

1.	Field of study	Mathematics
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2023/2024 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Modern Instrumental Techniques
Module code		W4-MT-S2-23-NMI
Number of the ECTS credits		4
Language of instruction		Polish
Purpose and description of the content of education		Moduł Nowoczesne metody instrumentalne ma za zadanie zapoznanie studentów z wybranymi technikami spektroskopowymi i chromatograficznymi stosowanymi w analityce. Student poznaje podstawy teoretyczne w zakresie niezbędnym do zrozumienia zjawisk fizyko-chemicznych zachodzących podczas pomiaru instrumentalnego. Potrafi w podstawowym zakresie zinterpretować uzyskane wyniki. Student poznaje podstawy metod przygotowania próbek do analizy prowadzonej metodami instrumentalnymi.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme		Level of competenc (scale 1-5)
NMI_01	Zna techniki instrumentalne stosowane w analizie chemicznej.	KN_Ch_K01		2
		KN_Ch_W01		2
NMI_02	Rozumie podstawy działania aparatury pomiarowej.	KN_Ch_K01		2
		KN_Ch_U04		4
		KN_Ch_W03		2
NMI_03	Potrafi przeprowadzić analizę jakościową i ilościową prostych związków chemicznych.	KN_Ch_U04		3
		KN_Ch_U07		3
NMI_04	Interpretuje i opracowuje wyniki uzyskane technikami instrumentalnymi.	KN_Ch_U02		3
		KN_Ch_U03		3
		KN_Ch_U05		4
		KN_Ch_W05		3
NMI_05	Jest odpowiedzialny za pracę własną i innych w laboratorium wyposażonym w aparaturę pomiarową.	KN_Ch_U06		4
		KN_Ch_W06		4

NMI_06	Ma świadomość odpowiedzialności za wspólnie realizowane zadania, związane z pracą zespołową.	KN_Ch_K02 KN_Ch_U06	4 4
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9. Methods of conducting classes		
Code	Category	Name (description)
b02	Problem-solving methods	Lecture-discussion <i>transmission of content involving interaction with the lecture audience; discussion of lecture-related issues is one of its elements or constitutes its follow-up</i>
d01	Programmed learning methods	Working with a computer <i>e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>
f01	Methods of self-learning	Self-education <i>a method which involves independent acquisition of knowledge, skills and social competences, extending their scope and quality; complementary to the learning process taking place in class; taking on the task of developing and adjusting qualifications on one's own; self-study</i>
f02	Methods of self-learning	Individual work with a text <i>searching for and acquiring new information using textbooks and other written sources (including their digital versions); searching for texts, selecting fragments for analysis/interpretation, using other texts to solve a problem related to the studied issue</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
NMI_fs_01	laboratory classes	45	course work	NMI_01, NMI_02, NMI_03, NMI_04, NMI_05, NMI_06	b02, d01, d03, e01, f01, f02

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	Yes
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent</i>	Yes

		<i>elements of the curriculum (as preparation for class participation)</i>	
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>	Yes
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.