DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE: Piotr Młynarz
DEPARTMENT: Chemical Department
SCIENTIFIC DISCIPLINE: Chemical Sciences

COURSE CARD

Course name in Polish: Zaawansowane metody analityczne z zastosowaniem spektrometrii mas i spektroskopii **NMR**
Course name in English: Advanced analytical methods using mass spectrometry and spectroscopy NMR
Course language english
University-wide general course type*:
1) basic science course: chemical sciences, biomedical engineering, chemical engineering
Specialized courses for PhD students receiving education in discipline*:1) specialized course in discipline: chemical sciences, biomedical engineering, chemical engineering

Subject code: NCQ100112W

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	30	na	na	na
Grading	Exam	na	na	na
Number of ECTS points	**0**			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of organic chemistry
2. Knowledge of analytical and instrumental chemistry
3. Basic knowledge in the field of NMR spectroscopy and MS mass spectrometry

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COURSE OBJECTIVES

C1. To acquaint students with the issues of applying analytical methods in chemical sciences, biological sciences (biological and environmental systems
C2. To acquaint students with the issues of using spectroscopic and spectrometric methods in material chemistry
C3. Providing students with issues that relate to advanced spectroscopic methods
C4. Providing students with issues that relate to advanced spectrometric methods
C6. To acquaint students with scientific literature and examples

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PROGRAM CONTENTS

Form of classes – lecture (Lec)		Number of hours
Lec1	Introduction to spectroscopic methods	2
Lec2	One-dimensional NMR in analytical studies	4
Lec3	Advanced 2D and 3D methods in structural research	4
Lec4	Chromatographic NMR	1
Lec5	Introduction to spectrometric and separation methods	6
Lec6	Liquid chromatography coupled with mass spectrometry	5
Lec7	Gas chromatography coupled with mass spectrometry	4
Lec8	Application of analytical biological research platforms	2
Lec9	Application of analytical platforms in material chemistry research	2
	Total	**30**

TEACHING TOOLS USED
Lecture N1 informative lecture N2 problem lecture N3 multimedia presentation

ACHIEVED SUBJECT LEARNING OUTCOMES		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8U_W	Exam
Knowledge	P8S_WG	Exam
Knowledge	P8S_WK	Exam
Skills	P8S_UW	Exam
Skills	P8S_UO	Exam
Skills	P8S_UU	Exam
Social competence	P8U_K	Exam
Social competence	P8S_KK	Exam

PRIMARY AND SECONDARY LITERATURE

DUE TO THE WIDE CHOICE OF LITERATURE, ALL AVAILABLE SCIENTIFIC REPORTS CAN BE USED TO DEVELOP THE KNOWLEDGE OF THIS SUBJECT

BASIC AND ADDITIONAL LITERATURE:

[1] Analytical Separation Science tom 1-5 Edited by Jared L. Anderson, Alain Berthod, Veronica Pino, Apryll M. Stalcup, Wiley-VCH, Second edition 2013
[2] Translation Dymanimcs and Megnetic Resonance, Paul T. Callghan, Oxford Uniwersity Press, 2011
[3] Spektroskopowe metody identyfikacji związków organicznych, Silverstein Robert M., Webster Francis X., Kiemle David J., Wydawnictwo Naukowe PWN, 2012
NMR Spectroscopy, Gunther Harald, Wiley-VCH Verlag GmbH, 2013
Solving Problems with NMR SpectroscopyAtta-ur-Rahman
[4] Elsevier Science Publishing Co Inc, 2015
[5] Fundamentals of Mass Spectrometry, Kenzo Hiraoka, Springer Science & Business Media
[6] Introduction to mass spectrometry, J. Throck Watson, John Wiley & Sons 2013
[7] Handbook of Advanced Chromatography /Mass Spectrometry Techniques, Academic Press and Aocs Press. 2017
NMR Data Interpretation Explained: Understanding 1d and 2D NMR Spectra of Organic Compounds and Natural Products, Neil E. Jacobsen, Wiley, 2016

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

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