopia
Name in English: Spectroscopy
Main field of study (if applicable) Chemistry
Specialization (if applicable): Medicinal Chemistry
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code CHC024060
Group of courses NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		60		
Form of crediting	Exam		crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	2		2		
including number of ECTS points for practical (P) classes			2		
including number of ECTS points for direct teacher-student contact (BK) classes	1		1		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of general chemistry.
2. Basic knowledge of physical chemistry.
3. Basic knowledge of organic chemistry.
4. Basic physiochemical calculations and mathematical analysis.
5. Basic knowledge of the spectroscopic methods used for structural analysis.

SUBJECT OBJECTIVES

C1 – Knowledge on various spectroscopic methods
C2 - Acquisition of knowledge on selected interpretation techniques of one dimensional nuclear magnetic resonance spectra.
C3 - Acquisition of knowledge on selected interpretation techniques of two dimensional nuclear magnetic resonance spectra.
C4 - Acquisition of knowledge on selected interpretation techniques of FT-IR and MS spectra.
C5 Knowledge on application of various methods in analysis. Scope and limitations.

SUBJECT EDUCATIONAL EFFECTS

Z zakresu wiedzy:
PEK_W01 Knowledge on various spectroscopic methods
PEK_W02 Knowledge on aplicaion of spectrocopic methods in analysis
PEK_W03 Knowledge on application of spectroscopic methods in medical diagnosis

Z zakresu umiejętności:
PEK_U01 is able to prepare the material for analysis
PEK_U02 is able to chose the apropriate method of analysis to the given problem
PEK_U03 is able to analyse the spectra data

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec1	Introduction to spectroscopic analysis, IR, NMR, UV, MS	2
Lec2	Interpretation to spectroscopic analysis of organic compounds structure	2
Lec3	Nuclear magnetic resonance, one dimensional spectra	2
Lec4	Design of spin system	2
Lec5	Special effects in NMR	2
Lec6	Two-dimensional NMR, theoretical introduction	2
Lec7	Interpretation of two-dimensional NMR	2
Lec8	Advanced techniques in IR	2
Lec9	Interpretation of IR spectral data	2
Lec10	Advanced techniques in NMR, theoretical interpretation	2
Lec11	Application of advanced techniques in NMR	2
Lec12	Spectroscopic analysis of dynamic systems	2
Lec13	Advanced spectroscopyical methods in MS	2
Lec14	Application of spectroscopic methods in medical diagnostics.	2
Lec15	Review of simulation programs in analysis of spectra data	2
	Total hours	**30**
Form of classes - laboratory		**Number of hours**
La1	Introduction to the strategy of structure analysis.	2
La2	Analysis and interpretation of 1D ^{1}H NMR spectra.	2
La3	Analysis and interpretation of 1D ^{1}H NMR spectra.	2
La4	Analysis and interpretation of 1D ^{13}C NMR spectra.	2
La5	Analysis and interpretation of practical examples of 1-D ^{1}H NMR, ^{13}C NMR spectra.	2
La6	Solving practical examples of 1-D NMR spectra.	2
La7	Two-dimensional NMR spectra analysis and interpretation.	2
La8	Solving practical examples of two-dimensional spectra.	2
La9	Infrared spectroscopy. Rules of spectra analysis.	2
La10	Analysis and interpretation of FT-IR spectra of unknown compounds.	2
La11	Mass spectroscopy. Molecular mass calculation. Confirming a molecular formula.	2
La12	Fragmentation patterns of molecules/ions. Solving practical examples.	2
La13	Practical spectroscopy problem solving.	2
La14	Determining the structure of organic compounds from different spectra.	2
La15	NMR and MS instrumentation.	2
	Total hours	**30**

TEACHING TOOLS USED

N1. Problem lectures - multimedia presentations
N2. Laboratory – problem exercises (multimedia presentations)
N3. Laboratory – solving practical examples, drawing structures and spectra, performing calculations – using multimedia whiteboard
N4. Independent work – preparation for the partial tests
N5. Consulations

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation F – forming (during	Educational effect number	Way of evaluating educational effect achievement

semester), C – concluding (at semester end)		
P (lecture)	PEK_W01-W03	exam
F1 (laboratory)	L1-5	partial test I
F2 (laboratory)	L5-10	partial test II
F3 (laboratory)	L10-15	partial test III
P (laboratory) = average from partial tests grades		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] K. Pigoń, Z. Ruziewicz, Chemia fizyczna t 2 Fizykochemia molekularna, Wyd. PWN, Warszawa 2007
[2] P.W. Atkins, Chemia fizyczna, PWN 2001
[3] R. M. Silverstein, F. X. Webster, D. J. Kiemle, Spektroskopowe metody identyfikacji związków organicznych PWN, Wraszawa 2007.
[4] D. A. Skoog, D. M. West, F. J. Holler, S. R. Crouch, Podstawy chemii analitycznej 2, PWN, Warszawa 2007.
[5] Z. Kęcki, Podstawy spektroskopii molekularnej, Wyd. PWN, Warszawa 1992.

SECONDARY LITERATURE:

[1] A. Cygański, Metody spektroskopowe w chemii analitycznej. WNT Warszawa, 2009
[2] J. Demichowicz-Pigoniowa, Chemia fizyczna t 3, Obliczenia fizykochemiczne, PWN, Warszawa 2010
[3] J. Najbar, A. Turek, Fotochemia i spektroskopia optyczna, PWN, Warszawa 2009.
[4] P. Suppan, Chemia i światło, PWN, Warszawa 1997.
[5] W. Zieliński, A. Rajca, Metody spektroskopowe i ich zastosowanie do identyfikacji związków organicznych, WNT, Warszawa 2000

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADRESS)

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