OBSAH

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD109A/22	**Course title:** Analytical Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Laboratory practical **Recommended study range:** **hours weekly:** 2 / 3 **hours per semester:** 26 / 39 **Teaching method:** on-site	
Credits: 4	**Working load:** 100 hours
Recommended semester/trimester: 5.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: The final evaluation will be based on the total number of points obtained from the written exam. Course evaluation and laboratory protocols	
Learning outcomes of the course: The aim is to teach the student to analytical thinking, which is extremely important in the pedagogical process and planning experiments. Students are able to describe and explain the principle of individual analytical methods, clarify the use of chemical reactions and chemical equilibria for analytical purposes, practically implement methodological procedures of qualitative and quantitative analysis.	
Course contents: 1. Basic concepts in analytical chemistry. Evidence. Identification. characterization. 2. Process of chemical analysis. Division of methods in analytical chemistry. 3. Selectivity of evidence and determination. 4. Methods of signal comparison, reference materials. Sampling. 5. Sample preparation. Dissolution of solid samples. Melting. Pyrolysis and decomposition of the sample by microwave radiation. 6. Protolytic equilibria. Quantitative analysis. Titration curves. Equivalence point indication. 7. Conditions for selection of chemical reaction and indicator. Standardization. Alkalimetry. Acidimetry. 8. Complex equilibria. Chelatometry. Measurement errors. Accuracy, precision and reliability of analysis results. 9. Oxidation-reduction equilibria. Redox potential and influence of side reactions. 10. Manganometry. Dichromatometry. Cerimetry. 11. Iodimetry. Bromatometry. Titanometry. 12. Precipitation equilibria. Solubility and solubility product. 13. Argentometry and gravimetry. Laboratory exercise: Preliminary analytical tests. Qualitative determinations - evidence of cations, evidence of anions, evidence of an unknown sample. Quantitative analysis - alkalimetric and acidimetric determinations, redox determinations, precipitation and chelatometric determinations. Gravimetry.	

Recommended or required literature:

1. Rievaj M., Tomčík P.: Chemical Reactions and Equilibria in Titrimetric Analysis, Verbum Ružomberok (2021)
2. Kellner R.: Analytical Chemistry Wiley 2004

Language of instruction:

Notes:

Course evaluation:

Assessed students in total: 3

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.11.2023

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD101C/22	**Course title:** Anorganic Chemistry Seminar
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 1 **hours per semester:** 13 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 2.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: During the semester, active participation in exercises will be evaluated. Each student prepares a report on the given topic. A maximum of 40 points can be obtained by activity in the exercises with the presentation of the report. The final evaluation of full-time students will be based on the evaluation of the exercises and the final written text, for which they can receive max. 60 points. In total, upon successful completion of the subject, students can receive max. 100 points.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: -The student can characterize the differences of elements s, p, d, f, deduce their basic properties and describe their reactivity. - Will be able to work independently with scientific and professional information, process and present it.	
Course contents: Course contents: 1. PSP – basic division and characteristics of groups of elements 2. History of discoveries of selected chemical elements 3. Theories of chemical bonding 4. Elements with – basic properties, position in PSP 5. Elements with – preparation, binding capacity, reactivity 6. Elements p - basic properties, position in PSP 7. Elements p - preparation, binding capacity, reactivity 8. Elements d - basic properties, position in PSP 9. Elements d- preparation, binding capacity, reactivity 10. Elements f 11. Presentation of students' own work 12. Presentation of students' own work	

Recommended or required literature:
Housecroft, Catherine E., Sharpe, Alan G.: Inorganic Chemistry, Harlow, Pearson Pentice Hall, 2008.

Language of instruction:

Notes:

Course evaluation:
Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): doc. Ing. Eva Culková, PhD.

Last modification: 06.08.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD111A/22	**Course title:** Auditory Practice
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 1 **hours per semester:** 13 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 5.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: In the course of the semester, the student demonstrates his theoretical knowledge in the preparation of pedagogical diaries, in the processing of lesson analyses. Practically, he participates in auditions in elementary or high school, while with a trainee teacher he analyzes the lessons he participated in (implementation takes place in groups).	
Learning outcomes of the course: Educational practice takes the form of pedagogical-psychological observations. Its aim is to teach students to observe, analyze and write in observation records and pedagogical diaries pedagogical and psychological aspects of the educational process. Students observe the teacher's work in the lesson, work and curriculum, the choice of methods and resources, as well as the level of management of students' learning activities. When observing, students also notice the way of evaluating student performance. In cooperation with the practicing teacher, they will analyze the teacher. hours and the student prepares a pedagogical diary. After completing the subject, the student will acquire the following knowledge, skills and competences: - Able to observe, analyze and record in hospital records and pedagogical diaries the pedagogical and psychological aspects of the educational process. - He is able to observe the work of the teacher in the lesson, the work and the curriculum, the choice of methods and means, as well as the level of management of the students' learning and learning activities. - Can analyze the lessons based on the analysis of the lessons in cooperation with the trainee teacher. hours and independently prepare a pedagogical diary.	
Course contents: 1. Didactic analysis of the curriculum - definition of the basic curriculum, basic concepts and relationships, expanding the curriculum, the use of intersubject relationships. 2. Didactic analysis of students' basic knowledge and abilities with regard to their individual and developmental characteristics. 3. Be able to evaluate: the formative component of the teaching process, didactic goal, content, methods of the teaching process. 4. Listening sessions and lesson outputs. Learning the analytical structure of the teaching process.	

Recommended or required literature:

Language of instruction:

Notes:

Course evaluation:
Assessed students in total: 3

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.07.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD112A/22	**Course title:** Basics of didactics of chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Seminar **Recommended study range:** **hours weekly:** 1 / 1 **hours per semester:** 13 / 13 **Teaching method:** on-site	
Credits: 1	**Working load:** 25 hours
Recommended semester/trimester: 6.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: During the semester, the student demonstrates his theoretical knowledge in the form of partial tasks, which are the application of theoretical knowledge from general pedagogy to a specific subject of chemistry. At the end of the semester, he demonstrates his competences in a sample presentation of his independent preparation on a specific topic in chemistry.	
Learning outcomes of the course: Objective of the subject: The aim of the subject is to provide students with examples and possibilities of applying general, pedagogical-psychological and didactic laws to the theory and practice of teaching chemistry in primary and secondary schools, to prepare them theoretically for pedagogical practice implemented in training schools. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - Can apply the knowledge gained from the pedagogical basis to the fields of chemistry. - He is able to analyze the lesson. - He is able to keep a hospital sheet and a diary of pedagogical practice.	
Course contents: 1. Didactics of chemistry as a scientific field - definition, subject - narrower, broader understanding, methodological starting points, goals, tasks and peculiarities, meaning, inclusion in the system of sciences and structure, general and special didactics). 2. The current position of chemistry in the curricula of primary and secondary schools. Causes of structural and conceptual changes. Innovative state education program. Educational standards - content and performance standards in chemistry for primary and secondary schools. 3. Teaching and learning, basic components of the educational process and their unity. 4. Concept formation process in chemistry - making concepts accessible and mastering, logical procedures (thought operations) of concept creation, the role of visualization in the process of concept creation.	

5. Lesson - basic characteristics, types of lessons, components, structure - specific applications using an example from chemistry. Ways of motivating students in different phases of the lesson (introductory, ongoing), demonstrations, examples.
6. Goals of chemical education at primary and secondary school (final, staged, partial) - their relationship to the content of the curriculum and coordination with the goals of other subjects. - Planning of educational work. Year-round work plan - time-thematic plan.
7. Preparation for the VH - a complete outline of written preparation, a model sample of the interpretation of the elementary school and gymnasium curriculum, determination of basic concepts and knowledge, determination of basic concepts.

Recommended or required literature:

Recommended reading:

1. Bellová, R.: Chapters from the general didactics of chemistry. Verbum, Ružomberok 2010.
2. Mokrejšová, O.: Modern chemistry teaching. Tritan, Prague 2009.
3. Skalková, J.: General didactics: teaching process, curriculum and its selection, methods, organizational forms of teaching. Grada, Prague 2007.
4. Kalhous, Z. et al.: School didactics. Portal, Prague 2009.
5. Turek, I.: Didactics. Iura Edition, spol. with r. o., Bratislava 2010.
6. Petlák, E.: General didactics. Bratislava: Iris, 2004.
7. Chemistry textbooks for primary and secondary schools.

