

Basic chemistry Educational subject description sheet

Basic information

Study programme Chemia (General Chemistry)		Didactic cycle	
Speciality -		Subject code 02CENS.11K.01809.24	
Organizational unit Faculty of Chemistry		Lecture languages English	
Study level First-cycle programme		Course type Obligatory	
Study form Full-time		Block Major subjects	
Education profile General academic			
Subject coordinator	Renata Jastrząb		
Lecturer	Renata Jastrząb		
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Period Semester 1	Activities and nours Number of • Lecture: 30, Exam; including sub-activities: ECTS points • Synchronous lecture: 30 13 • Classes: 30, Graded credit 13 • Proseminar: 30, Graded credit; including sub-activities: • Asynchronous digital laboratory: 10		Number of ECTS points 13

Goals

Code	Goal
C1	To provide knowledge of the most important chemical issues, processes, chemical laws and theories, to develop the ability to select an appropriate analytical technique for solving analytical determinations and to develop new analytical methods and methodologies.
C2	To impart knowledge of atomic and molecular structure, chemical bonding, the periodic table, and basic properties of elements, to prepare for proper interpretation of test results, validation of analytical procedure, evaluation of the use of analytical apparatus, to demonstrate their advantages and disadvantages in reporting.
С3	Providing knowledge on the basics of thermochemistry and chemical kinetics and chemical equilibria.
C4	To provide knowledge of chemical calculations and to develop the ability to use theoretical knowledge in solving calculation tasks.
C5	Develop the ability to behave correctly and work in accordance with health and safety rules during activities in the chemistry laboratory.
C6	Provide knowledge on the use of laboratory equipment and the use of basic laboratory techniques.
C7	Preparation for individual laboratory work.
C8	Developing the ability to read exercise descriptions correctly, interpret results and prepare a laboratory exercise protocol.
С9	Practising the use of literature sources.
C10	Developing communication and teamwork.

Entry requirements

No prerequisites required.

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge - Student:			
W1	knows and understands basic chemical concepts and theories and explains basic chemical laws.	CEN_K1_W01, CEN_K1_W04	Written exam, Written colloquium, Test, Report
W2	knows and understands the mechanisms of basic chemical reactions.	CEN_K1_W05, CEN_K1_W10	Written exam, Written colloquium, Test, Report
W3	knows the chemical properties of substances in relation to their structure/composition, structure, including those discovered more recently.	CEN_K1_W08, CEN_K1_W12	Written exam, Written colloquium, Test, Report
W4	knows basic laboratory and analytical techniques and methods for the economic optimisation of chemical processes.	CEN_K1_W14, CEN_K1_W15, CEN_K1_W17	Written exam, Written colloquium, Test, Report
Skills - Student:			

Code	Outcomes in terms of	Learning outcomes	Examination methods
U1	is able to identify the chemical properties of substances according to their structure/composition, identify and justify the properties of substances on the basis of their structure, including those recently discovered.	CEN_K1_U03	Written exam, Written colloquium, Test
U2	can define, describe, plan and carry out basic chemical synthesis processes.	CEN_K1_U01, CEN_K1_U05, CEN_K1_U10	Written exam, Written colloquium, Test
U3	is able to use chemical terminology according to IUPAC and PTChem recommendations.	CEN_K1_U01	Written exam, Written colloquium, Test
U4	can select and apply mathematical and statistical methods in chemical and physicochemical calculations and data analysis.	CEN_K1_U08, CEN_K1_U09	Written exam, Written colloquium, Test, Report
U5	is able to work in a chemical laboratory, perform chemical and physicochemical experiments based on a description, apply analytical techniques to explain basic chemical and physicochemical phenomena.	CEN_K1_U05, CEN_K1_U06, CEN_K1_U14, CEN_K1_U15, CEN_K1_U16, CEN_K1_U17, CEN_K1_U18	Report, Practical exam
U6	is able to analyse and process laboratory test results and prepare a final report on the chemical and physicochemical experiments carried out.	CEN_K1_U19, CEN_K1_U22, CEN_K1_U25, CEN_K1_U27	Written exam, Written colloquium, Test, Report, Practical exam
U7	is able to apply the principles of safety and health in the chemical laboratory and to assess the risks when conducting chemical experiments.	CEN_K1_U14, CEN_K1_U15	Written colloquium, Practical exam
Social competences - Student:			
Кl	is willing to perform chemical and physicochemical experiments in accordance with health and safety rules and to critically evaluate the information gathered.	CEN_K1_K03	Practical exam

