CONTENS

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ BS-CH/22	**Name:** Bachelor's Thesis Seminar
Types, range and methods of educational activities: **Form of study:** Seminar **Recommended extent of course (in hours):** **Per week:** 1 **For the study period:** 13 **Methods of study:** present	
Number of credits: 4	
Recommended semester/trimester of study: 5.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: Submission of a selected bibliography related to the topic of the Bachelor thesis and drafting of a part of the Bachelor thesis (10-12 pages). Attendance at the seminar is compulsory. The student prepares part of the Bachelor thesis and submits the bibliography. The student must hand in a ready part of the thesis to the tutor by the deadline. If the student does not hand in the ready part of the thesis within 7 days after the deadline, he/she will not receive the credits for the course. The length of the ready part of the thesis to be handed in is determined by the tutor, the formal requirements are specified in the Rector's Directive 2/2021. The work must comply with the technical rules and ethics of citation. Criteria for the evaluation of the work: – the student's analytical-synthetic thought process, – expression of personal opinion supported by theoretical knowledge, – the definition of the problem and the aim of the work, the way in which it has been developed, – the structure of the work - logical structure and proportional length of each part, – work with literature and sources of information (how they are selected and used), – compliance with the basic formal requirements of the essay, compliance with citation requirements, – aesthetic and linguistic quality of the essay. Percentages for each task: Work done in seminars: 20 %. Seminar paper: 80 %. The student must complete at least 50 % of all assignments.	
Results of education: Knowledge: The student is able to: - list and explain the general requirements for the preparation of the Bachelor thesis, describe and characterize the content structure of the Bachelor thesis and its parts (introduction, main body, appendices),	

- explain the concepts of phenomenon and fact, list and describe ways of investigating educational phenomena,
- describe in more detail the main methods of collecting and processing the data presented in the Bachelor thesis,
- identify the basic requirements for the author of a thesis, describe and characterise the model, characteristics and formal structure of a thesis,
- list and explain the formal requirements for the Bachelor thesis,
- define the concept of an abstract, describe its structure, describe the characteristics of a quality abstract, list the most common mistakes in abstract preparation, distinguish between an abstract and an annotation, an extract, a summary and an overview,
- explain the concepts of citation, quotation, paraphrasing, compilation, plagiarism, distinguish between quotating and paraphrasing, and illustrate different citation and referencing techniques with examples,
- define and interpret in his (her) own words the basic concepts and motifs of the chosen subject area,
- be familair with the basic terms used in the thesis,
- explain thebasic terms used in an essay,
- construct (elaborate) the theoretical plane of the thesis, including all its important aspects,
- analyse and justify the conclusions of the thesis,
- critically analyse, re-evaluate and use in theory the knowledge gained.

Skills:

The student is able to:
- write a draft of his (her) own Bachelor thesis,
- explain the methodological rules for writing a Bachelor thesis,
- define the main question and the aim of the thesis, formulate hypotheses where appropriate,
- plan a timetable for the preparation of the Bachelor thesis, including its table of contents,
- work with literature (primary and secondary sources), search for information in library information databases,
- prepare the text of the Bachelor thesis, based on the knowledge acquired, by formulating ideas in a logical and precise way, producing a quality abstract, writing an introduction and conclusion, taking into account the criteria given,
- present the knowledge acquired in the field, recognising its complexity and drawing conclusions,
- apply knowledge of the ethics and techniques of citation and drafting,
- use correctly the various methods of citation and referencing and compile a bibliography correctly,
- create (develop) the practical aspects of the thesis, including all relevant aspects,
- analyse, synthesise and compare knowledge and propose solutions on this basis,
- draw conclusions and formulate practical implications through critical analysis,
- critically analyse, reassess and apply the knowledge acquired in practice,
- present, discuss and support the ideas with proper arguments, while writing the thesis,
- present, in a group of students and in the presence of the tutor, the outputs of the activity and justify their relevance and practical use,
- complete the Bachelor thesis and prepare for its public defence,
- to grade the strengths and weaknesses of the topic of the thesis and the thesis itself,
- critically evaluate the methods and procedures used in the thesis and make suggestions for their practical application,
- acquire independent knowledge in the chosen field,
- apply theoretical knowledge to teaching practice.

Competences:
The student
- is aware of the importance of respecting academic ethics and the ethical implications for his/her own student and future teaching activities,
- acts in accordance with the rules of good conduct,
- has mastered the basics of social appearance, and is dressed appropriately for the state examination,
- adheres to the wthical principles of citation
- expresses his/her beliefs and opinions in a straightforward and honest manner, while accepting that the other party has the right to form his/her own opinion,
- bears and accepts the consequences of his/her own actions.

Brief syllabus:

1. Requirements for the Bachelor thesis in the SJE guidelines.
2. A concise description of the Bachelor thesis.
3. The importance of the Bachelor thesis
4. Selection of the topic for the Bachelor thesis.
5. Preparation of a selected bibliography for the thesis.
6. Tasks and objectives of the Bachelor thesis.
7. Choosing the appropriate citation.
8. Content of the Bachelor thesis.
9. Formulating a strategy for the development of each part (chapter).
10. Working with reference books and journals.
11. Use of the Internet and online publications.
12. Preparing and carrying out the research, and getting ready for the defence of the Bachelor thesis.

Literature:

A magyar helyesírás szabályai. 2015. Budapest: Akadémiai Kiadó. 12. kiadás. ISBN 978 963 05 9631 2
Madarásová, J. (red.) 2000. Pravidlá slovenského pravopisu. Bratislava: VEDA. ISBN 8022406554
Smernica rektora č. 2/2021 o úprave, registrácii, sprístupnení a archivácii záverečných, rigoróznych a habilitačných prác na Univerzite J. Selyeho. 2021. Komárno: UJS
Ecco, U.: Hogyan írjunk szakdolgozatot? Kairosz, 1987. - 255. - ISBN 9639137537
Chajdiak, J.: Štatistika jednoducho v Exceli. - 1. vyd. - Bratislava : Statis, 2013. - 340 s. - ISBN 978-80-85659-74-0.
Katuščák, D.: Ako písať záverečné a kvalifikačné práce. 5. vyd. - Nitra : Enigma, 2007. - 164 s. - ISBN 978-80-89132-45-4
Nagy-György, J.: Valószínűségszámítás és statisztika példatár : POLYGON Jegyzettár - 1.vyd. - Szeged : Szegedi Egyetemi Kiadó POLYGON, 2010. - 111 s.
Silverman, D.: Ako robiť kvalitatívny výskum /. - Bratislava : Ikar a.s., 2005. - 328 s. – ISBN 80-551-0904-4.
Marko J.: Ako písať záverečnú prácu. - 1. vyd. - Zvolen : TU, 2010. - 66 s. - ISBN 978-80-228-2112-4.
Murray R.: How to Write a Thesis - 3. vyd. - England : McGraw-Hill Open University Press, 2011. - 326 s. - ISBN 978-0-33-524428-7.

Language, knowledge of which is necessary to complete a course:

Hungarian or Slovak

Notes:

Evaluation of subjects

Total number of evaluated students: 0

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

Teacher: doc. RNDr. Róbert Gyepes, PhD., prof. Róbert Mészáros, DSc., Dr. habil. PaedDr. György Juhász, PhD., Mgr. Katarína Szarka, PhD., Mgr. Andrea Vargová, PhD., Attila Kardos, PhD., doc. Ing. Ondrej Hegedűs, PhD., Dr. habil. Imre Varga, PhD., Mgr. Alexandra Hengerics Szabó, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ CCL/22	**Name:** Chemistry of foreign substances

Types, range and methods of educational activities:
Form of study: Seminar
Recommended extent of course (in hours):
Per week: 2 **For the study period:** 26
Methods of study: present

Number of credits: 2

Recommended semester/trimester of study: 6.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
During the semester, the tasks submitted by the student are evaluated. In addition to solving the tasks (max. 8 points), the submission of the tasks on time (max. 2 points) is also assessed.
At the end of the course, the student must achieve a score of at least 50% on the written examination. The final evaluation of the course is calculated on the basis of the assignments submitted by the student and the results obtained in the written examination.
The final grade is calculated based on the scores of the written examination and the assigned tasks as follows: (1x the average percentage of the submitted tasks + 2 x the percentage of the written examination) / 3.
Total student load: 2 credits = 50-60 hours
- 26 hours of participation in contact classes; 13 hours to solve the tasks; 11 to 21 hours of independent study and preparation for the written examination.
The condition for successful completion of the course is to obtain at least 50% of the maximum possible score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.

Results of education:
After successfully completing the course, the student:
Knowledges:
• able to identify the basic conceptual and categorical apparatus of the given chemical field;
• has basic knowledge of the selected chemical discipline;
• able to describe and characterize basic chemical phenomena based on specific aspects;
• can establish connections between chemical substances and their transformations;
• mastered the basic concepts of environmental science and environmental chemistry;
• acquired theoretical foundations for understanding the relationship between chemistry and the environment in solving practical problems;
• has basic knowledge of food chemistry, which is related to knowledge of inorganic chemistry, organic chemistry and biochemistry, with particular regard to the chemical mechanisms of foreign substances in the food chain;
• knows the basic requirements of a healthy diet and the risk of foreign substances in the food chain;

• becomes able to analyze and evaluate the relationships between pollutants and additives;
• understand the purpose of monitoring natural ingredients that are generally used positively in nutrition and food technology.
Skills:
• can comprehensively analyze basic chemical phenomena in the field of environmental chemistry;
• can combine the knowledge acquired from the studied chemistry subjects to understand the theoretical foundations of the subject;
• able to apply the acquired theoretical knowledge and use it comprehensively when choosing the right lifestyle and healthy diet;
• acquires the ability to analyze and evaluate the relationships between food production and the presence of foreign substances in the final product;
• can find out about additives used in food industry production, realistically assess the necessity and possibility of their use, and adequately explain the benefits and risks in his future pedagogical practice;
• can understand and explain the process and results of the official inspection;
Competencies:
• has creative thinking and independence in solving professional problems related to chemistry, as well as planning his own education, and is capable of autonomous and responsible decisions within the given field;
• is able to present his own opinion properly and professionally;
• understands the ethical, social, legal, security and economic contexts of the given area;
• able to comprehensively analyze basic chemical phenomena and interpret them in the field of food quality.