Language of instruction:

Notes:

Course evaluation:

Assessed students in total: 3

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.07.2022

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD110A/22	**Course title:** Biochemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 5.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: Conducting an oral exam. The detailed scope of the material for the exam, materials and materials for studying the subject are published in the electronic education system - moodle.	
Learning outcomes of the course: To provide students with basic knowledge of the chemical composition and properties of living systems, chemical processes and the formation of energy in living systems. Students are able to characterize biogenic elements, inorganic compounds (water, CO2, ammonia), organic compounds (carbohydrates, lipids, proteins, nucleic acids), explain the principle of biocatalysts (enzymes, hormones, vitamins), describe and clarify chemical processes in living systems , formation of energy in organisms, metabolic processes, metabolism of carbohydrates, lipids and proteins, linking metabolism.	
Course contents: Course contents: 1. Chemical composition and properties of living systems. Biogenic elements and their importance. Organic compounds and their meaning. Inorganic compounds and their importance. Properties of living systems. 2. Carbohydrates. Characteristics and distribution. Biochemical functions and importance of carbohydrates. 3. Lipids. Characteristics and distribution. Simple and complex lipids. Biochemical functions and importance of lipids. 4. Proteins. Characteristics and distribution. Structure and structure of proteins. Simple and complex proteins. Properties of proteins (denaturation, coagulation). Biological functions and importance of proteins. 5. Nucleic acids. Characteristics and distribution. Nucleotides and nucleosides. Structure and composition of DNA, RNA. Structure and properties. Biological functions and their meaning. 6. Enzymes, vitamins and hormones. Characteristics, composition and distribution. Biological functions and their meaning.	

7. Metabolism. Catabolic and anabolic events and their mutual relationship and comparison. Functions and phases of catabolism. Connection of metabolism of carbohydrates, lipids and proteins.
8. Chemical events in living systems. Assimilation and dissimilation, endergonic and exergonic events. Oxidation-reduction reactions. Aerobic and anaerobic events. Enzymatic events.
9. Generation of energy in organisms. Origin and significance of acetyl coenzyme A. Macroergic compound ATP. Krebs cycle and respiratory chain. The essence and their meaning.
10. Carbohydrate metabolism. Carbohydrate digestion. Anabolism of carbohydrates - photosynthesis and gluconeogenesis. Carbohydrate catabolism - glycolysis.
11. Lipid metabolism. Digestion of lipids. Lipid anabolism - synthesis of fatty acids. Lipid catabolism - beta oxidation of fatty acids.
12. Protein metabolism. Protein digestion. Protein anabolism - amination and transamination. Proteosynthesis. Protein catabolism – AMK deamination. Urea (ornithine) cycle.

Recommended or required literature:

Presentations from lectures
Mikušová K.: Princípy biochémie v schémach a v príkladoch, UK Bratislava, 2005
Kotlík B.: Chémia II v kocke. Art Area 2002
Lisá V.: Organická chémia a biochémia. Príroda Bratislava 2002

Language of instruction:

English

Notes:

Course evaluation:

Assessed students in total: 3

A	B	C	D	E	FX
0.0	66.67	0.0	33.33	0.0	0.0

Name of lecturer(s): Ing. Jaroslav Durdiak, PhD., doc. RNDr. Jaroslav Timko, PhD.

Last modification: 22.07.2022

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD104C/22	**Course title:** Biochemistry Seminar
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 1 **hours per semester:** 13 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 5.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: In order to fulfill the condition of passing the subject, the student must present a specific set issue in biochemistry, which can earn a maximum of 20 points. Based on the activity at the seminars, he can get a maximum of 20 additional points. By processing the semester work, he will get a maximum of 60 points. In total, when completing the subject, students can receive max. 100 points. evaluation grade: A – 100%-93% B – 92%-85% C – 84%-77% D – 76%-69% E – 68%-60% Fx – 59%- 0%	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - has knowledge about the chemical composition and properties of living systems, chemical events and the generation of energy in living systems. - is able to clarify the biochemical cycles of biogenic elements, the metabolism of mineral substances and water, explain the chemistry and importance of photosynthesis and respiration, the essence of digestion, and characterize mutual relationships in nutrient metabolism.	
Course contents: 1. Biosphere and biochemical cycle of carbon (C), hydrogen (H) and oxygen (O). 2. Biosphere and biochemical cycle of nitrogen (N), phosphorus (P) and sulfur (S). 3. Importance of minerals (Ca, Mg, P, S) and water in the body. 4. Metabolism of mineral substances and water. 5. Substance and energy metabolism. 6. Biological redox reactions. 7. Chemistry and the importance of photosynthesis.	

8. Chemistry and the importance of breathing.
9. Principle and mechanism of digestion.
10. Interrelationships in nutrient metabolism
11. Enzyme and hormonal regulation of metabolism.

Recommended or required literature:

1. Kollárová, M.: Princípy biochémie. (v schémach a príkladoch). UK Bratislava, 2008
2. Dostál, J.: Biochemie : pro posluchače bakalářských oborů. Brno : Masarykova univerzita , 2012
3. Vodrážka, Z.: Biochemie. Academia Praha, 1992
4. Pavlíček, P.: Biochemie. UK Praha, 2009

Language of instruction:
Slovak language

Notes:

Course evaluation:
Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): doc. RNDr. Jaroslav Timko, PhD.

Last modification: 08.09.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD103B/22	**Course title:** Bioinorganic Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 2.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: The subject will be completed by a final written exam (40 b)	
Learning outcomes of the course: Objective of the subject: To provide students with information about new knowledge of the effect of elements and their compounds on living organisms, especially on the human organism. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - The student knows the occurrence of elements in the human organism, they can clarify their function in the organism, -He has knowledge about absorption conditions, natural sources, manifestations of hypo- and hyper-occurrence of an element in the organism. - They can connect individual information of scientific knowledge to the activity of events taking place in the human organism. Verification of the level of acquired knowledge, skills and competences: The subject will be completed by a final written exam.	
Course contents: Course contents: 1. Macrobiogenic elements of the 1st group of elements in PS and their compounds, their function in the organism, sources, conditions of absorption, effect on the organism, changes caused by their deficiency in the organism 2. Macrobiogenic elements of the 2nd group of elements and iron and their compounds, their function in the organism, sources, conditions of absorption, effect on the organism, changes caused by their deficiency, excess in the organism 3. Macrobiogenic elements of the 14th to 16th PS elements (C, N, O) and their compounds, their function in the organism, sources, absorption conditions, effect on the organism, changes caused by their deficiency, excess in the organism	

4. Macrobiogenic elements of the 14th to 16th PS elements (P, S, Cl) and their compounds, their function in the organism, sources, absorption conditions, effect on the organism, changes caused by their deficiency, excess in the organism
5. Microbiogenic elements of the 15th to 17th groups of PS elements and their compounds, their function in the organism, sources, conditions of absorption, effect on the organism, changes caused by their deficiency, excess in the organism
6. Microbiogenic elements of the 6th, 14th and 16th groups of elements in PS and their compounds, their function in the organism, sources, conditions of absorption, effect on the organism, changes caused by their deficiency, excess in the organism
7. Microbiogenic elements 7., 9. – 12. Groups of elements in PS and their compounds, their function in the organism, sources, conditions of absorption, effect on the organism, changes caused by their deficiency, excess in the organism
8. Selected elements and their compounds with a therapeutic effect on the human body (Li, B, Ti, V, W), therapeutic effect, sources, toxic effect
9. Selected elements and their compounds with a therapeutic effect on the human body (Pt, Ag, Au, Sb, Bi)), therapeutic effect, sources, toxic effect
10. Selected elements and their compounds with a therapeutic effect on the human organism (Ra, Rn), therapeutic effect, sources, toxic effect
11. Selected elements and their compounds with a toxic effect on the human body (Be, Ba, Al, As, Te), their exposure possibilities, manifestations of the toxic effect, acute and chronic poisoning, intoxication
12. Selected elements and their compounds with a toxic effect on the human body (Cd, Hg, Pb, Tl), their exposure possibilities, manifestations of the toxic effect, acute and chronic poisoning, intoxication.

Recommended or required literature:

Language of instruction:

1. Melicherčík, M., Melicherčíková, D.: The influence of the environment and the effects of substances on the human organism. FPV UMB, Banská Bystrica, 2010.
2. 3. Melicherčíková, D. a kol.: Anorganická a bioanorganická chémia pre učiteľov, Verbum – Katolícka univerzita v Ružomberku, 2019, 300 s.

