Master laboratory - didactic laboratory of physical and theoretical chemistry

Educational subject description sheet

Basic information

Study programme Chemistry **Speciality** - **Organizational unit** Faculty of Chemistry **Study level** Second-cycle programme **Study form** Full-time **Education profile** General academic	**Didactic cycle** 2023/24 **Subject code** 02CHSS.2CP.01289.23 **Lecture languages** English **Course type** Elective **Block** Basic subjects

Subject coordinator	Renata Jastrząb, Marcin Podsiadło
Lecturer	Renata Jastrząb, Marcin Podsiadło

Period	**Activities and hours**	**Number of ECTS points**
Semester 3	• Laboratories: 170, Graded credit	18

Period	**Activities and hours**	**Number of ECTS points**
Semester 4	• Laboratories: 170, Graded credit	17

Goals

Code	Goal
C1	Develop the ability to apply the acquired theoretical knowledge to experimental work in physical and theoretical chemistry.
C2	Develop the ability to use the chemical literature and databases, also in English, in physical and theoretical chemistry.
C3	Develop the ability to work independently on a given topic in physical and theoretical chemistry, including making calculations and selecting laboratory and analytical methods.
C4	Ability to analyse and present experimental results (oral presentation, poster).
C5	Ability to write a longer study describing the results of the experimental work, taking into account literature data.

Entry requirements

No prerequisites required.

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge – Student:			
W1	knows and understands definitions and concepts in physical and theoretical chemistry.	CHS_K2_W01, CHS_K2_W03	Project, Report, Oral statement
W2	knows and understands the chemical properties of the compounds studied.	CHS_K2_W01, CHS_K2_W07, CHS_K2_W09	Project, Report, Oral statement
Skills – Student:			
U1	can apply basic laboratory techniques.	CHS_K2_U03, CHS_K2_U05, CHS_K2_U06	Project
U2	is able to analyse research results and formulate conclusions based on them.	CHS_K2_U12, CHS_K2_U13, CHS_K2_U14	Project
U3	is able to work in a chemical laboratory, taking into account the hazards of the chemistry profession and applying the principles of occupational health and safety.	CHS_K2_U06, CHS_K2_U15	Project
U4	is able to use databases, including English-language databases.	CHS_K2_U08, CHS_K2_U09, CHS_K2_U10	Project, Report, Oral statement
U5	is able to write a scientific paper based on experiments conducted and available literature sources on physical and theoretical chemistry.	CHS_K2_U07, CHS_K2_U08, CHS_K2_U10, CHS_K2_U11, CHS_K2_U12	Project, Report
Social competences – Student:			

Code	Outcomes in terms of	Learning outcomes	Examination methods
K1	is ready to present his/her acquired knowledge and to lead discussions in physical and theoretical chemistry.	CHS_K2_K02, CHS_K2_K04	Oral statement
K2	is willing/ready to apply alternative solutions in laboratory work with a view to protecting the environment and promoting professional ethics.	CHS_K2_K01, CHS_K2_K03, CHS_K2_K04	Project, Report, Oral statement

Study content

No.	Course content	Subject learning outcomes	Activities
1.	Self-organisation of laboratory studies.	U1, U3, K2	Laboratories
2.	Selection and application of laboratory methods used in the graduate physical and theoretical chemistry laboratory.	W1, W2, U1, U3, K2	Laboratories
3.	Planning and execution of tests, respecting health and safety rules in accordance with the specifics of the physical and theoretical chemistry laboratory.	W2, U1, U3, U5, K2	Laboratories
4.	Preparation of an oral or poster presentation outlining the results of the research obtained.	W1, W2, U2, U4, U5, K1	Laboratories
5.	Methods and form of writing a final paper in the form of a master's thesis using the conducted experiments and literature data.	W1, U2, U4, U5, K1	Laboratories

Additional information

Semester 3

Activities	Teaching and learning methods and activities
Laboratories	Discussion, Work with text, Solving tasks (e.g. computational, artistic, practical), Laboratory method, Research method (scientific inquiry), Project method, Demonstration and observation, Activating method - "brainstorming"

Activities	Credit conditions
Laboratories	A prerequisite for passing is the completion of a literary review for the thesis part of the thesis and significant advancement of the experimental thesis. Grading scale with applied percentage distribution: • excellent (5.0): achievement of the student's expected learning outcomes at a minimum of 90.0%. • very good (4.5): achievement by the student of the desired learning outcomes ranging from 80.0% - 89.9%. • good (4.0): achievement of student learning outcomes 70.0% - 79.9%. • average (3.5): achievement of student learning outcomes 60.0% - 69.9%. • satisfactory (3.0): attainment of the student learning outcomes within 50.0% - 59.9%. • unsatisfactory (2.0): failure of the student to achieve the expected learning outcomes below 50.0%.