Brief syllabus:

1. Introduction to environmental chemistry.
2. Renewable and non-renewable energy sources.
3. The air and its pollution. Protection of the air.
4. Water and water pollution. Protection of groundwater, surface water and drinking water.
5. Soil and its protection. Illegal and organized landfills.
6. Municipal waste - recycling of solid waste.
7. Concept of food safety, history, food chain, consumer protection in the EU.
8. Health protection - concept of health, basic determinants of health, food and health damage.
9. Food - definition, basic components of food, energy value of food, calculation of energy value, energy needs in the stages of human development. Food composition: water-solids, proteins, fats, carbohydrates, fibers, vitamins.
10. Proper nutrition, the pyramid of healthy nutrition. Alternative eating habits.
11. Free radicals and antioxidants. Occurrence of free radicals, properties, role of antioxidants, occurrence of antioxidants.
12. Foreign substances in food. Additives, technological aids - their role and occurrence in foods. Pollutants – chemical, biological, physical. Occurrence and health risks.
13. Official control of foodstuffs in the Slovak Republic. Exercise control and competence. Legal basis for food inspection. National and international regulation. An overview for the practice of future chemistry teachers.

Literature:

Klinda J., Lieskovská Z. a kol.: Správa o stave životného prostredia Slovenskej republiky v roku 2010 - 1. vyd. - Bratislava - Banská Bystrica : Ministerstvo ŽP SR - Slovenská agentúra

životného prostredia - 192 s. - ISBN 978-80-89503-19-3, dostupné na internete: https://www.enviroportal.sk/spravy/detail/3424
Bihariné Krekó I., Kanczler Gy.: Természetvédelem és környezetvédelem az ELTE TÓK hallgatóinak, Szerkesztette: Dr. Vitályos Gábor Áron, ELTE Tanító- és Óvóképző Kar, Természettudományi Tanszék, Budapest, 2019, ISBN 978-963-489-073-7, dostupné na internete: https://www.eltereader.hu/media/2019/03/Termeszetvedelem_es_kornyezetvedelem_WEB.pdf
Angyal Zs. et al.: A környezetvédelem alapjai, Typotex Kiadó, 2012, ISBN 978-963-279-547-8, dostupné na internete: https://ttk.elte.hu/dstore/document/1134/EJ-A_kornyezetvedelem_alapjai_OK.pdf
Hoffmann D.J. et al: Handbook of ecotoxicology, 2nd edition, CRC Press LLC, Boca Raton Florida, 2003, ISBN 1-56670-546-0, dostupné na internete: http://www.jlakes.org/ch/book/Handbook.of.Ecotoxicology.2nd.ed.2003.pdf

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: doc. Ing. Ondrej Hegedűs, PhD., Mgr. Andrea Vargová, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ CH1/22	**Name:** General Chemistry
Types, range and methods of educational activities: **Form of study:** Lecture / Seminar **Recommended extent of course (in hours):** **Per week:** 2 / 2 **For the study period:** 26 / 26 **Methods of study:** present	
Number of credits: 5	
Recommended semester/trimester of study: 1.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: The seminar ends with a written examination, which can be divided into two during the semester if needed. In the case of a division in two, the final evaluation of the seminar is given by the average result of the two written examinations. Only students who have passed the written examination with at least 50% are allowed to participate the oral examination. During the termtime of the semester, the student can earn additional points by solving and submitting assignments. The exam consists of a written and an oral part. Only those students who have passed the written part with a score of over 50% are allowed to take the oral part, otherwise the exam will be evaluated as insufficient (Fx) at the given time. The final assessment of the course is as follows: 0.15 x the % of points awarded for the submitted assignments + 0.25 x the % of points awarded for the evaluation of the seminar's written examinations + 0.6 x the % of points awarded for the exam part. Total student load: 5 credits = 125-150 hours - 52 hours of participation in contact classes; 26 hours of preparing and solving seminar tasks; 47-72 hours of self-study, preparation for written and oral exams. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: • get to know the structure and basic laws of the world around us; • understands the structure of atoms and molecules, as well as the creation of matter from molecules; • get to know the states of matter and their properties, as well as the laws of the periodic system of the elements; • can interpret the course of chemical reactions by knowing the structure of atoms and molecules.	

• within the framework of knowledge of chemical reactions, the student learns about the laws of equilibrium reactions and becomes familiar with acid-base reactions important in everyday life, as well as their practical applications;
Skills:
• using the knowledge acquired during the course, the graduate is able to understand the more complex laws of chemistry;
• able to understand the complex relationships between different areas of chemistry (organic, inorganic, analytical and physical chemistry);
• able to use the periodic table of elements independently;
• able to organize simple chemical reactions;
• is able to routinely and professionally use concepts relevant to everyday life (e.g. acidity, alkalinity);
Competencies:
• seeks to understand basic chemical and physical relationships;
• strives to use chemical terms accurately and professionally;
• able to independently interpret basic natural phenomena.

Brief syllabus:
1. Development of atomic theory.
2. Modern atomic theory - the quantum mechanical model of the atom.
3. Classical theories of chemical bonding (ionic, covalent and coordination bonding).
4. Hydrogen molecule. Quantum mechanical foundations of chemical bond theory.
5. The electronic structure of diatomic molecules. Electronic structure of polyatomic molecules (fundamentals of hybridization, delocalization of π-bonds.
6. Electronic structure of polyatomic molecules (metals, semiconductors and insulators). Internal movements of molecules.
7. Geometry of molecules (VSEPR theory). Secondary intermolecular interactions (van der Waals interactions, hydrogen bonding).
8. Single-component, single-phase systems: gases and their properties. Gas laws and ideal gas equation of state.
9. Single-component, single-phase systems: liquids and their properties (surface tension, viscosity and evaporation). Solid materials and their properties (crystal structure, amorphous materials).
10. Chemical energetics: heat of reaction and Hess's law.
11. Chemical kinetics: chemical transformations leading to equilibrium, chemical equilibrium. Redox reactions. Acid-base balances.
12. The most important types of chemical reactions.

Literature:
Kotočová A., (1993): Všeobecná chémia: Návody na laboratórne cvičenia. Bratislava, Slovenská technická univerzita, 209 s., ISBN 80 227 0560 8
Gyorbíró K., (1994): Általános kémia. Budapest, Műszaki Könyvkiadó, 155 s., ISBN 00 0255 3
Kiss Zs., (2004): Összefoglaló feladatgyűjtemény kémiából - Megoldások. Budapest, Nemzeti Tankönyvkiadó, ISBN 963 19 5394 7
Rózsahegyi M.,(1996): Érettségi felvételi feladatok. Mozaik Oktatási Stúdió, ISBN 963 697 017 3

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects

Total number of evaluated students: 0

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

Teacher: Dr. habil. PaedDr. György Juhász, PhD., Attila Kardos, PhD.

Date of last update: 06.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ CH2/22	**Name:** Inorganic Chemistry
Types, range and methods of educational activities: **Form of study:** Lecture / Seminar **Recommended extent of course (in hours):** **Per week:** 2 / 2 **For the study period:** 26 / 26 **Methods of study:** present	
Number of credits: 5	
Recommended semester/trimester of study: 2.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: The seminar ends with a written examination, which can be divided into two during the semester if needed. In the case of a division in two, the final evaluation of the seminar is given by the average result of the two written examinations. Only students who have passed the written examination with at least 50% are allowed to participate the oral examination. During the termtime of the semester, the student can earn additional points by solving and submitting assignments. The exam of the course consists of a written and an oral part. Only those students who have passed the written part with a score of over 50% are allowed to take the oral part, otherwise the exam will be evaluated as insufficient (Fx) at the given time. The final assessment of the course is as follows: 0.15 x the % of points awarded for the submitted assignments + 0.25 x the % of points awarded for the evaluation of the seminar's written examinations + 0.6 x the % of points awarded for the exam part. Total student load: 5 credits = 125-150 hours - 52 hours of participation in contact classes; 26 hours of preparing and solving seminar tasks; 47-72 hours of self-study, preparation for written and oral exams. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student will be able to: Knowledges: • successfully classifies chemical compounds and changes, is able to determine the internal structure of substances, explain their structure and chemical properties; • successfully defines the conceptual, grouping and instrumental structure of inorganic chemistry; • is able to relate chemical substances and their changes, and is able to deduce the end products expected during chemical reactions; • has knowledge of the concepts of classical and modern inorganic chemistry, such as the periodicity of the properties of the elements, changes in their physical and chemical properties,	

acidic and alkaline properties, and changes in reactivity depending on the location of the elements in the periodic table;
• has in-depth knowledge of binary and more complex compounds;
• has theoretical knowledge of the chemistry of elements and inorganic compounds.
Skills:
• able to comprehensively analyze basic chemical phenomena within the scope of inorganic chemistry;
• determine the binary and more complex inorganic compounds formed from the most important elements;
• able to determine simple coordinative compounds in the case of elements prone to this;
• define stoichiometric and non-stoichiometric binary compounds;
• names inorganic compounds correctly according to the currently accepted nomenclature, and successfully derives the structural formula of basic inorganic compounds;
• acquires proficiency in the application of nomenclature for stoichiometric and non-stoichiometric compounds, including compounds containing solvent molecules.
Competencies:
• has creative thinking, is independent within his own educational process, is capable of autonomous and responsible decisions within the framework of the study major of chemistry;
• capable of independent and efficient activity.

Brief syllabus:

The periodic system of the elements, the structure of the valence shell. Basic chemistry of non-transitional and transition elements.
1. The periodic system of the elements, the structure of their valence shell, the periodic table.
2. Types of chemical bonds, characterization of inorganic compounds - hydrides, halides, oxides, peroxides, superoxides, oxoacids, sulfides, nitrides, phosphides, carbides, silicides, borides, cyanides. Hybridization of atomic orbitals.
3. Hydrogen, bond types, occurrence, production, compounds, isotopes.
4. General properties of non-transition and transition metals.
5. Alkali metals - elements of group I of the periodic system, bond types, compounds. A subgroup of copper.
6. Alkaline earth metals - the periodic table II. group elements, bond types, compounds. A subgroup of zinc.
7. Hybridization.
8. The elements of the III. group, bond types, compounds. A subgroup of scandium.
9. The elements of the IV. group, bond types, compounds. A subgroup of titanium.
10. The elements of the V. group, bond types, compounds. A subgroup of vanadium.
11. The elements of the VI. group, bond types, compounds. A subgroup of chromium.
12. The elements of the VII. group, bond types, compounds. A subgroup of manganese.
13. The elements of the VIII. group and compounds.

Literature:

Krätsmár - Šmogrovič J. a kol., (2007): Všeobecná a anorganická chémia. Osveta, ISBN 80 806 3245 8
Greenwood N. N., Earnshaw A., (2004): Az elemek kémiája I, II, III.
ISBN: 963195255X
Fajnor V., (1992) : Laboratórna technika, názvoslovie a chemické výpočty: Vysokoškolské skriptá. - Bratislava, Univerzita Komenského - 100 s. - ISBN 80 223 0436 0
Lukeš I., (2009): Systematická anorganická chémie. - 1. vyd. – Praha, Nakladatelství Karolinum - 230 s. ISBN 978-80-246-1614-8.