Notes:

Course evaluation:
Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.11.2023

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD100B/22	**Course title:** Calculations in Chemistry 1
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 1.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: During the semester, the student proves his theoretical knowledge of basic chemical calculations in three written tests. The final evaluation will be based on the total number of points obtained from the interim tests and the final written work.	
Learning outcomes of the course: Objective of the subject: The aim of the subject is to acquaint the student with the basics of the nomenclature of inorganic substances, basic chemical calculations of the composition of systems of chemical substances, chemical balances and calculations from chemical equations. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - He is able to perform calculations of the composition of systems of chemical substances and the calculation of substance balances in chemical systems. - Is able to practically create names of chemical compounds from formulas and formulas from names, understand the essence of the composition of solutions and chemical systems. - Controls practically calculations of the composition of solutions and mass balances in systems without chemical processes and with chemical processes. Verification of the level of acquired knowledge, skills and competences: Verification of the degree of acquisition of the relevant knowledge, skills and competencies of the student is carried out on the basis of computer tests during the semester teaching of the subject and the final overall test.	
Course contents: THEME OUTLINE: 1. General concepts of chemistry 2. Terminology of inorganic compounds (nomenclature of two-element compounds) 3. Terminology of inorganic compounds (nomenclature of multi-element compounds) 4. Expression of the composition of chemicals (substance quantity) 5. Composition of chemical systems I. (molar fraction, mass fraction, volume fraction) 6. Composition of chemical systems II. (concentration of substance, mass concentration)	

7. Composition of chemical systems III. (molalita, stoichiometric formula)
8. Fabric balances in systems without chemical processes I. (preparation, dilution, mixing of solutions)
9. Fabric balances in systems without chemical events II. (distribution of compound mixtures, combined events)
10. Determination of stoichiometric coefficients of redox reactions
11. Fabric balances in systems with chemical processes I.
12. Fabric balances in systems with chemical processes II.

Recommended or required literature:

1. Vavra, M., Čurda, M.: Chemical nomenclature of inorganic and organic compounds and biochemical terminology. Rokus. 2016.
2. Sirota, A., Adamkovič, E.: Nomenclature of inorganic substances. Bratislava: Methodological Center, 2002.
3. Galamboš, M. et al.: Nomenclature of inorganic substances: principles and examples. Bratislava: Comenius University, 2009.
4. Mašlejová, A. et al.: Calculations in inorganic chemistry. Bratislava: Spektrum STU: Slovak Technical University in Bratislava, 2018.
5. Bellová, R., Durdiak, J.: Examples of calculations from general and inorganic chemistry. Liptovský Mikuláš: Military Academy, 1998.
6. Gažo et al: General and inorganic chemistry, Alfa STNL Bratislava, 1981
7. Bellová, R. et al.: General and inorganic chemistry. KU Ružomberok, 2006
8. Bellová, R., Durdiak, J.: Examples of calculations from general and inorganic chemistry. Liptovský Mikuláš: Military Academy, 1998.
9. Gazdíková, V.: Calculations in inorganic chemistry 2. Trnava: Trnava University, 2006.
10. D. Valigma: Chemical tables, CHTF STU Bratislava, 2018.

Language of instruction:

Notes:

Course evaluation:
Assessed students in total: 8

A	B	C	D	E	FX
37.5	12.5	25.0	12.5	0.0	12.5

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.07.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD106B/22	**Course title:** Calculations in Chemistry 2
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 4.	
Level of study: I.	
Prerequisities: KCH/Ch-BD100B/22	
Requirements for passing the course: During the semester, the student proves his theoretical knowledge of basic chemical calculations in three written tests. The final evaluation will be based on the total number of points obtained from the interim tests and the final written work.	
Learning outcomes of the course: Objective of the subject: The aim of the subject is to expand the student's knowledge in chemical calculations by applying basic relationships to analytical chemistry so that they acquire the habits that are necessary for their specialization and for practical use in the chemical laboratory (especially within analytical chemistry). Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - Is able to practically use and apply basic chemical calculations in the chemical laboratory when preparing solutions and chemical substances needed for analysis. - He is able to perform practical calculations from chemical equations, calculations necessary for quantitative determinations - standardization, determination of substances, chemical balances, reactions with gases, pH calculations, solubility product. - Can apply knowledge from calculations in the preparation and evaluation of practical quantitative determinations in the laboratory. Verification of the level of acquired knowledge, skills and competences: Verification of the degree of acquisition of the relevant knowledge, skills and competencies of the student is carried out on the basis of computer tests during the semester teaching of the subject and the final overall test.	
Course contents: THEME OUTLINE: 1. Basic calculations in analytical chemistry (solution composition, chemical equilibrium). 2. Calculations in solving stoichiometric problems. 3. Calculations for neutralization volumetric determinations. 4. Calculations for redox volumetric determinations.	

5. Calculations for volumetric precipitation measurements.
6. Calculations in measuring and complexometric measurements.
7. Gravimetric determinations - direct, indirect.
8. Gases - basic laws of ideal gas, mixture of ideal gases.
9. Calculations from chemical equations with gases.
10. Calculations of pH, solubility products.
11. Correctness and Accuracy of Chemical Measurement of Error Distribution.
12. Utilization of statistics in chemistry.

Recommended or required literature:

1. P. Tomčík: Analytical Chemistry - Basics, KU: Verbum, 2013
2. Volka, K. a kol.: Príklady z analytické chemie pro bakaláře.. Praha : Vysoká škola chemicko-technologická, 2010.
3. Mariničová, R.: Analytická chémia v príkladoch. SPŠ: Humenné, 2005. https://docplayer.gr/33102822-Analyticka-chemia-v-prikladoch.html
4. I. Zelenský: Seminár a cvičenie z analytickej chémie, Bratislava: UK, 2003
5. Potočňák, I.: Chemické výpočty vo všeobecnej a anorganickej chémii. Košice, 2017. https://unibook.upjs.sk/img/cms/2017/pf/chem-vypocty-naweb.pdf
6. Vohlídal, J. a kol.: Chemické a analytické tabulky. Praha: Grada, 1999.

Language of instruction:

Notes:

Course evaluation:

Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.07.2022

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok

Faculty: Faculty of Education

Course code: KCH/Ch-BD100S/22	**Course title:** Chemistry - State exam

Type and range of planned learning activities and teaching methods:
Form of instruction:
Recommended study range:
hours weekly: **hours per semester:**
Teaching method: on-site

Credits: 5	**Working load:** 125 hours

Recommended semester/trimester: 5., 6..

Level of study: I.

Prerequisities:

Requirements for passing the course:

Learning outcomes of the course:

Course contents:

Recommended or required literature:

Language of instruction:

Notes:

Course evaluation:
Assessed students in total: 17

A	B	C	D	E	FX
35.29	23.53	11.76	11.76	17.65	0.0

Name of lecturer(s):

Last modification: 25.02.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD105B/22	**Course title:** Chemistry of Common Life
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 3.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: The evaluation will be based on the results of the final written exam.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - Is able to describe and explain the effects of chemical substances in the home and natural environment on the human body. -Controls the possibilities of protection against the adverse effects of chemical substances on living organisms. - Can reevaluate the attitude to chemical substances in the home and natural environment from the point of view of a healthy life.	
Course contents: Course contents: 1. Living environment and health. Effects and sources of formaldehyde, radon, PVC and other substances. 2. Washing and cleaning agents. Detergents. Composition and effect on the environment. 3. Cosmetic preparations and their effects on the human body. Medicinal, decorative cosmetics. 4. Medicines, their division. Use, contraindications, effect on the body. 5. Plant nutrition and protection. Acute poisoning. 6. Food and health. Toxic substances in food (solanine, acrylamide, acrolein, furan, etc.). Manifestations of acute and chronic poisoning. 7. Additives in food, their effect on the human body. 8. Organic acids used in the domestic environment and their effect on living organisms. 9. Antioxidants, their effect in living organisms, sources. 10. Energy sources – galvanic cells, accumulators, hydrogen cells. 11. Nanomaterials in the environment, their effect on living organisms. 12. Radioisotopes and human health (radioactivity of the environment, human body, therapeutic radioactive substances).	