Study content

No.	Course content	Subject learning outcomes	Activities
1.	Basic definitions, concepts and chemical laws, stoichiometric calculations.	W1, W3, U1, U3	Lecture, Proseminar, Classes, Laboratories, Synchronous lecture
2.	Atomic structure, electron configurations.	W3, U1	Lecture, Proseminar, Synchronous lecture
3.	Periodic table of elements.	W3, U1	Lecture, Laboratories, Synchronous lecture
4.	Chemical bonds, molecular structure, intermolecular interactions.	W1, W2, U1, U2	Lecture, Proseminar, Synchronous lecture

No.	Course content	Subject learning outcomes	Activities
5.	Chemical reactions, types of reactions, structuring of chemical reaction equations.	W2, W3, U1, U2	Lecture, Proseminar, Laboratories, Synchronous lecture, Asynchronous digital Iaboratory
6.	Basics of thermochemistry, directions of chemical transformations.	W1, W2, W3, U1, U2, U3	Lecture, Proseminar, Synchronous lecture
7.	Fundamentals of chemical kinetics, chemical equilibria, ionic equilibria, acids and bases.	W1, W2, W3, U1, U4, U5, U6, U7	Lecture, Proseminar, Laboratories, Synchronous lecture
8.	Oxidation and reduction reactions.	W1, W2, W3, W4, U1, U2, U3, U5, U7, K1	Lecture, Proseminar, Classes, Laboratories, Synchronous lecture
9.	Complex compounds and their properties.	W1, W2, W3, W4, U1, U2, U3, U5, U7, K1	Lecture, Proseminar, Laboratories, Synchronous lecture
10.	Basic laboratory equipment.	U5, U7, K1	Laboratories, Asynchronous digital laboratory
11.	Basic laboratory techniques.	U4, U5, U7, K1	Lecture, Laboratories, Synchronous lecture, Asynchronous digital laboratory
12.	Titrated solutions of acids and bases.	W1, W3, W4, U4, U5, U6, U7, K1	Lecture, Laboratories, Synchronous lecture
13.	Methods of separation of mixtures.	W3, W4, U5, U7, K1	Lecture, Laboratories, Synchronous lecture
14.	Chemical properties of the elements.	W1, W3, W4, U1, U5, U6, U7, K1	Lecture, Proseminar, Laboratories, Synchronous lecture
15.	Health and safety in the basic chemistry laboratory.	U7, K1	Laboratories, Asynchronous digital laboratory
16.	Basic knowledge of chemical calculations.	W1, U3, U4, U6	Lecture, Classes, Laboratories, Synchronous lecture
17.	The concentration of solutions (percentage, molar), conversion of concentrations and mixing of solutions.	W1, W3, W4, U4, U5, U6	Lecture, Laboratories, Synchronous lecture

Additional information

Activities	Teaching and learning methods and activities
Lecture	Lecture with a multimedia presentation of selected issues, Game/simulation, Demonstration and observation, Audio and/or video demonstrations
Classes	Discussion, Solving tasks (e.g. computational, artistic, practical), Classes method, Work in groups
Proseminar	Discussion, Problem-based learning, Work in groups

Activities	Teaching and learning methods and activities
Laboratories	Discussion, Solving tasks (e.g. computational, artistic, practical), Laboratory method, Research method (scientific inquiry), Work in groups

Activities	Credit conditions
Lecture	The condition for taking the exam is to obtain passing grades in computational exercises, proseminar, and laboratory. Components of the final module grade (maximum 100 points): WRITTEN EXAMINATION • 5 open questions (maximum 50 points) • 35 test questions (maximum 35 pts) A mark for the proseminar (maximum 5 points: 5 - 5 points, 4,5 - 4 points, 4 - 3 points, 3,5 - 2 points, 3 - 1 points). Assessment of the calculus exercises (maximum 5 points: 5 - 5 points, 4,5 - 4 points, 4 - 3 points, 4 - 3 points, 3,5 - 2 points, 3 - 1 points). Iaboratory grade (maximum 5 points: 5 - 5 points, 4,5 - 4 points, 3,5 - 2 points, 3 - 1 points). The possibility of gaining additional points for activity in the lecture - max. 6 points. Grading scale with applied percentage distribution: • excellent (5.0): achievement of the student's expected learning outcomes at a minimum of 92.0%. • very good (4.5): achievement by the student of the desired learning outcomes ranging from 84.0% - 91.9%. • average (3.5): achievement of student learning outcomes 76.0% - 83.9%. • average (3.5): achievement of the student learning outcomes for 0.0% - 67.9%. • unsatisfactory (2.0): failure of the student to achieve the expected learning outcomes below 60.0%.
Classes	 Grading is conditional on attendance at a minimum of 60% of classes. Components of the final grade for calculus exercises: 1. Knowledge test after each section - maximum 20 points minimum 12 points. 2. Evaluation of activity in class - maximum 10 points. Grading scale with applied percentage distribution: excellent (5.0): achievement of the student's expected learning outcomes at a minimum of 92.0%. very good (4.5): achievement by the student of the desired learning outcomes ranging from 84.0% - 91.9%. good (4.0): achievement of student learning outcomes 76.0% - 83.9%. average (3.5): achievement of the student learning outcomes 68.0% - 75.9%. satisfactory (3.0): attainment of the student to achieve the expected learning outcomes below 60.0%. A minimum number of points from written colloquia after each section is required to pass the exercises. Unscored colloquia may be corrected by the student during the last 15 classes.