Bánhidi L., (1989): Szervetlen kémia. Budapest, Tankönyvkiadó, ISBN 96 318 2192 7
Fehér D., (1987): Szervetlen kémia. Budapest, Tankönyvkiadó, ISBN 96 318 0282 5
Sunlight Photolysis of Decamethyltitanocene Dihydrosulfide Affords the Titanium Sulfide Cage Clusters (Cp*Ti)6S8 and (Cp*Ti)4S6 / Gyepes Róbert, Cisařová Ivana, Pinkas Jiří, Kubišta Jiří, Horáček Michal, Mach Karel, 2013. In: European Journal of Inorganic Chemistry. - ISSN 1434-1948. - Vol. 2013, no. 19 (2013), pp. 3316-3322.
Experimental and computational evidence of solid-state anion-π and π-π Interactions in [VO(O2)(L)(pa)]•xH2O complexes (L = picolinate, pyrazinate or quinolinate; Pa = picolinamide) / GYEPES Róbert, PACIGOVÁ Silvia, SIVÁK Michal, TATIERSKY Jozef, 2009. DOI 10.1039/B819875F In: New Journal of Chemistry. - ISSN 1144-0546, Vol. 33, no. 7 (2009), pp. 1515-1522., IF (2019): 3,288, Q WoS=Q2

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: doc. RNDr. Róbert Gyepes, PhD., Mgr. Katarína Szarka, PhD.

Date of last update: 06.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ CH3/22	**Name:** Analytical Chemistry

Types, range and methods of educational activities:
Form of study: Lecture / Seminar
Recommended extent of course (in hours):
Per week: 2 / 2 **For the study period:** 26 / 26
Methods of study: present

Number of credits: 5

Recommended semester/trimester of study: 3.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
The seminar ends with a written examination, which can be divided into two during the semester if needed. In the case of a division in two, the final evaluation of the seminar is given by the average result of the two written examinations. Only students who have passed the written examination with at least 50% are allowed to participate the oral examination. During the termtime of the semester, the student can earn additional points by solving and submitting assignments.
The exam of the course consists of a written and an oral part. Only those students who have passed the written part with a score of over 50% are allowed to take the oral part, otherwise the exam will be evaluated as insufficient (Fx) at the given time.
The final assessment of the course is as follows:
0.15 x the % of points awarded for the submitted assignments + 0.25 x the % of points awarded for the evaluation of the seminar's written examinations + 0.6 x the % of points awarded for the exam part.
Total student load: 5 credits = 125-150 hours
- 52 hours of participation in contact classes; 26 hours of preparing and solving seminar tasks; 47-72 hours of self-study, preparation for written and oral exams.
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.

Results of education:
After successfully completing the course, the student will be ablke to:
Knowledges:
• identify the basic conceptual and categorical apparatus of analytical chemistry, knows the basic equipment, laboratory aids and other laboratory supplies that can be used in analytical laboratory practice;
• masters the basic analytical methods, their theoretical foundations and practical applicability from sampling to sample preparation, performing actual measurement and evaluating of measurement results.

• can use the knowledge of the chemistry subjects which has already been completed to understand the theoretical foundations of qualitative and quantitative analysis;
Skills:
• utilize the theoretical knowledge acquired in the field of analytical chemistry in practical laboratory activities;
• correctly plan, independently search and evaluate appropriate analytical methods and their application in future practice;
• identify the professional problems that occur, examine and formulate the theoretical and practical starting points necessary for their solution, and solve them in practice;
Competencies:
• has creative thinking, independence to solve the professional chemistry problems in our changing environment, as well as to plan one's own education, and is capable of autonomous and responsible decisions within the given field;
• apply the quality requirements and the basics of current quality management methods during your work, including ensuring cleanliness and accuracy;
• is able to present his own opinion properly and professionally;
• understands the ethical, social, legal, security and economic contexts of the discipline;
• find solutions to professional problems arising in the field of analytical, critical and conceptual thinking;
• create an atmosphere of reliability, helpfulness, encouragement, attention, accepting behavior, openness, recognize and control the work style of others.

Brief syllabus:

1. Introduction - tasks and methods of analytical chemistry, basic concepts, quality of chemicals and water, basic methods of sample processing.
2. Qualitative analysis - proof, identification, methods of qualitative analysis, preliminary testing, flame tests, solubility tests, separation and detection of anions, qualitative organic analysis.
3. Qualitative analysis - division and proof of cations, class reactions of cations, selective reactions of cations and anions.
4. Gravimetry - principle, chemical equilibrium, solubility product, heterogeneous system, precipitation reactions, gravimetric factor, practical examples.
5. Titration methods - Acidimetric, alkalimetric and precipitation titrations - their principles, basic concepts, equivalent point, indicators, primary raw materials and their role in titrimetry, determination of exact concentration, practical examples
6. Titration methods - redox titrations: reactions, standard redox potential, indicators, permanganometry, bichromatometry, primary raw materials, determination of the exact concentration, practical examples.
7. Titration methods - redox titrations: iodometry and reductometry, reactions, indicators, primary raw materials, determination of the exact concentration, practical examples.
8. Chelatometry - complex compounds, buffers, primary raw materials, indicators, determination of the exact concentration, practical examples.
9. Instrumental analytical methods - spectral methods in general (the nature and properties of electromagnetic radiation, the interaction of radiation with matter). The most common spectral methods in laboratories (spectrophotometry, atomic absorption spectrometry, ICP).
10. Instrumental analytical methods - liquid chromatography, gas chromatography, principles of methods, principle of equipment, injection, separation, detection, evaluation of the chromatogram, ways of evaluating the results, practical use.
11. Instrumental analytical methods - electrochemical methods: electrode, half-cell - cell, standard electrode potential, Nernst equation, potentiometry and conductometry, voltammetry.

12. Evaluation of analytical results, parallel analyses, certified reference materials, laboratory round tests, proficiency tests, interpretation of results.
13. Basic chemometric calculations - validation of analytical methods (accuracy, precision, LOD, LOQ, measurement uncertainty).

Literature:

Karlíček R., a kol. (2009): Analytická chemie pro farmaceuty. Karolinum, ISBN 97 8802 46 1453 3
Barcza L., (2006): A mennyiségi kémiai analízis gyakorlati kézikönyve. Medicina Kiadó, ISBN: 963 2429 61 3
Barcza L., (2007): Kvantitatív analitikai kémia. Budapest, Semmelweis Kiadó, ISBN 978 963 9656 73 4.
Barcza L., Buvári Á., (2009): A minőségi kémiai analízis. Medicina Könyvkiadó, ISBN 978 9 6 322 6186 7
Pokol Gy., a kol. (2011):Analitikai kémia: Egyetemi tananyag. Typotex Kiadó, ISBN 978-963-279-466-2, dostupné na internete: http://oktatas.ch.bme.hu/oktatas/konyvek/anal/AnalKemBSc/Analitikai_kemia.pdf
Paveleková I. (2010): Analytická chémia pre študentov pedagogických fakúlt. ISBN 978-80-8082-388-7, dostupné na internete: https://pdf.truni.sk/download?e-skripta/analchem.pdf
Krížek M., Šíma J. (2015): Analytická chemie. Katedra analytické chemie Přírodovědecká fakulta Univerzity Karlovy Praha, ISBN: 978-80-7394-486-5, dostupné na internete: http://kch.zf.jcu.cz/vyuka/download/Analyticka_chemie_komplet.pdf

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: doc. RNDr. Róbert Gyepes, PhD., doc. Ing. Ondrej Hegedűs, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ CH4/22	**Name:** Organic Chemistry
Types, range and methods of educational activities: **Form of study:** Lecture / Seminar **Recommended extent of course (in hours):** **Per week:** 2 / 2 **For the study period:** 26 / 26 **Methods of study:** present	
Number of credits: 5	
Recommended semester/trimester of study: 4.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: The seminar ends with a written examination, which can be divided into two during the semester if needed. In the case of a division in two, the final evaluation of the seminar is given by the average result of the two written examinations. Only students who have passed the written examination with at least 50% are allowed to participate the oral examination. During the termtime of the semester, the student can earn additional points by solving and submitting assignments. The exam of the course consists of a written and an oral part. Only those students who have passed the written part with a score of over 50% are allowed to take the oral part, otherwise the exam will be evaluated as insufficient (Fx) at the given time. The final assessment of the course is as follows: 0.15 x the % of points awarded for the submitted assignments + 0.25 x the % of points awarded for the evaluation of the seminar's written examinations + 0.6 x the % of points awarded for the exam part. Total student load: 5 credits = 125-150 hours - 52 hours of participation in contact classes; 26 hours of preparing and solving seminar tasks; 47-72 hours of self-study, preparation for written and oral exams. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: • can classify chemical compounds and transformations, can identify the chemical composition of organic compounds, can explain their structure and chemical properties, • can identify the basic conceptual, categorical and methodological apparatus of organic chemistry, • is able to derive the connections between compounds and their transformations, and can draw conclusions regarding the expected products of chemical reactions,	

• acquires the basic knowledge of organic chemistry, including the division of organic compounds based on structure and the most important functional groups,
• able to solve theoretical and practical problems that arise during their work,
• knows and can apply the nomenclature of organic compounds,
• knows the basic structure and reactions of organic compounds,
• • knows the physical and chemical properties of organic compounds, as well as their effects on health and the environment,
• • learns the basic principles of organic chemistry,
• • recognize the different types of isomers: constitutional, geometric (cis-, trans) and stereo- (R/S) isomerism,
• • acquires the theoretical knowledge necessary to study and understand the subject of biochemistry;
Skills:
• can comprehensively analyze basic organic chemical processes,
• knows the nomenclature of organic compounds and based on this is be able to correctly writes the structural formula of the compounds,
• can explain the variety of structures and stereochemistry of organic compounds and knows their chemical reactions,
• able to solve constitutional, geometric (cis- and trans) and stereo- (R/S) isomerism tasks,
• understands the basic principles and mechanisms of chemical reactions of organic compounds,
• can plan the synthesis of a specific organic compound,
• able to design a chemical method to prove the structure of a given compound;
Competencies:
• has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
• is committed to applying the chemical way of thinking,
• open to learning higher-level organochemical knowledge,
• understand the interactions between different groups of organic compounds,
• can explain everyday chemical problems, can assess the course of a chemical reaction, its control, and act proactively in the event of possible occupational health and safety hazards.