Recommended or required literature:

1. Bellová R.: Chémia potravín, výživa a zdravie. Ružomberok: Verbum - vydavateľstvo Katolíckej univerzity v Ružomberku, Ružomberok 2011, 159s., ISBN 978-80-8084-796-8.
2. Melicherčík, M., Melicherčíková, D.: Vplyv prostredia a účinky látok na ľudský organizmus. Banská Bystrica: Fakulta prírodných vied UMB, Banská Bystrica 2010, 344 s., ISBN 978-80-577-0005-2.
3. Ozin, Geoffrey A., Arsenault, André C., Cademartiri, L.: Nanochemistry: a chemical approach to nanomaterials, Cambridge, RSC Publishing,2009.

Language of instruction:

anglický

Notes:

Course evaluation:

Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): doc. Ing. Eva Culková, PhD.

Last modification: 06.08.2022

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD109B/22	**Course title:** Chemistry repetitoria
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 5.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: In order to fulfill the conditions for passing the course, the student must complete presentations on the specified topics during the semester, and he can receive a maximum of 30 points during the semester for the mentioned activity and activity in the exercises. A final knowledge check will be conducted in the form of a final test, for which the student can get a maximum of 70 points.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - Has knowledge in the area of basic concepts, chemical laws, principles and mutual connection of phenomena and controls the theoretical foundations of general, inorganic, organic and physical chemistry - is able to present and clearly explain the chosen issue from the basic ones disciplines of chemistry.	
Course contents: 1. Theories of chemical bonding 2. Chemical reactions and chemical equilibrium 3. PSP - structure and properties of chemical elements 4. PSP – preparation and reactivity of chemical elements 5. Organic compounds - properties, overview and classification 6. Derivatives of organic compounds - preparation, reactions 7. Chemical thermodynamics 8. Chemical kinetics 9. Basic methods of chemical analysis 10. Redox balances 11. Chemistry of living systems 12. Basic biochemical processes in living systems	

Recommended or required literature:

1. Kurucz, J. a kol.: Všeobecná a anorganická chémia (Skriptá), KU Ružomberok, 2006, 100s
2. Gažo, J. a kol. Všeobecná a anorganická chémia. 3. vydanie. Bratislava : SNTL, 1981
3. Durdiak, J., Tomčík, P.: Organická chémia pre pedagogické fakulty. Vysokoškolská učebnica, Katolícka univerzita v Ružomberku. VERBUM - vydavateľstvo KU, 2018. - 295 s., ISBN 978-80-561-0556-6
4. Tomčík P.: Analytická chémia-základy, Verbum Ružomberok, 2013
5. Tomčík P.: Fyzikálna chémia (skriptá), VERBUM KU v Ružomberku, 2013

Language of instruction:

English

Notes:

Course evaluation:

Assessed students in total: 3

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): doc. Ing. Eva Culková, PhD., Ing. Jaroslav Durdiak, PhD.

Last modification: 22.07.2022

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD101B/22	**Course title:** English for Chemists
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 1.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: Passing the presentation in English in ppt 20 minutes	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - students know elementary vocabulary in chemical terminology. They understand professional English text and are able to present a brief content in English in their own words language	
Course contents: 1. Basic chemical glass used in chemical laboratory. States of matter and their transformation. 2. The equipment of chemical laboratory. 3. Web of Snience and scientific papers 4. The composition of glass, its properties and glass optical fibers. 5. Environment. Water and air pollution. 6. Atoms and molecules. Basic terms. 7. The structure of atom. The Periodic table of the elements. 8. The definition of acids and bases. Strong and weak acids. Strong and weak bases. 9. The composition of the air, its usage and pollution. 10. Basic terms in inorganic and analytical chemistry. 11. Carbon chemistry. Nomenclature of organic compounds (izomers, alkanes, alkenes, alcohols). 12. Important macromolecules (carbohydrates, lipids, proteins and nucleic acids).	
Recommended or required literature: 1. Velebná, B.: English for Chemists. UPJŠ Košice, 2009, ISBN 978-80-7097-732-3 2. Billíkoví, A.+Ciprianová, E.: English grammar-Exercises and tests, Enigma, 2011 3. Benson, P., Kelly M., Ježková, L.: Say it in English, SPN, Mladé letá, 2012 4. Pišteková, V., Kozlík, M., Štrecová, D.: English for students of the Chemical Technology Faculty SVŠT, SVŠT Bratislava, 1984. Foreign professional and scientific articles	

Language of instruction:
Slovak language

Notes:

Course evaluation:
Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Prof. Ing. Peter Tomčík, PhD.

Last modification: 29.08.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD102B/22	**Course title:** Environmental Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 2.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: The final assessment will be based on a written test of 90 points max. Subject evaluation: A – 100%-94% B – 93%-88% C – 87%-81% D – 80%-75% E – 74%-69% Fx – 68%- 0%	
Learning outcomes of the course: To provide students with information about chemical substances and processes in the hydrosphere, its pollution, cleaning processes and measures for the protection of water and water resources. Students know the basic methods for the analysis and technology of water and its chemical and biological pollution. They have cultivated positive relationship to the environment.	
Course contents: 1. General knowledge about the hydrosphere. 2. Physical and chemical properties of water. Basic knowledge about water. Sensoric properties of water. 3. Chemical composition of waters. Atmospheric, underground and surface water. 4. Water analysis. COD. BOD. The need and quality of water. Water resources and water withdrawal. 5. Waste water. 6. Saprobity and toxicity of water. 7. Eutrophication of waters. Aerobic and anaerobic biological processes in water. 8. Physical, chemical and biological processes of water treatment and wastewater treatment. 9. Health assurance of treated water. 10. Sludge management of WWTPs and water treatment plants. Water systems. 11. Drainage and drainage network. Processes and equipment of WWTPs and water treatment plants.	

12. Activation of wastewater. Technological line and sludge disposal processes. Treatment of wastewater from various industries.

Recommended or required literature:

Language of instruction:

Notes:

Course evaluation:
Assessed students in total: 3

A	B	C	D	E	FX
33.33	0.0	0.0	0.0	0.0	66.67

Name of lecturer(s): doc. Ing. Jaroslav Demko, CSc., doc. RNDr. Miroslav Rievaj, PhD.

Last modification: 22.07.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD100A/22	**Course title:** General Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Seminar **Recommended study range:** **hours weekly:** 2 / 2 **hours per semester:** 26 / 26 **Teaching method:** on-site	
Credits: 4	**Working load:** 100 hours
Recommended semester/trimester: 1.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: During the semester, the student proves his theoretical knowledge of basic chemical laws and concepts in the form of two written tests. To participate in the exam, it is necessary to get at least 50% in both tests. The final evaluation will be based on the total number of points obtained from the tests and the final oral exam.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - He has expert knowledge in the field of basic concepts, chemical laws, principles and the mutual connection of phenomena, in the theoretical foundations of general chemistry and basic chemical calculations. - The graduate can propose solutions to methodological, professional and practical problems in chemistry.	
Course contents: Course contents: 1. Subject and object of chemistry research. Basic concepts, quantities and laws of chemistry. 2. Construction and structure of the atom. 3. Periodic law and periodic table of elements. 4. Chemical bond. Ionic, covalent, metallic bond. Weak binding interactions. 5. Chemical structure and properties of substances. Chemical states and chemical changes of substances. 6. Solutions and solubility of substances. Formation and properties of salt. Electrolytes. Theory of acids and bases. 7. Chemical reactions. Reaction kinetics. Fast, slow and catalyzed chemical reactions. 8. Thermochemistry and chemical thermodynamics. Exothermic and endothermic reactions. 9. Equilibrium of a chemical reaction. Unidirectional and reversible chemical reactions. 10. Classification of chemical reactions. Protolytic reactions. Dissociation of acids and bases, autoprotolysis of water, neutralization, hydrolysis of salt. 11. Redox reactions. Electrode potentials. Corrosion of metals, electrolysis, galvanic plating, galvanic cells and accumulators.	

12. Precipitation and complexation reactions.

Recommended or required literature:
Ebbing, Darrell D.: General chemistry. Boston, Houghton Mifflin, 1987

Language of instruction:
anglický

Notes:

Course evaluation:
Assessed students in total: 8

A	B	C	D	E	FX
12.5	37.5	0.0	37.5	0.0	12.5

Name of lecturer(s): doc. Ing. Eva Culková, PhD.