Activities	Credit conditions
Proseminar	 Attendance at a minimum of 60% of classes is a prerequisite for grading. Components of the final proseminar grade: Knowledge test after each section - maximum 10 points minimum 6 points. Evaluation of activity in class - maximum 10 points. Grading scale with applied percentage distribution: excellent (5.0): achievement of the student's expected learning outcomes at a minimum of 92.0%. very good (4.5): achievement by the student of the desired learning outcomes ranging from 84.0% - 91.9%. good (4.0): achievement of student learning outcomes 76.0% - 83.9%. average (3.5): achievement of student learning outcomes 68.0% - 75.9%. satisfactory (3.0): attainment of the student to achieve the expected learning outcomes below 60.0%. If 50.0%-59.9% of the total points are obtained, the student has the opportunity to write an exit colloquium on all the material allowing for a pass mark of 30 points maximum, 20 points minimum.
Laboratories	 Attendance at a minimum of 60% of classes is a prerequisite for grading. Components of the final laboratory grade: Passing the practical exam after the first 5 exercises - maximum 10pts minimum 6pts Knowledge test before each exercise - maximum 5 points, minimum 1 point. Evaluation of the exercise report - maximum 3 pts. Exercise performance assessment - maximum 2 points. Grading scale with applied percentage distribution: excellent (5.0): achievement of the student's expected learning outcomes at a minimum of 92.0%. very good (4.5): achievement by the student of the desired learning outcomes ranging from 84.0% - 91.9%. good (4.0): achievement of student learning outcomes 76.0% - 83.9%. average (3.5): achievement of student learning outcomes 68.0% - 75.9%. satisfactory (3.0): attainment of the student to achieve the expected learning outcomes below 60.0%.

Literature

Obligatory

- 1. Chemical Principles: The Quest for Insight, Peter Atkins and Loretta Jones, W. H. Freeman & Co
- 2. Chemistry, Molecules, Matter, and Change, Loretta Jones nad Peter Atkins, W. H. Freeman & Co
- 3. Chemical Principles, Steven S. Zumdahl, Houghton Mifflin Co

Optional

- 1. Chemical Principles, International Student Edition, Peter Atkins, W. H. Freeman & Co
- 2. Chemistry, Kenneth W. Whitten, Raymond E. Davis, M. Larry Peck, George G. Stanley, Brooks/Cole, Cengage Learning

Calculation of ECTS points

Activities	Activity hours*
Lecture	30
Classes	30

Proseminar	30
Laboratories	90
Preparation for classes	45
Reading the indicated literature	30
Report preparation	30
Preparation for the assessment	45
Preparation for the exam	45
Student workload	Hours 375
Number of ECTS points	ECTS 13

* academic hour = 45 minutes

Efekty uczenia się dla kierunku

Kod	Treść
CEN_K1_K03	The graduate is ready to correctly assessy the risks involved in conducting chemical experiments
CEN_K1_U01	The graduate can use basic chemical terminology according to IUPAC and PTChem recommendations
CEN_K1_U03	The graduate can identify and justify the properties of a substance on the basis of its structure
CEN_K1_U05	The graduate can carry out basic chemical synthesis processes
CEN_K1_U06	The graduate can carry out chemical reactions reflecting technological processes on a laboratory scale
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_U14	The graduate can work in a chemical laboratory according to health and safety rules
CEN_K1_U15	The graduate can work in a group in a variety of roles including group leader
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 physico- chemical experiments carried out
CEN_K1_U22	The graduate can prepare a summary of the analyses of the literature data carried out
CEN_K1_U25	The graduate can create a presentation of a specific chemical or physicochemical problem and propose a solution to it
CEN_K1_U27	The graduate can demonstrate the ability to make correct inferences on the basis of data from chemical or physico-chemical experiments and literature sources
CEN_K1_W01	The graduate knows and understands basic chemical laws and issues
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_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
CEN_K1_W15	The graduate knows and understands the basic methods of instrumental analysis
CEN_K1_W17	The graduate knows and understands opportunities for the economic optimisation of chemical processes