Brief syllabus:

1. Introduction to the subject. The History of Organic Chemistry. Types of organic compounds. Hybrid states of the carbon atoms. Stereochemistry, basic concepts of stereochemistry: configuration, conformation, chirality, geometric isomerism, optical isomerism.
2. Alkanes, cycloalkanes - the structure, nomenclature, physical and chemical properties and typical reactions of saturated hydrocarbons.
3. Alkenes, cycloalkenes - the structure, nomenclature, physical and chemical properties and typical reactions of unsaturated hydrocarbons.
4. Alkadienes, alkynes - structure, nomenclature, physical and chemical properties, typical reactions, amphoteric nature of alkynes.
5. Aromatic hydrocarbons - the structure and aromatic character of arenes. The Hückel rule. Nomenclature, physical and chemical properties and typical reactions of aromatic hydrocarbons.
6. Halogen derivatives - nomenclature, polarity of the C-X bond, dipole moment, polarizability of molecules. Physical and chemical properties and typical reactions of halogen derivatives.
7. Hydroxy derivatives of hydrocarbons - alcohols and phenols. Nomenclature and division. Physical and chemical properties. Typical reactions of alcohols and phenols.
8. Ethers, thiols - nomenclature, physical and chemical properties. Nucleophilic substitution and elimination reactions of hydroxy derivatives. Tautomerism.

9. Carbonyl compounds - aldehydes and ketones. Nomenclature, physical and chemical properties. Structure of the carbonyl group (spatial and electronic structure). Reactions of oxo compounds.
10. Carboxyl compounds - nomenclature, spatial and electronic structure of the carboxyl group, physical and chemical properties. Reactions of carboxylic acids, decarboxylation, esterification.
11. Carboxylic acid derivatives. Functional derivatives: acyl halides, anhydrides, esters, amides. Substitution derivatives of carboxylic acids: halogen carboxylic acids, hydroxy carboxylic acids, amino acids, β-dicarbonyl compounds.
12. Nitrogen-containing organic compounds - nitro compounds and amines. Electronic structure and spatial arrangement of functional groups. Physical and chemical properties. Basic nature and reactions of amines.
13. Heterocyclic compounds, their structure, nomenclature, physical and chemical properties. Acidic and basic character of heterocyclic compounds.

Literature:

Devínsky F., a kol.(2001) : Organická chémia pre farmaceutov. 1. vyd. – Bratislava, Osveta, - 750 s. ISBN 80-8063-056-9
Antus S., Mátyus P., (2010) : Szerves kémia I. Budapest, Nemzeti Tankönyvkiadó, ISBN: 978 963 195 716 7
Balogh Á., (1990): Szerves kémia. Budapest, Tankönyvkiadó, ISBN 96 318 2741 0
Halmos I., (1992): Szerves kémia. Budapest, Műszaki Könyvkiadó, ISBN 96 310 9743 9
Kajtár M.: Változatok négy elemre - Szerves kémia 1-2. ELTE Eötvös Kiadó Kft., ISBN: 9789 6328 4113 7
McMurry J., (2007) : Organická chemie, ISBN 987-80-7080-637-1
Svoboda J., (2013) : Organická chemie - 1. vyd. – Praha, Vysoká škola chemicko-technologická - 310 s, ISBN 978-80-7080-561-9.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Dr. habil. PaedDr. György Juhász, PhD., Mgr. Andrea Vargová, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ CH5/22	**Name:** Biochemistry

Types, range and methods of educational activities:
Form of study: Lecture / Seminar
Recommended extent of course (in hours):
Per week: 2 / 2 **For the study period:** 26 / 26
Methods of study: present

Number of credits: 5

Recommended semester/trimester of study: 5.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
The seminar ends with a written examination, which can be divided into two during the semester if needed. In the case of a division in two, the final evaluation of the seminar is given by the average result of the two written examinations. Only students who have passed the written examination with at least 50% are allowed to participate the oral examination. During the termtime of the semester, the student can earn additional points by solving and submitting assignments.
The exam of the course consists of a written and an oral part. Only those students who have passed the written part with a score of over 50% are allowed to take the oral part, otherwise the exam will be evaluated as insufficient (Fx) at the given time.
The final assessment of the course is as follows:
0.15 x the % of points awarded for the submitted assignments + 0.25 x the % of points awarded for the evaluation of the seminar's written examinations + 0.6 x the % of points awarded for the exam part.
Total student load: 5 credits = 125-150 hours
- 52 hours of participation in contact classes; 26 hours of preparing and solving seminar tasks; 47-72 hours of self-study, preparation for written and oral exams.
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.

Results of education:
After successfully completing the course, the student:
Knowledges:
• can classify chemical compounds and chemical transformations, can identify the chemical structure of natural macromolecular substances, can explain their structure and chemical properties;
• able to identify the basic conceptual, categorical and methodological apparatus of biochemistry,
• knows and can apply the nomenclature of biologically important compounds;
• knows the basic principles of the primary, secondary, tertiary and quaternary structure of hydrocarbons, peptides and proteins;

• can explain the connections between biological function and the chemical structure of the cell membrane;
• knows the role of organic molecules in biological processes, from their entry into the body to their removal from the body;
• acquires knowledge of the basic biochemical processes taking place in living organisms and gets a comprehensive picture of the chemical laws of living organisms;
• able to create interdisciplinary connections between chemistry and biology;
Skills:
• capable of comprehensive analysis of basic chemical phenomena in the field of biochemistry;
• able to describe the structure of macromolecular organic substances;
• can explain the variety of their structures, their stereochemistry and know their chemical reactions;
• able to explain the biological function of macromolecular substances based on their structure;
• understand the basic principles and mechanisms of chemical reactions of biochemical compounds;
• able to propose a chemical method to prove the chemical structure of a given compound
Competencies:
• has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
• apply chemical thinking in biological systems;
• able to understand the principle of the structure of organic macromolecules and explain their biological function;
• open to learning higher level organochemical knowledge;
• understand the interactions between different groups of organic compounds;
• able to explain everyday biochemical problems

Brief syllabus:

1. Introduction to the subject. The subject of biochemistry. Biochemistry as an interdisciplinary science.
2. Carbohydrates, their biological importance and division. Monosaccharides - Fischer, Tollens, Haworth formulas. Oligosaccharides, polysaccharides - chemical structure.
3. Simple lipids - chemical structure, biological importance. Comparison of fats, oils and waxes. Complex lipids.
4. Composition of biological membranes. Material transport processes through the membrane.
5. Amino acids, the structure and general properties of amino acids, optical activity, isoelectric point. The division of amino acids. Essential amino acids.
6. Peptides. Peptide bond formation and structure. Biologically significant peptides. Proteins - their structure and distribution.
7. Enzymes. The composition of enzymes, the active center of the enzyme. Specificity of enzymes. Mechanism of action of enzymes. Michaelis - Menten equation. Michaelis constant. Inhibitors and their types.
8. Chemical processes in living organisms. Characteristics, nature and importance of redox reactions.
9. Krebs cycle - citric acid cycle. The respiratory chain. Oxidative phosphorylation.
10. Carbohydrate metabolism. Anabolism of carbohydrates - photosynthesis, phases of photosynthesis. Carbohydrate catabolism - glycolysis under aerobic and anaerobic conditions.
11. Lipid metabolism. Hydrolysis of lipids. Breakdown of fatty acids. Biosynthesis of fatty acids. Lipid biosynthesis.
12. The nitrogen cycle in nature. Protein metabolism - anabolism and catabolism of proteins. Urea cycle (ornithine cycle).

Literature:

Vodrážka Z. a kol. (2007) : Biochemie. - 1. vyd. - Praha : Academia, 190 s. - ISBN 978-80-200-0600-4
Šajter V., (2006) : Biofyzika, biochémia a radiológia. - 1. vyd. - Martin : OSVETA - 272 s. - ISBN 80-8063-210-3
Lásztity R. (1995): Biokémia. Budapest, Nemzeti Tankönyvkiadó, 127 s. - ISBN 96 318 6565 7
Chikán Á., (2000) : Szegedi biológiai központ : Biofizika, biokémia, enzimológia, genetika, növénybiológia. - Budapest : MTA, - 56 s. - ISBN 963 508 255 x
Mandl J., Hrabák A., Mészáros Gy., (2006) : Biokémia. - 1. vyd. - Budapest : Semmelweis Kiadó, - 176 s. - ISBN 963 9656 18 6
Gasztonyi K.(1996): Élelmiszerkémia. Budapest. Nemzeti Tankönyvkiadó. ISBN 96 318 7419 2
Berg J.M., Tymoczko J.L., Stryer L.(2002): Biochemistry - 5. vyd. - New York, USA : W. H. Freeman - 1100 s. - ISBN 978-0716746843.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: prof. Róbert Mészáros, DSc., Mgr. Andrea Vargová, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ CH6/22	**Name:** Physical Chemistry
Types, range and methods of educational activities: **Form of study:** Lecture / Seminar **Recommended extent of course (in hours):** **Per week:** 2 / 2 **For the study period:** 26 / 26 **Methods of study:** present	
Number of credits: 3	
Recommended semester/trimester of study: 6.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: The seminar ends with a written examination, which can be divided into two during the semester if needed. In the case of a division in two, the final evaluation of the seminar is given by the average result of the two written examinations. Only students who have passed the written examination with at least 50% are allowed to participate the oral examination. During the termtime of the semester, the student can earn additional points by solving and submitting assignments. The exam of the course consists of a written and an oral part. Only those students who have passed the written part with a score of over 50% are allowed to take the oral part, otherwise the exam will be evaluated as insufficient (Fx) at the given time. The final assessment of the course is as follows: 0.15 x the % of points awarded for the submitted assignments + 0.25 x the % of points awarded for the evaluation of the seminar's written examinations + 0.6 x the % of points awarded for the exam part. Total student load: 3 credits = 75-90 hours - 52 hours of participation in contact classes; 5 hours of preparing and solving seminar tasks; 18-33 hours of self-study, preparation for written and oral exams. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: • is able to identify the basic conceptual, categorical and methodological apparatus of physical chemistry; • is able to analyze basic chemical phenomena based on selected aspects; • is able to establish relationships between chemical substances and their transformations, and is able to draw conclusions regarding the expected products of chemical reactions; • knows the concept of real and ideal gases and knows the laws applicable to them; • understands the concept of thermodynamic system, state variables and state functions;	

• understands the axiomatic structure of equilibrium thermodynamics and its consequences;
• knows the concepts of internal energy, work, heat and enthalpy;
• knows and understands the statistical and thermodynamic definition of entropy;
• understands the concept of Gibbs and Helmholtz free energy;
• knows the conditions for the phase equilibrium of single-component systems, as well as the Gibbs phase law;
• knows the concepts of partial molar quantities and chemical potential;
• knows the differences between real and ideal mixtures;
• understands the thermodynamic bases of chemical balances;
• knows the basics of electrochemistry; knows the types of electrode processes and their practical applications;
Skills:
• can creatively use the methods and techniques of mathematics or logic, is able to define a specific theoretical and practical problem, and provide typical basic arguments and solutions;
• is able to apply the ideal and real gas laws during the calculations required in practice and research;
• is able to apply the acquired theoretical knowledge in practical tasks of physical chemistry;
• is able to perform basic thermochemical calculations;
• is able to distinguish between equilibrium and non-equilibrium systems;
• can judge whether a chemical process can occur spontaneously;
• is able to perform basic reaction kinetic calculations by solving rate equations;
• is able to perform calculations regarding the chemical equilibrium and the equilibrium state of the solution;
• is able to solve tasks related to electrochemical and redox processes;
Competencies:
• able to use analytical, critical and conceptual thinking when solving basic chemical problems and specific professional problems;
• strives to work professionally and using the latest knowledge;
• willing to accept new results and recognize the limitations of existing theories;
• is characterized by creative thinking and independence, while deepening his knowledge and being able to perform effective work independently;
• his approach to solving practical problems of physical chemistry is active and responsible.