Last modification: 06.08.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD100C/22	**Course title:** General Chemistry Seminar
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 1 **hours per semester:** 13 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 1.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: The seminar will end with a written examination, for which 20 points can be obtained.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: -The student has extensive knowledge in the field of chemical reactions in terms of stoichiometry, kinetics, thermochemistry. -He will acquire practical skills in calculating chemical equations. -Learns calculations according to chemical equations related to solutions, gases, as well as pH calculations.	
Course contents: Course contents: 1. Chemical reactions of everyday life. 2. Enumeration of chemical reactions. 3. Stoichiometry of chemical reactions. 4. Practical use of neutralization reactions. 5. Stoichiometry of redox reactions. 6. Practical use of redox reactions. 7. Chemical reactions with gases. 8. Basic laws of gases. 9. pH of aqueous solutions of strong acids and bases. 10. pH of aqueous solutions of weak acids and bases 11. Solubility constants. 12. Practical use of thermo-reactions.	
Recommended or required literature: Ebbing, Darrell D.: General chemistry. Boston, Houghton Mifflin, 1987	
Language of instruction: anglický	
Notes:	

Course evaluation:
Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): doc. Ing. Eva Culková, PhD.

Last modification: 06.08.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD106A/22	**Course title:** ICT in Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 3.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: During the semester, the students' activity, the quality of the preparation of sub-tasks and compliance with the deadlines for handing in the processed tasks and the evaluation of the final project will be evaluated. The final evaluation will be based on the total number of points obtained.	
Learning outcomes of the course: Objective of the subject: The aim of the subject is to provide the student with basic theoretical knowledge and practical skills with the possibility of using the computer as a didactic aid and technological tool in teaching chemistry in primary and secondary schools, and acquires the necessary skills in handling available chemical programs and working with the Internet. He will use the acquired skills in the processing of tasks and practical exercises in other chemical disciplines. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - Can work on a computer, with creative use of commercial chemical software, is able to work with chemical multimedia educational programs and computer applications for creating chemical structures. - Uses standard computer programs, some applications and chemical programs used within ICT in chemistry. Verification of the level of acquired knowledge, skills and competences: Verification of the degree of acquisition of the relevant knowledge, skills and competencies of the student is carried out on the basis of the ongoing evaluation of partial tasks and the final project.	
Course contents: 1. Technical prerequisites for using ICT in teaching 2. Pedagogical preconditions for the use of ICT in teaching (ICT competence) 3. Educational software - typology and evaluation 4. Analysis and evaluation of teaching programs for teaching chemistry 5. Possibilities of using ICT in individual organizational forms and methods of teaching chemistry I (teacher, pupil)	

6. Possibilities of using ICT in laboratory tasks
7. Possibilities of using ICT in home preparation
8. Computer Applications I. (Multimedia Learning Programs)
9. Computer applications II. (formation of chemical formulas and structures)
10. Computer Applications III. (formation of chemical formulas, structures and laboratory schemes)
11. ICT testing
12. Computer applications IV. (creation of didactic tests)

Recommended or required literature:

1. Gazdíková, V.: Basics of distance electronic education, study texts, Faculty of Education, Trnava University, Trnava 2003, ISBN 80-89074-67-7
2. Gazdíková, V.: Creation of electronic educational materials., Trnava, University of Trnava, 2011.
3. Stašek, J.: Information and communication technologies in the Internet environment. Ružomberok: PF K, 2004.
4. Bellová, R.: Chapters from the general didactic of chemistry, Ružomberok 2010.
Chemistry teaching software available

Language of instruction:
slovak

Notes:

Course evaluation:
Assessed students in total: 3

A	B	C	D	E	FX
33.33	33.33	0.0	0.0	0.0	33.33

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.07.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD103A/22	**Course title:** Inorganic Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Laboratory practical **Recommended study range:** **hours weekly:** 2 / 3 **hours per semester:** 26 / 39 **Teaching method:** on-site	
Credits: 6	**Working load:** 150 hours
Recommended semester/trimester: 2.	
Level of study: I.	
Prerequisities: KCH/Ch-BD100A/22	
Requirements for passing the course: During the semester, the student demonstrates his theoretical knowledge of the physical and chemical properties of chemical elements and compounds of the main PSP groups in the form of two written tests. It also demonstrates practical skills in the chemical laboratory. To participate in the exam, it is necessary to obtain at least 50% from both tests, 90% participation in practical laboratory exercises with the submission of the necessary outputs. The final evaluation will be based on the total number of points obtained from the tests and the oral exam.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - Knows the theoretical basics of inorganic, organic, analytical, physical, environmental, nuclear and biochemistry - Has knowledge of the theoretical aspects of basic laboratory operations, operations and knows the principles of laboratory methods of synthesis and chemical analysis, methodological procedures of qualitative and quantitative analysis. - He is able to work in a chemical laboratory using modern laboratory equipment, he knows how to carry out specific laboratory operations. - Can organize, implement and evaluate individual work procedures within the framework basic areas of chemistry. - It is characterized by the ability to search for new professional information, independence in its processing, critical evaluation and presentation, solve and analyze problems independently, adopt and defend one's own opinion. - He is a professional worker in a chemical laboratory.	
Course contents: Course contents: - Subject of inorganic chemistry. General characteristics of the elements of the main groups of the periodic table of elements. - Physical and chemical properties of individual elements of the main subgroups of PSP, their occurrence, laboratory and industrial production, use and their most important compounds.	

- Characteristics of hydrogen. Alkali metals, alkaline earth metals, boron, subgroup of aluminum, carbon, silicon, nitrogen, phosphorus, subgroup of arsenic, chalcogens, halogens, noble gases.
- General characteristics of transitional elements. A subgroup of scandium. A subgroup of titanium. A subgroup of vanadium. A subgroup of chromium. A subgroup of manganese. A subgroup of iron. A subgroup of cobalt. A subgroup of nickel. A subgroup of copper. A subgroup of zinc. Lanthanoids. Actinoids.
Laboratory exercises:
- Selected laboratory techniques.
- Inorganic syntheses with chemical reactions – acid-base, elimination, oxidation-reduction and complexometric reactions.
- Test tube experiments – evidence of the properties of inorganic substances.

Recommended or required literature:
Housecroft, Catherine E., Sharpe, Alan G.: Inorganic Chemistry, Harlow, Pearson Pentice Hall, 2008.

Language of instruction:
anglický

Notes:

Course evaluation:
Assessed students in total: 4

A	B	C	D	E	FX
0.0	25.0	25.0	0.0	0.0	50.0

Name of lecturer(s): doc. Ing. Eva Culková, PhD.

Last modification: 06.08.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD101A/22	**Course title:** Laboratory Technology
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 1.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: In order to fulfill the condition of passing the course, the student must pass 6 short written examinations of theoretical knowledge in the form of tests during the semester. A maximum of 10 points can be obtained for each. Another condition is the completion of at least 90% of the laboratory exercises and the submission of protocols from them. The final evaluation will be based on the total number of points obtained from the written examinations and the continuous evaluation of the activity in the individual laboratory exercises.	
Learning outcomes of the course: The student has knowledge of the principles of work safety in a chemical laboratory, knows basic laboratory tools and materials, - Has knowledge of the theoretical aspects of basic laboratory procedures and operations and knows the principles of laboratory methods of synthesis and chemical analysis, - Handles practical work in a chemical laboratory using modern laboratory equipment techniques, can implement specific laboratory operations	
Course contents: 1. Introduction and organization of exercise. Principles of safety at work with chemical substances. 2. Chemical laboratory equipment and fire protection Materials used in the laboratory and basic laboratory tools. 3. Nature of chemical substances used in chemical laboratory. Working with gases. 4. Measurement of weight, volume and density. Calibration of measuring containers. 5. Solubility, effect of temperature on solubility, dissolution, preparation of solutions, saturated solution solubility curve. 6. Preparation of insoluble matter, precipitation, decantation, filtration, drying. 7. Working with glass, measuring temperature, heating, cooling, phase conversion, determination of melting point, boiling point. 8. Principles of construction of laboratory apparatuses. 9. Crystallization, sublimation 10. Distillation, fractional distillation and boiling point. 11. Determination of acid-base equivalence point, acid-base indicators, solution preparation and pipetting.	

