



UNIwersYTET  
IM. ADAMA MICKIEWICZA  
W POZNANIU

## Basic Physical Chemistry 2

### Educational subject description sheet

#### Basic information

<b>Study programme</b> Chemia (General Chemistry) <b>Speciality</b> - <b>Organizational unit</b> Faculty of Chemistry <b>Study level</b> First-cycle programme <b>Study form</b> Full-time <b>Education profile</b> General academic		<b>Didactic cycle</b> 2023/24 <b>Subject code</b> 02CENS.18K.01828.23 <b>Lecture languages</b> English <b>Course type</b> Obligatory <b>Block</b> Major subjects
<b>Subject coordinator</b>	Anna Olejniczak	
<b>Lecturer</b>	Anna Olejniczak	
<b>Period</b> Semester 4	<b>Activities and hours</b> <ul style="list-style-type: none"><li>• Lecture: 45, Exam</li><li>• Classes: 30, Graded credit</li><li>• Laboratories: 45, Graded credit</li></ul>	<b>Number of ECTS points</b> 7

## Goals

Code	Goal
C1	Familiarization with the health and safety rules in the physical chemistry laboratory.
C2	Providing knowledge in the field of terminology and basic laws from selected areas of physical chemistry.
C3	Developing the ability to use physical chemistry in understanding and interpreting the simplest facts in the field of chemical sciences.
C4	Theoretical familiarization with modern research techniques useful in the interpretation of facts in the field of chemical sciences.
C5	Developing the ability to carry out quantitative measurements of physical quantities important from the chemical point of view.
C6	Preparation for the proper interpretation of the results of physicochemical experiments.
C7	Developing the ability to carry out simple physicochemical calculations.
C8	Preparation for the correct interpretation of the physicochemical results.
C9	Developing the skills of reporting the results from laboratory classes.

## Entry requirements

No prerequisites required.

## Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
<b>Knowledge - Student:</b>			
W1	understands and use the basic laws of physical chemistry and their consequences.	CEN_K1_W01, CEN_K1_W02	Written exam, Written colloquium, Report
W2	knows basic kinetics and mechanisms of chemical reactions.	CEN_K1_W01, CEN_K1_W05	Written exam, Written colloquium, Report
W3	recognizes the chemical aspects in natural sciences.	CEN_K1_W05, CEN_K1_W09, CEN_K1_W10	Written exam, Written colloquium, Report
W4	explains the physicochemical properties of substances depending on their structure or composition.	CEN_K1_W04, CEN_K1_W12, CEN_K1_W14	Written exam, Written colloquium, Report
W5	understands the properties and physicochemical transformations of substances depending on their structure or composition.	CEN_K1_W08	Written exam, Written colloquium, Report
<b>Skills - Student:</b>			
U1	can use simple measuring equipment.	CEN_K1_U16, CEN_K1_U17, CEN_K1_U18, CEN_K1_U26	Written colloquium, Oral colloquium, Report
U2	uses basic analytical techniques to investigate specific physicochemical phenomena.	CEN_K1_U16, CEN_K1_U17, CEN_K1_U18, CEN_K1_U26	Written colloquium, Oral colloquium, Report

Code	Outcomes in terms of	Learning outcomes	Examination methods
U3	is able to prepare the report from the obtained results of experiment and analyze them.	CEN_K1_U08, CEN_K1_U09, CEN_K1_U10, CEN_K1_U19, CEN_K1_U25	Written colloquium, Oral colloquium, Report
U4	can perform simple physicochemical calculations and interpret their results.	CEN_K1_U08, CEN_K1_U09	Written colloquium, Oral colloquium, Report
U5	is able to participate and argue in a discussion on physicochemical topics.	CEN_K1_U02, CEN_K1_U20, CEN_K1_U21	Written colloquium, Oral colloquium, Report
U6	uses the indicated literature sources.	CEN_K1_U20, CEN_K1_U21	Written colloquium, Oral colloquium, Report
<b>Social competences - Student:</b>			
K1	is able to carry out a discussion on physicochemical topics and to promote and observe professional ethics.	CEN_K1_K01, CEN_K1_K05, CEN_K1_K06	Oral colloquium, Report

### Study content

No.	Course content	Subject learning outcomes	Activities
1.	Chemical kinetics.	W1, W2, W3, W5, U2, U3, K1	Lecture, Classes, Laboratories
2.	Molecules in motion.	W1, W2, W3, W5, U1, U2, U6	Lecture, Classes, Laboratories
3.	Electrochemistry.	W1, W2, W3, W4, U2, U3, U4, K1	Lecture, Classes, Laboratories
4.	Chemical equilibrium.	W1, W4, U1, U5	Lecture, Classes, Laboratories
5.	Molecular spectroscopy.	W2, W3, U3, U5	Lecture, Classes, Laboratories

### Additional information

Activities	Teaching and learning methods and activities
Lecture	Lecture with a multimedia presentation of selected issues, Discussion, Solving tasks (e.g. computational, artistic, practical)
Classes	Discussion, Solving tasks (e.g. computational, artistic, practical), Classes method
Laboratories	Discussion, Solving tasks (e.g. computational, artistic, practical), Classes method, Laboratory method