Brief syllabus:

1. The kinetic gas theory, the pressure of ideal gases, internal energy of ideal gases, equipartition theorem, velocity distribution of gas molecules. Theory of real gases.
2. Absolute temperature scale. The zeroth law of thermodynamics.
3. Basics of chemical thermodynamics: system, state indicators, state functions. Energy, internal energy, work and heat.
4. The first law of thermodynamics and its applications: volumetric work, heat and enthalpy. Heat capacity/specific heat.
5. Thermochemistry: the standard enthalpy change and its more important types, Hess' theorem.
6. Spontaneous processes, statistical and thermodynamic definition of entropy. The second law of thermodynamics. The efficiency of heat engines.
7. Direction of spontaneous processes in non-isolated systems: Gibbs and Helmholtz free energy.
8. Molar free enthalpy. Phase equilibria in single-component systems, phase diagrams and their significant points. Gibbs' phase law.
9. Partial molar quantities, chemical potential. Chemical potential of ideal gases, mixtures of ideal gases. Chemical potential of ideal mixtures.
10. Spontaneous chemical reactions, chemical equilibrium, solubility equilibrium.

11. Colligative properties of multicomponent systems: ebuloscopy, cryoscopy, osmosis.
12. Electrode processes, types of electrodes. Galvanic elements: batteries, batteries, fuel cells. Electrolysis.
13. Boundary surface phenomena. Colloids and nanosystems.

Literature:

Atkins P.W., (1991) : Fizikai kémia I-III. a tankönyvi feladatok megoldására. Tankönyvkiadó, ISBN 96 318 4350 5
Atkins P. W., (2002): Fizikai kémia I. Egyensúly. Budapest: Nemzeti Tankönyvkiadó, ISBN: 96 319 3314 8
Atkins P. W.,(2002): Fizikai kémia II. Szerkezet. Budapest: Nemzeti Tankönyvkiadó, ISBN: 96 319 2145 X
Atkins P.W.,(2013): Fyzikální chemie, - 1. vyd. - Praha : Vysoká škola chemicko-technologická, 2013. - 915 s. - ISBN 978-80-7080-830-6.
Čipera J., (1990): Fyzikálna chémia. Bratislava: Osveta, ISBN 80 217 0134 x
Ulický L., a kol. (1972) : Štruktúra tuhej fázy. - 1. vyd. – Bratislava, SVŠT v Bratislave- 130 s.
László K., a kol. (2012): Fizikai kémia I. Kémiai termodinamika - 2. vyd. - Typotex Kiadó, ISBN 978-963-279-473-0, dostupné na internete: https://oszkdk.oszk.hu/storage/00/00/59/78/dd/1/Fizikai_K__mia_I_anim__ci__k_n__lk__l__V2.pdf
Zrínyi M. (2015): A fizikai kémia alapjai. Budapest: Semmelweis Kiadó, ISBN: 978-963-331-367-1, dostupné na internete: http://real.mtak.hu/30641/1/Fizikai_kemia_e-book.pdf
Malijevský A. (2005): Physical chemistry in brief, Institute of Chemical Technology, Prague Faculty of Chemical Engineering, dostupné na internete: https://old.vscht.cz/fch/en/tools/breviary-online.pdf

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: prof. Róbert Mészáros, DSc., Attila Kardos, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ CHV/22	**Name:** Chemical calculations
Types, range and methods of educational activities: **Form of study:** Seminar **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 3	
Recommended semester/trimester of study: 3.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: The assignments submitted by the student will be evaluated during the semester. When evaluating the submitted assignments, in addition to the right solutions (for which you can get a maximum of 8 points), the submission of the assignments by the deadline is also taken into account (max. 2 points). The course ends with a written test, on which the student must achieve a minimum of 50% of the maximally achivable points. During the evaluation of the semester, the grade includes the followings: ● the student's performance on the written test ● the results of the assignments. Final grade will be calculated on the following basis: (1 x the % expression of the performance achieved on the assignments + 2 x the % expression of the performance achieved in the written test)/3. Total student load: 3 credits = 75-90 hours, of which: - participation in 26 hours of face-to-face education; 20 hours of calculation tasks or solving other chemical tasks; 29-44 hours of independent study and preparation for the written tests. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: ● has practical knowledge of basic chemical calculations, which serve as a basis for future practical and research work as well; ● has special knowledge of mathematics and other natural science disciplines, which are necessary for the application of this knowledge; ● knows the concepts related to the formulas of chemical substances; ● understands the nature of the interpretation of chemical equations; ● knows the basic laws of balancing chemical equations; ● knows and able to characterize the gas laws;	

● knows and able to characterize electrochemical processes;
● knows and able to describe the following concepts: heat of formation, heat of reaction;
● knows thermochemical laws;
● knows and is able to characterize the concept of electrolytic dissociation.
Skills:
● can creatively use the schemes, models, methods and tools of chemistry;
● is able to use basic chemical calculations to calculate the amount of material;
● actively apply the laws when balancing chemical equations;
● actively apply the laws during stoichiometric calculations;
● actively apply the gas laws during chemical calculations;
● actively applies Faraday's laws during chemical calculations;
● calculates the heat of formation, reaction enthalpy and reaction enthalpies of thermochemical reactions;
● actively applies thermochemical laws during chemical calculations;
● able to perform basic chemical calculations in the field of protolytic equilibria;
Competencies:
● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● capable of independent and efficient activity.
● takes an active and responsible approach to the completion of course tasks.

Brief syllabus:
1. Basic stoichiometric calculations
2. Composition of solutions – stoichiometric calculations.
3. Calculations for the amount of reaction products in case of an excess of reactants.
4. Calculation of the purity of the product and the yield of the chemical reaction.
5. Thermochemistry – formation and reaction heat;
6. Thermochemistry - thermochemical laws.
7. The gas laws. Ideal gases.
8. Equilibria in aqueous solutions - degree of dissociation of weak electrolytes.
9. Equilibrium of protolytic reactions - pH, characteristics of acidity and basicity of solutions.
10. Equilibrium of proton transfer reactions - pH of solutions of acids, bases and salts.
11. Redox balances - the dependence of the electrode potential on the concentration.
12. Electrochemical calculations - Faraday's laws.

Literature:
Krätsmár-Šmogrovič, J. a kol., (2007): Všeobecná a anorganická chémia. Osveta, ISBN 80 806 3245 8
Fajnor V.,(1992) Laboratórna technika, názvoslovie a chemické výpočty. Vysokoškolské skriptá, UK Bratislava, ISBN 80 223 0436 0
Kotočová A, Valigura D.(1993): Všeobecná chémia- Návody na laboratórne cvičenia. Bratislava: STU, ISBN 80 227 0560 8
Csányi C., (2002): Kémiai példatár és tesztgyűjtemény megoldásokkal. Budapest, ISBN 96 31 6211 2 X
Kiss Zs., (2004): Összefoglaló feladatgyűjtemény kémiából - Megoldások. Budapest, Nemzeti Tankönyvkiadó, ISBN 963 19 5394 7
Mayer J., (2002): Módszertani stratégiák 4. Országos Közoktatási Intézet, ISBN 9636825033
Borissza, E., Villányi, A. & Zentai, G. (2006). Ötösöm lesz genetikából . - 5. vyd. - Budapest: Műszaki Könyvkiadó Kft., 2006. - 319 s. - ISBN 963 16 2836 1.

Language, knowledge of which is necessary to complete a course:

Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Katarína Szarka, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ DCH/22	**Name:** The history of chemistry
Types, range and methods of educational activities: **Form of study:** Seminar **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 1	
Recommended semester/trimester of study: 6.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: During the semester the assignments submitted by the student will be evaluated. When evaluating the assignments, in addition to the right solutions, the content and form requirements, as well as compliance with the submission deadline, are also taken into account. Total student load: 1 credit = 25-30 hours, of which - participation in 13 hours of classroom teaching; 12-14 hours of preparation of assignments, seminar work and presentation, The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: ● knows the historical and theoretical foundations of the given discipline, as well as its interdisciplinary overlaps and connections; ● knows the chronological overview in the development of chemistry as a science; ● learn about the basic laws of chemistry and the milestones of its development through the history of chemistry; ● gets to know the history of the development of chemistry; ● knows the significant figures and results of the development of chemistry; ● recognizes and understands the beginnings and foundations of scientific investigation; ● knows the most important discoveries and basic laws that advance chemistry. Skills: ● is able to adapt his knowledge to the planning a chemistry class; ● is able to interpret chemistry in the context of interdisciplinary relations with history; ● usefully applies the acquired knowledge during his future career. ● is able to make responsible decisions, and reports facts and misconceptions about the history of chemistry. Competencies:	

● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● seeks to understand the basic relationships of chemistry;
● is able to understand and communicate the acquired knowledge professionally and comprehensibly.

Brief syllabus:
1. Chemistry in early communities (early metallurgy, Bronze Age and Iron Age), "chemistry" in ancient Egypt.
2. Chemistry in the Middle Ages: The Persian-Arabic foundations of alchemy, alchemy in Europe.
3. Chemistry in 17th and 18th century Europe. The phlogiston theory.
4. Outstanding chemists and their contribution to the development of chemistry: Lavoisier, Proust, Dalton, Berzelius.
5. The foundations of modern chemistry in the 19th century, the discovery of new elements.
6. Birth and development of organic chemistry; the development of the chemical industry.
7. Atomic theories. J.J. Thomson and the discovery of the electron, E. Rutherford and the discovery of the proton, the discovery of the neutron.
8. Chemistry in the 20th century: the development of quantum chemistry.
9. Discovery of radioactivity and its significance for the further development of chemistry.
10. Chemistry Nobel laureates.