12. Determination of water in crystalline hydrates, heating and annealing.

Recommended or required literature:

1. Durdiak, J. a kol.: Laboratórna technika 1, Ružomberok: Verbum - vydavateľstvo Katolíckej univerzity v Ružomberku, 2005.
2. Bellová, R. a kol.: Laboratórne cvičenia zo všeobecnej a anorganickej chémie, Ružomberok: Verbum - vydavateľstvo Katolíckej univerzity v Ružomberku, Ružomberok 2005.
3. Kurucz, J. Bellová, R.: Laboratórne cvičenia z fyzikálnej chémie, Ružomberok: Verbum - vydavateľstvo Katolíckej univerzity v Ružomberku, Ružomberok 2006.

Language of instruction:
English

Notes:

Course evaluation:
Assessed students in total: 8

A	B	C	D	E	FX
25.0	12.5	0.0	25.0	12.5	25.0

Name of lecturer(s): Ing. Jaroslav Durdiak, PhD., doc. Ing. Eva Culková, PhD.

Last modification: 22.07.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok

Faculty: Faculty of Education

Course code: KCH/Ch-BD102A/22	**Course title:** Mathematics

Type and range of planned learning activities and teaching methods:
Form of instruction: Lecture / Seminar
Recommended study range:
hours weekly: 1 / 1 **hours per semester:** 13 / 13
Teaching method: on-site

Credits: 2	**Working load:** 50 hours

Recommended semester/trimester: 1.

Level of study: I.

Prerequisities:

Requirements for passing the course:

Learning outcomes of the course:

Course contents:

Recommended or required literature:

Language of instruction:

Notes:

Course evaluation:
Assessed students in total: 7

A	B	C	D	E	FX
42.86	0.0	0.0	0.0	42.86	14.29

Name of lecturer(s): Mgr. Peter Mlynárčik, PhD.

Last modification: 13.11.2023

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD108B/22	**Course title:** Nuclear Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 5.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: At the final oral exam, the student can get max. 60 points. In the case of an external form of study, there will be a written examination (max. 40 points) before the oral examination. The final evaluation will be based on the total number of points obtained from the background checks and the oral exam.	
Learning outcomes of the course: Objective of the subject: To provide students with basic knowledge about physico-chemical and chemical events in the nucleus of an atom. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: -Students are able to define individual elementary particles of an atom, characterize types of radioactive transformations, nuclear reactions and their types, -They have knowledge of the chemical and physical effects of nuclear radiation, ionizing radiation and the interaction with the material environment. -They can master procedures for calculating simple examples of nuclear decays. Verification of the level of acquired knowledge, skills and competences: At the final oral exam, the student can get max. 60 points.	
Course contents: 1. Subatomic structure of matter, elementary particles, 2. Radioactivity and kinetics of radioactive transformations, 3. General laws of transformation of atomic nuclei, types of radioactive transformations, 4. Nuclear reactions and their characteristics, types of nuclear reactions, 5. Fission and fusion of atomic nuclei, 6. Radionuclides and their preparation options, production of artificial radionuclides, 7. Chemical and physical effects of radioactive radiation, 8. Radiochemical processes, 9. Theory of ionizing radiation, directly and indirectly ionizing radiation,	

10. Interaction of radiation after passing through matter, absorption of radiation in substances,
11. Radioactive radiation and health,
12. Sample examples from nuclear chemistry.

Recommended or required literature:

1.Kurucz, J.: Nuclear chemistry. Belianum Publishing House, Matej Bel University, Banská Bystrica, 2013
2. J. Tölgyessy et al.: Nuclear chemistry, FPV, B. Bystrica, 20012. Navrátil, O. et al: Nuclear chemistry, Academia, Prague, 1985. 301 p.
3. Choppin, G., Liljenzin, N, J.O., Rydberg, J.: Radiochemistry and NuclearChemistry, 3rd Ed., , 2001, Butterwort-Heinemann, Tallahassee, Gothenburg, 673 p.
4. Morovská Turoňová, A.: Nuclear Chemistry, UPJŠ Košice, 20115. J. Kurucz: Nuclear Chemistry, PF KU Ružomberok, 2007
5. Kurucz, J., Suško, M.: Nuclear physics (Selected chapters), PF KU Ružomberok, 2011

Language of instruction:

Kurucz, J.: Nuclear chemistry. Belianum Publishing House, Matej Bel University, Banská Bystrica, 2013
2. J. Tölgyessy et al.: Nuclear chemistry, FPV, B. Bystrica, 20012. Navrátil, O. et al: Nuclear chemistry, Academia, Prague, 1985. 301 p.
3. Choppin, G., Liljenzin, N, J. O., Rydberg, J.: Radiochemistry and NuclearChemistry, 3rd Ed., , 2001, Butterwort-Heinemann, Tallahassee, Gothenburg, 673 p.
4. Morovská Turoňová, A.: Nuclear chemistry , UPJŠ Košice, 20115. J. Kurucz: Nuclear chemistry, PF KU Ružomberok, 2007
5. Kurucz, J., Suško, M.: Nuclear physics (Selected chapters), PF KU Ružomberok, 2011

Notes:

Course evaluation:

Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.07.2022

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD105A/22	**Course title:** Organic Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Laboratory practical **Recommended study range:** **hours weekly:** 2 / 4 **hours per semester:** 26 / 52 **Teaching method:** on-site	
Credits: 6	**Working load:** 150 hours
Recommended semester/trimester: 3.	
Level of study: I.	
Prerequisities: KCH/Ch-BD100A/22	
Requirements for passing the course: In order to fulfill the condition of passing the course, the student must take an oral exam. The condition for its completion is to participate in at least 90% of the laboratory exercises during the semester and to prepare protocols on their progress and results. Final evaluation: The student can get a maximum of 80 points in the oral exam.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - Knows the theoretical basics of organic chemistry, -He has knowledge in the nomenclature of organic compounds, knows their structure, knows how to judge their tendency to chemical reactions and to characterize some mechanisms of selected ones reactions of organic substances - Has knowledge of the theoretical aspects of basic laboratory procedures and operations and knows the principles of laboratory methods of synthesis of selected organic substances. - He is able to work in a chemical laboratory with the use of modern laboratory technology, he knows to implement specific laboratory operations - Can work on a computer, with creative use of commercial chemical software, is able to work with computer applications for the creation of chemical structures (BIOVIA), which applies when processing protocols from laboratory exercises. - It is characterized by the ability to search for new professional information and its independence processing.	
Course contents: 1. Sources, properties and structure of organic compounds. Construction and bonds in organic molecules. Reactions of organic compounds. Substituent s Effects. Classification and nomenclature of organic compounds. 2. Alkanes and cycloalkanes. 3. Alkenes and dienes, alkynes. 4. Aromatic hydrocarbons. Halogenated derivatives 5. Nitrogen derivatives - nitro compounds and amines.	

6. Sulfur derivatives.
7. Oxygen derivatives - alcohols, phenols, ethers,
8. Aldehydes, ketones, quinones, carboxylic acids.
9. Functional derivatives of carboxylic acids
10. Substitution. carboxylic acid derivatives
11. Derivatives of carbonic acid.
12. Natural substances. Carbohydrates. Lipids.
13. Protein. Nucleic acids. alkaloids
Laboratory exercises:
Identification of Organic Compounds. Nucleophilic and electrophilic substitution reactions. Electrophilic and nucleophilic addition reactions. Oxidation and reduction of organic compounds.

Recommended or required literature:

1. Durdiak, J., Tomčík, P.: Organická chémia pre pedagogické fakulty. Vysokoškolská učebnica, Katolícka univerzita v Ružomberku. VERBUM - vydavateľstvo KU, 2018. - 295 s., ISBN 978-80-
561-0556-6
2. P. Hrnčiar: Organická chémia. SPN Bratislava, 1990
3. Pacák, J.: Jak porozumět organické chemii. Praha, Karolinum 2007, ISBN9788024613543
4. Vavra, M., Čurda, M.: Chemické názvoslovie : anorganické a organické zlúčeniny a biochemická terminológia. Prešov: Rokus , 2016
5. Grgáň, F., Melicherčík, M., Vaculčíková, D.: Laboratórne cvičenia z organickej chémie. UMB Banská Bystrica, 2010
6. Zahradník R. a kol. Organická chémia, vydavateľstvo UK, 2015

Language of instruction:
Slovak language

Notes:
The detailed scope of the material for the exam, materials and materials for studying the subject are published in the electronic education system - moodle.