Activities	Credit conditions
Lecture	<p>The prerequisite for taking the exam is passing the exercises and laboratories. Written exam (open-ended and/or closed questions). Grading scale with percentage distribution:</p> <ul style="list-style-type: none"> <li>• very good (bdb; 5.0): achieving the intended learning outcomes at a minimum level of 90.0%</li> <li>• good plus (db+; 4.5): achieving the intended learning outcomes within the range of 80.0% - 89.9%</li> <li>• good (db; 4.0): achieving the intended learning outcomes within the range of 70.0% - 79.9%</li> <li>• satisfactory plus (dst+; 3.5): achieving the intended learning outcomes within the range of 60.0% - 69.9%</li> <li>• satisfactory (dst; 3.0): achieving the intended learning outcomes within the range of 50.0% - 59.9%</li> <li>• unsatisfactory (ndst; 2.0): failure to achieve the intended learning outcomes, resulting in a score below 50.0%</li> </ul>
Classes	<p>Passing is based on written quizzes on a specific topic. The condition for passing is attendance of at least 13 out of 15 classes and obtaining at least 50% of the maximum possible number of points from each test. Grading scale with percentage distribution:</p> <ul style="list-style-type: none"> <li>• very good (bdb; 5.0): achieving the intended learning outcomes at a minimum level of 90.0%</li> <li>• good plus (db+; 4.5): achieving the intended learning outcomes within the range of 80.0% - 89.9%</li> <li>• good (db; 4.0): achieving the intended learning outcomes within the range of 70.0% - 79.9%</li> <li>• satisfactory plus (dst+; 3.5): achieving the intended learning outcomes within the range of 60.0% - 69.9%</li> <li>• satisfactory (dst; 3.0): achieving the intended learning outcomes within the range of 50.0% - 59.9%</li> <li>• unsatisfactory (ndst; 2.0): failure to achieve the intended learning outcomes, resulting in a score below 50.0%</li> </ul>
Laboratories	<p>The condition for passing is to pass at least 8 out of 9 exercises and obtain at least 2.75 GPA (55.0%). Grading scale with percentage distribution:</p> <ul style="list-style-type: none"> <li>• very good (bdb; 5.0): achieving the intended learning outcomes at a minimum level of 95.0%</li> <li>• good plus (db+; 4.5): achieving the intended learning outcomes within the range of 85.0% - 94.9%</li> <li>• good (db; 4.0): achieving the intended learning outcomes within the range of 75.0% - 84.9%</li> <li>• satisfactory plus (dst+; 3.5): achieving the intended learning outcomes within the range of 65.0% - 74.9%</li> <li>• satisfactory (dst; 3.0): achieving the intended learning outcomes within the range of 55.0% - 64.9%</li> <li>• unsatisfactory (ndst; 2.0): failure to achieve the intended learning outcomes, resulting in a score below 55.0</li> </ul>

## Literature

### Obligatory

1. Peter Atkins, Julio de Paula, James Keeler. "Atkins' Physical Chemistry". Oxford University Press, 2018.
2. Peter Bolgar, Haydn Lloyd, Aimee North, Vladimiras Oleinikovas, Stephanie Smith, James Keeler. "Student Solution Manual to Accompany Atkins' Physical Chemistry". Oxford University Press, 2018.

### Optional

1. Peter Atkins, Julio de Paula, David Smith. "Elements of Physical Chemistry". Oxford University Press, 2013.

## Calculation of ECTS points

Activities	Activity hours*
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Lecture	45
Classes	30
Laboratories	45
Preparation for classes	15
Reading the indicated literature	15
Paper preparation	15
Preparation for the assessment	15
Preparation for the exam	20
Report preparation	10
<b>Student workload</b>	<b>Hours</b> 210
<b>Number of ECTS points</b>	<b>ECTS</b> 7

\* academic hour = 45 minutes

## Efekty uczenia się dla kierunku

Kod	Treść
CEN_K1_K01	The graduate is ready to the development of new chemical technologies
CEN_K1_K05	The graduate is ready to understand and appreciate the importance of professional ethics in his/her own actions and those of others
CEN_K1_K06	The graduate is ready to formulate precise questions to deepen his/her own understanding of a topic or to find missing pieces of reasoning
CEN_K1_U02	The graduate can present the knowledge acquired in an accessible manner
CEN_K1_U08	The graduate can apply mathematical methods in chemical and physicochemical calculations
CEN_K1_U09	The graduate can select and apply statistical methods to describe chemical and physicochemical processes and analyse data
CEN_K1_U10	The graduate can interpret and analyse quantitative descriptions of basic physical and chemical phenomena
CEN_K1_U16	The graduate can apply analytical techniques to explain basic chemical and physicochemical phenomena
CEN_K1_U17	The graduate can select instrumental analysis methods to investigate specific chemical and physicochemical phenomena
CEN_K1_U18	The graduate can perform a chemical and physicochemical experiment based on the description
CEN_K1_U19	The graduate can analyse and develop test results and prepare a final report on the chemical and physicochemical experiments carried out
CEN_K1_U20	The graduate can use databases to retrieve information needed in the chemist's work
CEN_K1_U21	The graduate can independently obtain information from both Polish and foreign literature, physicochemical tables and other available sources
CEN_K1_U25	The graduate can create a presentation of a specific chemical or physicochemical problem and propose a solution to it
CEN_K1_U26	The graduate can carry out simple research tasks or expert opinions under the guidance of a mentor
CEN_K1_W01	The graduate knows and understands basic chemical laws and issues
CEN_K1_W02	The graduate knows and understands basic physics and their relationship to chemical laws
CEN_K1_W04	The graduate knows and understands fundamental knowledge of natural sciences
CEN_K1_W05	The graduate knows and understands the mechanisms of basic chemical reactions
CEN_K1_W08	The graduate knows and understands the chemical properties of substances according to their structure/composition
CEN_K1_W09	The graduate knows and understands the basics of chemical kinetics and catalysis
CEN_K1_W10	The graduate knows and understands the basic processes of chemical synthesis
CEN_K1_W12	The graduate knows and understands chemical compounds, including those discovered recently
CEN_K1_W14	The graduate knows and understands the basic laboratory and analytical techniques