Literature:
Balázs Lóránt: A kémia története I. / - 1. vyd. - Szekszárd : Nemzeti Tankönyvkiadó RT., 1996. - 567 s. - ISBN 963 18 7183 5.
Balázs Lóránt: A kémia története II. / - 1. vyd. - Szekszárd : Nemzeti Tankönyvkiadó RT., 1996. - 1075 s. - ISBN 963 18 7343 9.
Linkešová,M., (2010): Kapitoly z histórie chémie 2. prepracované vydanie. – Trnava, Pedagogická fakulta Trnavskej univerzity v Trnave, 145s. - ISBN 978-80-8082-399-3, dostupné online: http://katchem.truni.sk/prilohy/Kapitoly%20z%20historie%20chemie.pdf
Cídlová,H. et al , (2011) : Historie chemie. Studijní materiál je určen pro studenty volitelného předmětu Historie chemie. Je součástí řešení projektu FR VŠ 464/2011. dostupné online: http://www.ped.muni.cz/wchem/sm/hc/hist/default.htm
Balázs, L., (1996): A kémia története I-II. Budapest, Nemzeti Tankönyvkiadó,1075s., - ISBN 963-18-7344-7.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Attila Kardos, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ MPC/22	**Name:** Mathematics for chemistry majors

Types, range and methods of educational activities:
Form of study: Lecture / Seminar
Recommended extent of course (in hours):
Per week: 1 / 1 **For the study period:** 13 / 13
Methods of study: present

Number of credits: 3

Recommended semester/trimester of study: 2.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
The seminar ends with a written examination, which can be divided into two during the semester if needed. In the case of a division in two, the final evaluation of the seminar is given by the average result of the two written examinations. Only students who have passed the written examination with at least 50% are allowed to participate in the oral examination. During the termtime of the semester, the student can earn additional points by solving and submitting assignments.
The exam consists of a written and an oral part. Only those students who have passed the written part with a score of over 50% are allowed to take the oral part, otherwise the exam will be evaluated as insufficient (Fx) at the given time.
The final assessment of the course is as follows:
0.15 x the % of points awarded for the submitted assignments + 0.25 x the % of points awarded for the evaluation of the seminar's written examinations + 0.6 x the % of points awarded for the exam part.
Total student load: 3 credits = 75-90 hours
- 26 hours of participation in contact classes; 26 hours of preparing and solving seminar tasks; 23-38 hours of self-study, preparation for written and oral exams.
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.

Results of education:
After successfully completing the course, the student:
Knowledges:
● • has knowledge of basic high school math calculations at a level that serves as a basis for practice and research;
● has the special knowledge of mathematics and other natural science disciplines that are necessary for the application of this knowledge;
● knows the basic concepts of algebra;
● knows the definition and properties of vectors; can characterize the linear dependence of vectors;

● knows and can define matrices; knows equivalent matrix arrangements;
● knows the concept of the determinant of a matrix and can calculate its value;
● knows and can write a system of linear equations;
● knows the methods of solving the system of linear equations;
● knows and can characterize the properties of functions;
● knows the concept of limits and derivatives of functions and their application in chemistry;
● knows the concept and application of primitive function and indefinite integral in chemistry.
Skills:
● knows the method of solving linear differential equations with separable variables;
● applies basic mathematical calculations in the above subjects;
● actively uses mathematical tools when solving chemical problems;
● actively applies the methods of solving algebraic equations in chemistry;
● actively applies the derivation and integration of functions in chemistry;
● is able to perform basic mathematical calculations in reaction kinetics.
Competencies:
● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● capable of independent and efficient activity.
● takes an active and responsible approach to the completion of subject tasks.

Brief syllabus:
1. Introduction to the subject.
2. Introduction to algebra.
3. Vectors, linear dependence of vectors.
4. Matrices and determinants.
5. Systems of linear equations and their application in chemistry.
6. Solving algebraic equations.
7. Introduction to mathematical analysis.
8. Functions - properties of functions and elementary functions.
9. The limit and continuity of the function.
10. Derivation and use of functions in chemistry.
11. The concept of the primitive function and the indefinite integral.
12. Differential equations.

Literature:
Valo, Dušan: Matematika pre chemikov – pracovné listy z vybraných kapitol, Fakulta prírodných vied, Univerzita Konštantína Filozofa v Nitre, 2006, ISBN 80-8094-049-5, http://www.km.fpv.ukf.sk/upload_publikacie/20110913_115157__1.pdf
Krajňáková D., Míčka J., Machačová Ľ., (1988): Zbierka úloh z matematiky. Bratislava, Alfa, 538 s. - ISBN 0002566
Obádovics, J. Gyula: Matematika, Scolar Kiadó Budapest, 1996
Buša J., Schrötter Š. (2015): Stredoškolská matematika pre študentov FEI TU v Košiciach. ISBN 978-80-553-2193-6, dostupné na internete: http://people.tuke.sk/jan.busa/SM/Busa_Schrotter_Stredoskolska_matematika_2015.pdf
Turzík D. a kol. (2011): Základy matematiky pro bakaláře. Vysoká škola chemicko-technologická v Praze. ISBN: 978-80-7080-787-3, dostupné na internete: http://147.33.74.135/knihy/uid_isbn-978-80-7080-787-3/978-80-7080-787-3.pdf

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Dr. habil. PaedDr. György Juhász, PhD.

Date of last update: 06.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ OB/22	**Name:** Bachelor's Thesis and Defense
Types, range and methods of educational activities: **Form of study:** **Recommended extent of course (in hours):** **Per week: For the study period:** **Methods of study:** present	
Number of credits: 8	
Recommended semester/trimester of study:	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: While writing the Bachelor thesis, the student follows the instructions of the supervisor and the Rector's guidelines on the preparation, registration, access and archiving of Bachelor and Master's theses, dissertations and habilitation theses written at Selye János University. The recommended length of the Bachelor thesis is 30 to 40 pages (54 000 to 72 000 characters with spaces). The deadline for submission of the Bachelor thesis is specified in the timetable for the academic year. The Bachelor thesis is checked for authenticity in the central register of final theses. A report is drawn up on the outcome. The examination of authenticity is a prerequisite for the defence. The submission of the Bachelor thesis includes a licence agreement between the student and the Slovak Republic, represented by the University, on the use of digital copies of the Bachelor thesis. The Bachelor thesis is evaluated by the supervisor and the assessor who prepare their evaluation on the basis of the criteria provided. The supervisor mainly assesses the fulfilment of the objective, the student's autonomy and initiative in the development of the topic, the cooperation with the supervisor, the logical structure of the Bachelor thesis, the chosen methods and methodology, the professional quality of the thesis, the depth and quality of the development of the topic, the usefulness of the thesis, the applicability of its results, the work with literature, the relevance of the sources used, as well as the formal features, spelling, style and originality of the thesis. The assessor focuses on the relevance and appropriateness of the topic of the thesis, the aim of the thesis and its fulfilment, the logical structure of the Bachelor thesis, the sequencing and division of chapters, the appropriateness of the methods and methodology used, and the professional quality of the thesis, the depth and quality of the treatment of the topic, the usefulness of the thesis, the applicability of its results, the work with the literature, the relevance of the sources used, and the formal features, spelling, style and originality of the thesis. The examination board will assess the originality of the thesis, the degree of student involvement in the solution of the academic problem, the student's self-reliance and ability to solve the scientific problem - including the search for literature, the formulation of objectives, the choice of method, the selection of research material, the ability to evaluate, the ability to discuss the results, the summary and presentation of the results, and the relevance to the educational process, etc.	

The committee will also assess the ability to present the results, including answers to questions on the topic, adherence to time constraints, etc.
The State Examination Board will evaluate the examination in an informal meeting and decide the mark. The grading is a complex assessment of the quality of the Bachelor thesis and its defence, taking into account the reviews and the process of thesis defence. The committee will mark the defence with an aggregate mark. The mark may be the same as, or better or worse than, the mark given in the marks, depending on the thesis defence.
The grading scale is A - 100-90%, B - 89-80%, C - 79-70%, D - 69-60%, E - 59-50%. A student who does not achieve 50% will not receive credit.
The results of the oral and theoretical part of the examination will be announced publicly by the chairperson of the board in public.

Results of education:
Knowledge:
- The student is familiar with the structure of an academic publication,
- The student can use the resources in an independent and creative way,
- The student is able to analyse and evaluate the problem under study in his/her field of research,
- The student is able to select research methods and procedures appropriately and to apply them effectively.

Skills:
- The Bachelor thesis demonstrates the student's knowledge of the theoretical and practical aspects of the problem under study,
- The student should demonstrate the ability to work with national and international literature, to select relevant information and to use his/her ability to collect, interpret and process literature,
- The student is able to learn independently, enabling him (her) to continue his (her) studies,
- The student is able to collect and interpret relevant data (facts) in the field of his (her) study and to make decisions that take into account social, scientific and ethical aspects,
- The student is able to support the ideas presented with arguments and to draw practical conclusions and formulate proposals,
- The student is able to present the results of the Bachelor thesis,
- The student is able to respect the principles of academic integrity and ethics.

Competences:
The student is able to
- express his/her own linguistic and professional culture and approach to the professional issues encountered in the course of his/her studies, in an appropriate way
- reason and apply knowledge methodologically, both theoretically and practically,
- put knowledge into practice and to organise it,
- answer the questions of the supervisor and the assessor to the required standard and thus be able to defend their Bachelor thesis successfully.

Brief syllabus:
The procedure for defending the Bachelor Thesis is as follows:
1. The student presents his/her thesis.
2. The main points of the thesis supervisor' and opponent's reviews are presented.
3. The student answers the questions of the supervisor and the opponent.
4. Professional discussion of the Bachelor Thesis, when the student answers questions.

The presentation of the Bachelor thesis should mainly include the following points:
1. A brief justification of the choice of topic, its relevance and practical utility.
2. Explanation of the objectives of the thesis and the methods used.
3. The main content of the thesis.

4. The conclusions and proposals drawn by the student.
A copy of the thesis and its electronic presentation are provided to the student during the presentation. The student presents the thesis on his own for a minimum of 10 minutes. He/she may use computing devices.
The final thesis is available to the committee before and during thesis defence.