Course evaluation:
Assessed students in total: 2

A	B	C	D	E	FX
0.0	0.0	50.0	0.0	0.0	50.0

Name of lecturer(s): Ing. Jaroslav Durdiak, PhD., Prof. Ing. Peter Tomčík, PhD., doc. Ing. Eva Culková, PhD.

Last modification: 29.08.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD102C/22	**Course title:** Organic Chemistry Seminar
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 1 **hours per semester:** 13 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 3.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: In order to fulfill the condition of passing the subject, the student must present a specific set issue from organic chemistry, which can earn a maximum of 20 points. Based on the activity at the seminars, he can get a maximum of 20 additional points. By processing the semester work, the student can get max. 60 points. In total, when completing the subject, students can receive max. 100 points..	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - controls the creation of the nomenclature of organic compounds -based on the structure of organic substances, he is able to characterize their fundamentals properties and treat available to individual reactions. - has the ability to search for new professional information, process and evaluate it independently and then present.	
Course contents: Course contents: 1. Chemical bonds, characteristics, length, energy, polarity, directionality, molecular orbitals. 2. Organic acids and bases, nucleophilicity, electrophilicity, electron effects – inductive, mesomeric, conjugative, steric. 3. IR and NMR spectra of organic compounds. Isomerism of organic compounds. 4. Nomenclature of organic compounds. 5. Structure and properties of alkanes, cycloalkanes (SR and AdR reactions of alkanes and cycloalkanes, cracking, stereochemistry of alkanes and cycloalkanes, conformations). 6. Structure, properties and reactions of alkenes, dienes and alkynes. Vinyl-type polymers in practice. 7. Structure and properties of aromatic compounds, Hückel's rule, aromatic character, delocalization energy, rules of substitution in SE reactions. Polycyclic aromatics. 8. Structure and properties of halogen derivatives and hydroxy derivatives (SN1, SN2, E1, E2, reactions with metals, structure and reactions of organometallic compounds). 9. Aromatic amines: preparation methods, diazotization, reactions of diazonium salts.	

10. Structure and reactions of carbonyl compounds, AdN reactions, oxidations, reductions, haloform
reaction.
11. Optical isomerism of carbohydrates. Amino sugars. The structure of fats from the point of view of healthy nutrition.
12. Optical isomerism of α-amino acids. The importance of hydrogen bonds in biopolymers

Recommended or required literature:

1. Durdiak, J., Tomčík, P.: Organická chémia pre pedagogické fakulty. Vysokoškolská učebnica, Katolícka univerzita v Ružomberku. VERBUM - vydavateľstvo KU, 2018. - 295 s., ISBN 978-80-561-0556-6
2. P. Hrnčiar: Organická chémia. SPN Bratislava, 1990
3. Pacák, J.: Jak porozumět organické chemii. Praha, Karolinum 2007,

Language of instruction:
English

Notes:

Course evaluation:
Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Jaroslav Durdiak, PhD.

Last modification: 22.07.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD107A/22	**Course title:** Physical Chemistry
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Seminar / Laboratory practical **Recommended study range:** **hours weekly:** 2 / 1 / 3 **hours per semester:** 26 / 13 / 39 **Teaching method:** on-site	
Credits: 6	**Working load:** 150 hours
Recommended semester/trimester: 4.	
Level of study: I.	
Prerequisities: KCH/Ch-BD104A/22	
Requirements for passing the course: During the semester, there will be written examinations on exercises from each topic, for each of which it is possible to obtain a maximum of 5 points. At the final oral exam, the student can get max. 60 points.	
Learning outcomes of the course: The aim is to provide students with a theoretical basis for understanding chemical phenomena and processes as well as to develop the student's logical and abstract thinking. Students are able to theoretically describe chemical phenomena and deduce relevant conclusions based on this knowledge. The aim of the laboratory exercise is to teach students to implement the basic methodologies of physical-chemical measurements, and to practically apply the acquired theoretical knowledge and perform the necessary physico-chemical calculations.	
Course contents: 1. Ideal gas. Equation of state of an ideal gas. 2. Van der Waals equation of state of real gas. Critical state of gas. Theorem of corresponding states of real gases. 3. Chemical thermodynamics. I. law of thermodynamics. Enthalpy. Heat capacity. 4. Adiabatic process. Thermochemistry, Kirchhoff's equations. 5. Second law of thermodynamics, Entropy. 6. Gibbs and Helmholtz function. Clausius and Clapeyron's equation 7. Gibbs phase law. Fugacity and activity. Raoult and Henry's law 8. Chemical equilibria. Van't Hoff's isobara. The third law of thermodynamics 9. Chemical kinetics. Rate of chemical reaction. Gulberg-Waage law. Molecularity and order of reaction. Kinetic equations of first, second and third order reactions. Methods for determining the order of reaction. 10. Kinetics of reversible, simultaneous (parallel and sequential). Dependence of rate constant on temperature, Arhenian equation, kinetic theories. Catalytic and autocatalytic reactions. Michaelis-Menten kinetics. 11. Electrochemistry. Electrolysis and Faraday's laws. Galvanic cells. Electromotive voltage. Electrode and standard potential. Nernst's equation.	

12. Types of electrodes. Concentration articles. Diffusion potential. Glass electrode. Nikoľského equation. Batteries. Electrode processes.
Laboratory exercise: Determination of molar mass. Determination of melting point, solidification temperature, boiling point. Determination of density of liquids by densitometers, pycnometrics, Mohr scales. Determination of viscosity of liquids. Refractometry. Spectrophotometry. Potentiometry. Conductometry

Recommended or required literature:
1. Atkins P.W.: Physical Chemistry, Oxford university press 2017
2. Moore W.J.: Physical chemistry, Pearson College Div; 4th edition (June 1, 1972)

Language of instruction:

Notes:

Course evaluation:
Assessed students in total: 3

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	100.0	0.0

Name of lecturer(s): Prof. Ing. Peter Tomčík, PhD., Ing. Renata Bellová, PhD.

Last modification: 28.11.2023

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD103C/22	**Course title:** Physical Chemistry Seminar
Type and range of planned learning activities and teaching methods: **Form of instruction:** Seminar **Recommended study range:** **hours weekly:** 1 **hours per semester:** 13 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 4.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: During the semester, the student demonstrates his knowledge and skills in various practical activities that will be carried out in groups. The seminar will end with a written examination. Final assessment: cumulative percentage gain from practical activities and final written examination.	
Learning outcomes of the course: Objective of the subject: The aim of the subject is to provide the student with expanding knowledge of physical chemistry in the topics of ideal and real gas, in the topics of reaction kinetics and electrochemistry. Learning outcomes: After completing the subject, the student will acquire the following knowledge, skills and competences: - Is able to apply basic knowledge of physical chemistry in practical tasks. - Can synergistically use knowledge from physical chemistry, analytical chemistry, chemical calculations 1, 2 when solving problem tasks. Verification of the level of acquired knowledge, skills and competences: Verification of the degree of acquisition of relevant knowledge, skills and competencies of the student is carried out on the basis of the evaluation of practical semester activities and a final written examination.	
Course contents: Course contents: 1. Properties of ideal and real gases. 2. Calculations from chemical equations with gases using the equation of state of an ideal gas. 3. Calculations with real gases. 4. Calculations in chemical kinetics - speed of a chemical reaction. 5. The first thermodynamic theorem. 6. The second theorem of thermodynamics. 7. Molecularity of the reaction. 8. Reaction order. 9. Basic calculations in electrochemistry. 10. Electrochemistry - electrolyte solutions.	

11. Basics of potentiometry.

Recommended or required literature:

Language of instruction:

1. Tomčík P.: Physical chemistry (scripts), Ružomberok: Verbum, 2011.
2. Kellö, V., Tkáč, A.: Physical chemistry. Alfa Bratislava, 1977.
3. Oremusová, M., Greksáková, O.: Fyzikálna chémia, Bratislava: UK, 2010
4. Kurucz J., Bellová R., Kustrová, M.: Laboratory exercises in physical chemistry (Scripts), KU Ružomberok, 2006.
5. Kubíček, V.: Calculations from physical chemistry I. Prague: Karolinum, 2010.
6. Reguli, J.: Physical chemistry: for undergraduate studies. Trnava: Typi Universitatis Tyrnaviens, 2017.

Notes:

Course evaluation:

Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Renata Bellová, PhD.