Semester 4

Activities	Teaching and learning methods and activities
Laboratories	Discussion, Work with text, Solving tasks (e.g. computational, artistic, practical), Laboratory method, Research method (scientific inquiry), Project method, Demonstration and observation, Activating method - "brainstorming"

Activities	Credit conditions
Laboratories	A prerequisite for passing is the completion of an experimental thesis and present the results at the annual Poznań Symposium of Young Scientists organized at the Faculty of Chemistry of the Adam Mickiewicz University. Grading scale with applied percentage distribution: • excellent (5.0): achievement of the student's expected learning outcomes at a minimum of 90.0%. • very good (4.5): achievement by the student of the desired learning outcomes ranging from 80.0% - 89.9%. • good (4.0): achievement of student learning outcomes 70.0% - 79.9%. • average (3.5): achievement of student learning outcomes 60.0% - 69.9%. • satisfactory (3.0): attainment of the student learning outcomes within 50.0% - 59.9%. • unsatisfactory (2.0): failure of the student to achieve the expected learning outcomes below 50.0%.

Literature

Obligatory

1. Literature in physical and theoretical chemistry as indicated by the MSc thesis supervisor.

Calculation of ECTS points

Semester 3

Activities	Activity hours*
Laboratories	170
Reading the indicated literature	30
Preparation of a project	60
Report preparation	45
Preparation for classes	60
Semester paper preparation	80
Preparation of a diploma thesis	80
Student workload	**Hours** 525
Number of ECTS points	**ECTS** 18

* academic hour = 45 minutes

Semester 4

Activities	**Activity hours***
Laboratories	170
Reading the indicated literature	60
Preparation of a project	45
Report preparation	45
Preparation for classes	60
Preparation of a multimedia presentation	60
Preparation of a diploma thesis	60
Student workload	**Hours** 500
Number of ECTS points	**ECTS** 17

* academic hour = 45 minutes

Efekty uczenia się dla kierunku

Kod	Treść
CHS_K2_K01	The graduate is ready to identify and evaluate cognitive and practical problems in the field of chemical research
CHS_K2_K02	The graduate is ready to evaluate the collected information critically
CHS_K2_K03	The graduate is ready to propose alternative solutions aimed at responsible decision-making, taking into account economic and social factors
CHS_K2_K04	The graduate is ready to appreciating, promoting and adhering to professional ethics in their own and others' activities
CHS_K2_U03	The graduate can carry out chemical processes including the selection of reagents and purification of products
CHS_K2_U05	The graduate can use mathematical methods in calculations for complex chemical and physicochemical systems and to evaluate the obtained results critically
CHS_K2_U06	The graduate can use analytical and instrumental techniques to describe the qualitative and quantitative interpretation of chemical phenomena
CHS_K2_U07	The graduate can prepare a final report on conducted research projects and conduct a critical analysis of experiments
CHS_K2_U08	The graduate can find and use information obtained from databases and literature resources in order to plan and carry out a research project
CHS_K2_U09	The graduate can use information and communication techniques in order to deepen his knowledge and communication in specialist circles of recipients
CHS_K2_U10	The graduate can use English at the B2 + level of the European System for the Description of Language Education in the field of chemistry and the discipline in which conducts research
CHS_K2_U11	The graduate can present a complex chemical or physicochemical problem and propose a solution
CHS_K2_U12	The graduate can draw conclusion properly and evaluate critically on the basis of data from self-conducted chemical or physicochemical experiments and literature resources
CHS_K2_U13	The graduate can deepens his specialistic knowledge to the extent necessary to solve and interpret the undertaken problem correctly
CHS_K2_U14	The graduate can express in an accessible way the acquired knowledge, conduct a debate and present the results of scientific projects in chemistry
CHS_K2_U15	The graduate can work in a group, performing various roles, including a leader
CHS_K2_W01	The graduate knows and understands selected advanced issues in the field of chemistry
CHS_K2_W03	The graduate knows and understands mechanisms of advanced chemical reactions and indicates their interrelationship and importance in science
CHS_K2_W07	The graduate knows and understands classifies advanced laboratory, analytical and instrumental techniques used in chemistry
CHS_K2_W09	The graduate knows and understands the ethical, legal and economic conditions applicable in the field of chemical sciences