Literature:
Katuščák, D. Ako písať vysokoškolské a kvalifikačné práce. Bratislava: Enigma, 2004.
Aktuálna Smernica rektora o úprave, registrácii, sprístupnení a archivácii záverečných prác na Univerzite J. Selyeho – dostupné na https://www.ujs.sk/documents/Smernica_c.2-2021o_zaverecnych_pracach_.pdf

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher:

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ PC1/22	**Name:** The basics of laboratory practice
Types, range and methods of educational activities: **Form of study:** Practical **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 4	
Recommended semester/trimester of study: 1.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: During the semester, the student solves practical tasks within the course and prepares a report on the given laboratory practice every week. The student must submit the reports within one week of the practice. During the evaluation of the lab reports, their content, formal execution, and their submission on time are taken into account. At the end of the semester, the student writes a written examination on the topics of the subject, in which he must achieve at least 50%. Participation in lab practices is mandatory, the missed classes can only be made up at the end of the semester if the absence was justified formerly. The final evaluation of the course is based on the results of the assignments, lab reports and the written examination. The final grade is calculated as follows: Final grade=(average % rating of the lab reports + 2 x % result of the written examination) / 3. Total student load: 4 credits = 100-120 hours - 26 hours of participation in contact classes; 26 hours of theoretical preparation for the laboratory practice and the solution of calculation tasks arising from the laboratory practice; 26 hours preparing the reports of the laboratory practice, 22-42 hours of self-training and preparation for the written examination. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: ● has practical knowledge of basic laboratory techniques and safe laboratory work, which serve as the basis for general practice and research work in every laboratories; ● can describe basic laboratory equipment; ● is able to describe basic laboratory operations; ● can describe the basic separation methods; Skills: ● gains the necessary practical skills during mandatory laboratory exercises;	

● is able to apply solutions to methodological, professional and practical problems of chemistry;
● knows how to work with basic laboratory equipment;
● is able to process notes on laboratory exercises in a protocol;
● handles chemicals effectively and safely;
Competencies:
● develops creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● is able to work effectively independently, emphasizing compliance with safety regulations during work in the chemical laboratory;
● takes an active and responsible approach to the completion of subject tasks.

Brief syllabus:

1. Introduction to laboratory practice. Laboratory safety specifications. Safety and occupational safety in the laboratory, occupational hygiene in the chemical laboratory, first aid in the event of a workplace accident, fire protection.
2. Materials used in the chemical laboratory - glass, porcelain, rubber, cork, paper, metals, alloys and other materials.
3. Basic laboratory operations - burners and heating devices, heating, temperature measurement, annealing, drying, cooling.
4. Basic laboratory operations - scales and mass measurement.
5. Basic laboratory operations - laboratory volume measurement devices, volume measurement.
6. Basic laboratory operations - density measurement, determination of density with a pycnometer.
7. Preparation of solutions - dissolution, solubility.
8. Purification and separation methods - characteristics of the basic separation methods (decantation, centrifugation, crystallization, sublimation, distillation).
9. Separation by decantation and filtration (classical and reduced pressure). Crystallization.
10. Separation with a separatory funnel.
11. Distillation at atmospheric pressure and vacuum distillation, distillation of a homogeneous mixture.
12. Thin-layer chromatography.

Literature:

Fajnor V., a kol. (1992) : Laboratórna technika, názvoslovie a chemické výpočty. UK Bratislava, ISBN 80 223 0436 0
Hugyivárová, M. & Szarka, K. (2015). Szervetlen kémia praktikum. 1. vyd. Komárno: Univerzita J. Selyeho, 2015. 50 s. ISBN 978-80-8122-134-7.
Gyepes, R., Katarína SZARKA, Ondrej HEGEDŰS & Róbert MÉSZÁROS. A laboratóriumi technika alapjai = Základy laboratórnej techniky Vysokoškolská učebnica pre študentov pedagogických fakúlt zameraním na aprobačný predmet chémia a/alebo biológia s vyučovacím jazykom maďarským: Tankönyv a kémia- és/vagy biológiatanár szakos hallgatók részére. 1. vyd. Komárno: Univerzita J. Selyeho, 2021. 86 s. ISBN 978-80-8122-402-7
Kiss Zs., (2004) : Összefoglaló feladatgyűjtemény kémiából - Megoldások. Budapest, Nemzeti Tankönyvkiadó, ISBN 963 19 5394 7
Kotočová A., Valigura D., (1993) : Všeobecná chémia - Návody na laboratórne cvičenia. Bratislava STU, ISBN 80 227 0560 8
Sík J., (1992): Kémiai számítások képletgyűjteménye. Budapest, Műszaki Könyvkiadó, ISBN 963 10 9419 7
Vargová, Z. a kol. (2019). Základné laboratórne cvičenia z anorganickej chémie. Košice: ŠafárikPress, 2019, ISBN 978-80-8152-794-4 (e-publikácia) (dostupné na internete: https://

unibook.upjs.sk/img/cms/2019/pf/zakladne-laboratorne-cvicenia-z-anorganickej-chemie-final.pdf)

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Katarína Szarka, PhD.

Date of last update: 06.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ PC2/22	**Name:** Laboratory practices in inorganic chemistry

Types, range and methods of educational activities:
Form of study: Practical
Recommended extent of course (in hours):
Per week: 2 **For the study period:** 26
Methods of study: present

Number of credits: 4

Recommended semester/trimester of study: 2.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
During the semester, the student solves practical tasks within the course and prepares a report on the given laboratory practice every week. The student must submit the reports within one week of the practice. During the evaluation of the lab reports, their content, formal execution, and their submission on time are taken into account.
At the end of the semester, the student writes a written examination on the topics of the subject, in which he must achieve at least 50%.
Participation in lab practices is mandatory, the missed classes can only be made up at the end of the semester if the absence was justified formerly.
The final evaluation of the course is based on the results of the assignments, lab reports and the written examination. The final grade is calculated as follows:
Final grade=(average % rating of the lab reports + 2 x % result of the written examination) / 3.
Total student load: 4 credits = 100-120 hours
- 26 hours of participation in contact classes; 26 hours of theoretical preparation for the laboratory practice and the solution of calculation tasks arising from the laboratory practice; 26 hours preparing the reports of the laboratory practice, 22-42 hours of self-training and preparation for the written examination.
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.

Results of education:
After successfully completing the course, the student:
Knowledges:
• has practical knowledge of basic laboratory techniques, safe experimental activities, selected chemical syntheses of inorganic chemistry, which serve as a basis for practice and research;
• is able to characterize the inorganic substances of selected chemical syntheses (starting materials, products);
• is able to describe the chemical principles of selected chemical syntheses;
Skills:
• has the practical skills acquired during mandatory laboratory exercises;

• is able to solve the basic methodological work procedure and practical problems of inorganic chemistry;
• can perform basic inorganic syntheses according to a specific procedure;
• knows the stoichiometric calculations required to calculate the amounts of reactants and products;
• knows how to calculate the yield of the product produced during chemical synthesis;
• can summarize the results of his observations from chemical syntheses and record his notes made during laboratory exercises;
• handles chemicals efficiently and safely.
Competencies:
• has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
• is able to work effectively independently, emphasizing compliance with safety regulations during work in the chemical laboratory;
• takes an active and responsible approach to the completion of subject tasks.

Brief syllabus:

1. Safety and health protection in the chemical laboratory. Laboratory regulations.
2. Production of elements - (under laboratory conditions) in gaseous state.
3. Production of elements - (under laboratory conditions) in solid state.
4. Production of oxides.
5. Production of acids.
6. Production of hydroxides.
7. Preparation of salts - chlorides.
8. Production of salts - carbonates.
9. Determination of the mass ratio of water in carbohydrates.
10. Production of salts - double salts.
11. Production of coordination compounds.

Literature:

Fajnor V., (1992): Laboratórna technika, názvoslovie a chemické výpočty. Vysokoškolské skriptá, UK Bratislava, ISBN 80 223 0436 0
Hugyivárová, M. & Szarka, K. (2015). Szervetlen kémia praktikum. 1. vyd. Komárno: Univerzita J. Selyeho, 2015. 50 s. ISBN 978-80-8122-134-7.
Gyepes, R., Katarína SZARKA, Ondrej HEGEDŰS & Róbert MÉSZÁROS. A laboratóriumi technika alapjai = Základy laboratórnej techniky Vysokoškolská učebnica pre študentov pedagogických fakúlt zameraním na aprobačný predmet chémia a/alebo biológia s vyučovacím jazykom maďarským: Tankönyv a kémia- és/vagy biológiatanár szakos hallgatók részére. 1. vyd. Komárno: Univerzita J. Selyeho, 2021. 86 s. ISBN 978-80-8122-402-7
Kotočová A., Valigura D., (1993): Všeobecná chémia- Návody na laboratórne cvičenia. Bratislava, Slovenská technická univerzita, ISBN 80 227 0560 8
Sík J., (1992): Kémiai számítások képletgyűjteménye. Budapest, Műszaki Könyvkiadó, ISBN 963 10 9419 7
Kiss Zs., (2004): Összefoglaló feladatgyűjtemény – Kémiából – Megoldások. Budapest, Nemzeti Tankönyvkiadó, ISBN 963 19 5394 7
Vargová, Z. a kol. (2019). Základné laboratórne cvičenia z anorganickej chémie. Košice: ŠafárikPress, 2019, ISBN 978-80-8152-794-4 (e-publikácia) (dostupné na internete: https://unibook.upjs.sk/img/cms/2019/pf/zakladne-laboratorne-cvicenia-z-anorganickej-chemie-final.pdf)

Language, knowledge of which is necessary to complete a course:

Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Katarína Szarka, PhD.