Last modification: 28.07.2022

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD104A/22	**Course title:** Physics
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Seminar **Recommended study range:** **hours weekly:** 1 / 1 **hours per semester:** 13 / 13 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 2.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: written exam	
Learning outcomes of the course: To provide students with the basic knowledge of physics necessary for applications in the field of chemistry. Students are able to describe, explain and define basic concepts and laws in the field of mechanics, thermodynamics, electricity, magnetism, optics and quantum mechanics and practically apply physical laws with the help of suitable simple mathematical procedures.	
Course contents: Course contents: 1. Mechanics: Kinematics. Newton's dynamic laws. Laws of conservation of momentum and mechanical energy. 2. Basics of thermodynamics and statistical physics. 3. Electricity, magnetism and optics: Lorentz force. Maxwell's equations. Electrostatics. Magnetostatics. Electromagnetic induction. 4. Law of conservation of electric and magnetic field energy. 5. Reflection and refraction of light. Lens view. Interference and bending of light. 6. Polarization. Laser and holography. 7. Fundamentals of quantum mechanics: 8. Schrödinger's equation. Potential pit. 9. Linear harmonic oscillator. Rotating molecule. 10. Hydrogen atom. 11. Periodic table of elements. Perturbation theory (Chemical bonds). 12. Systematics of elementary particles. Nuclear reactor.	
Recommended or required literature: 1. Feynmanove prednášky z fyziky 1, ALFA Bratislava, 1980 2. Krempaský J.: Fyzika, ALFA-SNTL Bratislava, 1987 3. Slabeycius J., Rosina Š.: TZMI 3. – Kvantová optika, SUZI Žilina, 2003	
Language of instruction: Slovak language	

Notes:

Course evaluation:
Assessed students in total: 1

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Prof. Ing. Peter Tomčík, PhD.

Last modification: 29.08.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD107B/22	**Course title:** Polymers chemistry basic
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture **Recommended study range:** **hours weekly:** 2 **hours per semester:** 26 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 4.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: To fulfill the condition of passing the subject, the student must take the final exam. The final exam will be in the form of a written examination, for which a maximum of 60 points can be obtained.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - they know the basic terms, classification, physical and chemical structure of polymers and their properties. - is able to clarify the individual mechanisms of synthesis of macromolecular substances and to define them as well prospective directions of their use.	
Course contents: 1. Basic concepts of macromolecular chemistry. History of polymers and the present. Hydrocarbons as the basis of macromolecular substances. 2. Characteristics and classification of macromolecular substances. Polymer composite materials. 3. Primary, secondary and tertiary structure of polymers. 4. Phase state and properties of polymers. 5. Natural macromolecular substances. 6. Production of polymers by polymerization. Characterization and use of the most important macromolecular substances produced by polymerization. Thermal preconditions of polymerization. Radical polymerization. 7. Cationic and anionic polymerization. 8. Polymerization with metallocenes and coordination polymerization. 9. Polymerization by polycondensation and characteristics of the most important macromolecular substances produced by polycondensation. 10. Polyaddition polymerization. 11. Basic technological methods of preparing polymers. Polymers and the environment. Recycling of polymers 12. New prospective directions for the use of polymers.	

Recommended or required literature:

1. Durdiak, J., Vojtko, J.: Základy makromolekulovej chémie. (Skriptá) Ružomberok: Katolícka univerzita, 2013, 100 strán, ISBN 978-80-561-0029-5
2. Durdiak, J., Tomčík, P.: Organická chémia pre pedagogické fakulty. Vysokoškolská učebnica, Katolícka univerzita v Ružomberku. VERBUM - vydavateľstvo KU, 2018. - 295 s., ISBN 978-80-561-0556-6

Language of instruction:

Notes:

Course evaluation:

Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Jaroslav Durdiak, PhD.

Last modification: 22.07.2022

Supervisor(s):

Person responsible for the delivery, development and quality of the study programme:

Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD108A/22	**Course title:** Theory of Chemical Bond
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Seminar **Recommended study range:** **hours weekly:** 2 / 1 **hours per semester:** 26 / 13 **Teaching method:** on-site	
Credits: 3	**Working load:** 75 hours
Recommended semester/trimester: 4.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: Written progress tests, final test	
Learning outcomes of the course: Students will be able to understand the relationships between chemical bonding, structure, properties and reactivity of inorganic compounds. They are able to elucidate the electron configuration and then discuss its relationship to the chemical bonds of inorganic compounds, to explain current theories of chemical bonds, to characterize and determine the different types of bonds.	
Course contents: 1. Development of the concept of chemical bond, quantum-mechanical theory of chemical bonding. 2. Formation of covalent bond by overlapping atomic orbitals, properties. 3. Sigma and pi binding. 4. Lewis theory, coordination covalent bond. 5. Characterization of covalent bond in hydrogen molecule. 6. Polar binding, electronegativity. 7. The theory of VSEPR. 8. Fundamentals of molecular orbitals theory, formation of molecular orbitals, types of MO. 9. Theory of hybridization. 10. Binding in ionic compounds, character of bond in ionic compounds, properties of ionic compounds. 11. Intermolecular attractive forces, van der Waals forces, hydrogen bonds. 12. Binding in metals, character of bond in metals, prerequisites for electric current.	
Recommended or required literature: 1. Kurucz, J.: Teória chemickej väzby. Ružomberok : Verbum, 2013. 2. Medveď, M., Skořepa, M., Buzák, Š.: Teória chemickej väzby. Banská Bystrica : FPV UMB, 2013 3. Mička, Z., Lukeš, I.: Teoretické základy anorganické chémie. Praha : KU, 2016	
Language of instruction:	
Notes:	

Course evaluation:
Assessed students in total: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Name of lecturer(s): Ing. Renata Bellová, PhD., doc. RNDr. Miroslav Rievaj, PhD.

Last modification: 28.11.2023

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.

COURSE INFORMATION SHEET

University: Catholic University in Ružomberok	
Faculty: Faculty of Education	
Course code: KCH/Ch-BD104B/22	**Course title:** Toxicology
Type and range of planned learning activities and teaching methods: **Form of instruction:** Lecture / Seminar **Recommended study range:** **hours weekly:** 1 / 1 **hours per semester:** 13 / 13 **Teaching method:** on-site	
Credits: 2	**Working load:** 50 hours
Recommended semester/trimester: 3.	
Level of study: I.	
Prerequisities:	
Requirements for passing the course: Each student must present a given topic from toxicology twice during the semester. A maximum of 20 points can be obtained for the presented content and the quality of the processed presentations. At the final oral exam, the student can get max. 60 points. The final evaluation will be based on the total number of points obtained from the evaluation of the presentations at the seminars and from the oral exam.	
Learning outcomes of the course: After completing the subject, the student will acquire the following knowledge, skills and competences: - The student knows the history of development, goal, content, classification and basic concepts of toxicology - He has knowledge of the effects of substances and their relationship to dose and other factors. He has knowledge on the mechanism and effects of selected groups of chemical substances on the human body organism. - He has the ability to search for expert information on toxicology, process it independently, evaluate and present. He will also acquire skills and habits in presenting individual topics from the field of toxicology, which are assigned to be processed by students for individual seminars.	
Course contents: 1. Introduction to the subject and historical development of toxicology. 2. Objectives, content and classification of toxicology. The main areas of toxicology and their relationship to others medical sciences. 3. Poison, harmful substance, basic terms. Scale of toxicity of chemical substances. Classification of poisons. 4. Classification of poisons and harmful substances. Interactions of CHL with a living organism. 5. Effect of poisons and types of effect. direct toxic effect, biochemical effect. Enzyme inhibition. 6. Immunotoxicity, teratogenicity, mutagenicity and carcinogenicity. 7. Dependence of the effect of substances on various factors. 8. Fate of chemical substances in the organism. 9. Toxicology of selected inorganic chemical substances. 10. Toxicology of important organic compounds, narcotic and psychotropic substances.	

11. Additives and dangerous substances in food.
12. Toxicology of chemical substances potentially abusable for the purposes of chemical terrorism (industrial chemicals and combat poisons)

Recommended or required literature:

Language of instruction:

Notes:

Course evaluation:
Assessed students in total: 2

A	B	C	D	E	FX
50.0	50.0	0.0	0.0	0.0	0.0

Name of lecturer(s): doc. RNDr. Miroslav Rievaj, PhD.

Last modification: 22.07.2022

Supervisor(s):
Person responsible for the delivery, development and quality of the study programme:
Prof. Ing. Peter Tomčík, PhD.