Date of last update: 06.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ PC3/22	**Name:** Laboratory practices in analytical chemistry
Types, range and methods of educational activities: **Form of study:** Practical **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 4	
Recommended semester/trimester of study: 3.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: During the semester, the student solves practical tasks within the course and prepares a report on the given laboratory practice every week. The student must submit the reports within one week of the practice. During the evaluation of the lab reports, their content, formal execution, and their submission on time are taken into account. At the end of the semester, the student writes a written examination on the topics of the subject, in which he must achieve at least 50%. Participation in lab practices is mandatory, the missed classes can only be made up at the end of the semester if the absence was justified formerly. The final evaluation of the course is based on the results of the assignments, lab reports and the written examination. The final grade is calculated as follows: Final grade=(average % rating of the lab reports + 2 x % result of the written examination) / 3. Total student load: 4 credits = 100-120 hours - 26 hours of participation in contact classes; 26 hours of theoretical preparation for the laboratory practice and the solution of calculation tasks arising from the laboratory practice; 26 hours preparing the reports of the laboratory practice, 22-42 hours of self-training and preparation for the written examination. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: • has practical knowledge of basic laboratory techniques and safe experimental activities in the field of analytical chemistry, which serve as a basis for later laboratory practice and research; • is able to identify the basic conceptual and categorical apparatus of analytical chemistry; • knows how to handle basic equipment, laboratory equipment and other laboratory tools useful in laboratory analytical practice; • is proficient in basic analytical methods and has practical experience in their implementation, as well as in the use of basic laboratory equipment that serves as a basis for practice and research;	

Skills:
• is able to solve the methodological, professional or practical problems of chemistry;
• has the practical skills acquired in the field of laboratory activities in the framework of mandatory laboratory exercises;
• is able to perform basic analytical methods related to the analysis of less complex matrices;
• is able to plan, perform and evaluate basic chemical analysis tasks and results;
• is able to sufficiently and systematically explain and apply the knowledge acquired in the course in his future teaching practice;
Competencies:
• has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
• is able to present his own opinion properly and professionally;
• is able to comprehensively analyze basic chemical phenomena in the field of analytical chemistry;
• is able to propose solutions in the field of analytical, critical and conceptual thinking when solving specific professional problems;
• practically and safely applies simple analytical methods to analyze different samples;
• is able to design and manage simple laboratory tests and exercises.

Brief syllabus:

1. The classical way of classification of cations and anions. The characteristic reactions of the I., II. and III. group of cations.
2. The characteristic reactions of the IV. and V. group of cations. The classification of the I. and II. group of cations.
3. The differentiation of the III. and IV. group of cations. Characteristic reactions of anions.
4. Application of the classical method of cation separation to separate cations in an unknown sample.
5. Introduction to volumetric analysis. Standardization of measuring solutions in volumetric analysis.
6. Alkalimetric determination of weak acids. Determination of the acetic acid content of vinegar.
7. Acidimetry. Determination of the alkalinity of sodium hydroxide.
8. Complexometry. Chelatometric determination of water hardness.
9. Indirect chelatometric determinations. Indirect determination of sulfates.
10. Back-measurement chelatometric determinations. Determination of aluminum.
11. Precipitation titration. Argentometry. Determination of chlorides according to Mohr.
12. Redox titrations. Manganometry. Determination of the iron content of the sample.
13. Redox titrations. Bromatometry. Determination of arsenic compounds.

Literature:

Orosz Gy.,(1998): Szerves kémiai praktikum. Nemzeti Tankönyvkiadó, ISBN: 96 318 8408 2
Karlíček R., a kol. (2009): Analytická chemie pro farmaceuty. Karolinum, ISBN 97 8802 46 1453 3
Barcza L., (2006): A mennyiségi kémiai analízis gyakorlati kézikönyve. Medicina Kiadó, ISBN: 963 2429 61 3
Barcza L., (2007): Kvantitatív analitikai kémia. Budapest, Semmelweis Kiadó, ISBN 978 963 9656 73 4.
Barcza L., Buvári Á., (2009): A minőségi kémiai analízis. Medicina Könyvkiadó, ISBN 978 9 6 322 6186 7
Pokol Gy., a kol. (2011):Analitikai kémia: Egyetemi tananyag. Typotex Kiadó, ISBN 978-963-279-466-2, dostupné na internete: http://oktatas.ch.bme.hu/oktatas/konyvek/anal/AnalKemBSc/Analitikai_kemia.pdf

Paveleková I. (2010): Analytická chémia pre študentov pedagogických fakúlt. ISBN 978-80-8082-388-7, dostupné na internete: https://pdf.truni.sk/download?e-skripta/analchem.pdf
Krížek M., Šíma J. (2015): Analytická chemie. Katedra analytické chemie Přírodovědecká fakulta Univerzity Karlovy Praha, ISBN: 978-80-7394-486-5, dostupné na internete: http://kch.zf.jcu.cz/vyuka/download/Analyticka_chemie_komplet.pdf

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: doc. Ing. Ondrej Hegedűs, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ PC4/22	**Name:** Laboratory practices in organic chemistry
Types, range and methods of educational activities: **Form of study:** Practical **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 4	
Recommended semester/trimester of study: 4.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: During the semester, the student solves practical tasks within the course and prepares a report on the given laboratory practice every week. The student must submit the reports within one week of the practice. During the evaluation of the lab reports, their content, formal execution, and their submission on time are taken into account. At the end of the semester, the student writes a written examination on the topics of the subject, in which he must achieve at least 50%. Participation in lab practices is mandatory, the missed classes can only be made up at the end of the semester if the absence was justified formerly. The final evaluation of the course is based on the results of the assignments, lab reports and the written examination. The final grade is calculated as follows: Final grade=(average % rating of the lab reports + 2 x % result of the written examination) / 3. Total student load: 4 credits = 100-120 hours - 26 hours of participation in contact classes; 26 hours of theoretical preparation for the laboratory practice and the solution of calculation tasks arising from the laboratory practice; 26 hours preparing the reports of the laboratory practice, 22-42 hours of self-training and preparation for the written examination. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: ● has practical knowledge of basic laboratory techniques, safe experimental activities, chemical syntheses in the field of organic chemistry, which serve as a basis for practice and research; ● is able to characterize the organic substances of selected chemical syntheses (starting materials, products); ● is able to describe the chemical principles of selected chemical syntheses; ● has comprehensive knowledge of the selection of compounds and the relevant methodology of organic syntheses;	

● knows the operation of basic equipment, laboratory equipment and other laboratory supplies that can be used in organic chemistry laboratory practice
Skills:
● has the practical skills acquired during mandatory laboratory exercises;
● is able to solve basic methodological, work process and practical problems of organic chemistry;
● can perform basic organic syntheses based on a given session;
● has practical experience in performing organic syntheses and using basic laboratory equipment, which serves as a basis for practice and research;
● is able to sufficiently and systematically explain and apply the knowledge acquired in the course in his future teaching practice;
● is able to record the results of observations of chemical syntheses and notes on laboratory exercises;
● handles chemicals efficiently and safely;
Competencies:
● has creative thinking, is independent within his own educational process, is capable of autonomous and responsible decisions within the framework of the study major of chemistry;
● is able to work effectively independently, with special emphasis on safety regulations during working in chemical laboratory;
● takes an active and responsible approach to the completion of subject tasks.

Brief syllabus:
1. Occupational safety training. Fire protection. First aid.
2. Proper handling of laboratory equipment. Handling of organic chemicals. The specificity of organic syntheses.
3. Laboratory work - syntheses focus on the production of organic compounds and different types of chemical reactions:
• production of hydrocarbons and hydrocarbon derivatives
• proving reactions of functional groups of organic compounds
• halogenation, nitration, acylation
• oxidation, reduction
• esterification

Literature:
Orosz, Gy.,(1998): Szerves kémiai praktikum. Nemzeti Tankönyvkiadó, ISBN: 96 318 8408 2
Večeřa, M. a kol. (1975) : Chemické tabulky organických sloučenin. 1. vyd. - Praha : Nakladatelství technické literatury, 888 s.
Hornyánszky, G. a kol. (2011): Szerves kémiai praktikum. Typotex Kiadó. ISBN 978-963-279-482-2, dostupné na internete: https://dtk.tankonyvtar.hu/handle/123456789/7659
Felföldi, K.: Szerves kémiai laboratóriumi alapgyakorlatok. dostupné na internete: http://www.staff.u-szeged.hu/~frank/education/Szerves_kemiai_lab_gyak_jegyzet.pdf
Miklós, E. (2013): Szerves kémia laboratóriumi gyakorlatok. Sapientia Erdélyi Magyar Tudományegyetem műszaki és Társadalomtudományi kar, Élelmiszer-tudományi Tanszék. dostupné na internete: http://www.em.sapientia.siculorum.ro/pdf/oktatasi%20segedanyagok/05%20Szerves%20kemia%20laboratoriumi%20gyakorlatok/01%20szerves%20kemia%20%20laboratoriumi%20gyakorlatok.pdf
Antus, S., Mátyus, P., (2010) : Szerves kémia I. Budapest, Nemzeti Tankönyvkiadó, ISBN: 978 963 195 716 7
Balogh, Á., (1990): Szerves kémia. Budapest, Tankönyvkiadó, ISBN 96 318 2741 0
Halmos, I., (1992): Szerves kémia. Budapest, Műszaki Könyvkiadó, ISBN 96 310 9743 9

Mc Murry, J., (2007) : Organická chemie, ISBN 987-80-7080-637-1
Svoboda, J., (2013) : Organická chemie - 1. vyd. – Praha, Vysoká škola chemicko-technologická - 310 s, ISBN 978-80-7080-561-9.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Andrea Vargová, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ PC5/22	**Name:** Laboratory practice in biochemistry
Types, range and methods of educational activities: **Form of study:** Practical **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 4	
Recommended semester/trimester of study: 5.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: During the semester, the student solves practical tasks within the course and prepares a report on the given laboratory practice every week. The student must submit the reports within one week of the practice. During the evaluation of the lab reports, their content, formal execution, and their submission on time are taken into account. At the end of the semester, the student writes a written examination on the topics of the subject, in which he must achieve at least 50%. Participation in lab practices is mandatory, the missed classes can only be made up at the end of the semester if the absence was justified formerly. The final evaluation of the course is based on the results of the assignments, lab reports and the written examination. The final grade is calculated as follows: Final grade=(average % rating of the lab reports + 2 x % result of the written examination) / 3. Total student load: 4 credits = 100-120 hours - 26 hours of participation in contact classes; 26 hours of theoretical preparation for the laboratory practice and the solution of calculation tasks arising from the laboratory practice; 26 hours preparing the reports of the laboratory practice, 22-42 hours of self-training and preparation for the written examination. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: ● has practical knowledge of basic laboratory techniques and safe experimental activities in the field of biochemistry, which serve as a basis for practice and research; ● is able to identify the basic conceptual, categorical and methodological apparatus of the laboratory experimental work of biochemical analyses; ● acquires the operation of the basic equipment, knows the laboratory aids and other laboratory supplies used in laboratory practice;	

● has the knowledge of experimental activities acquired in the framework of mandatory laboratory exercises, which serve as the basis for practice and research
Skills:
● is able to solve methodological, professional and practical problems of chemistry;
● has the practical skills acquired in the framework of mandatory laboratory exercises
● is able to apply the theoretical knowledge acquired in the field of biochemistry in practical laboratory activities related to the course;
● is able to sufficiently explain and systematically apply the knowledge acquired in the course in his future teaching practice;
● is able to correctly structure, independently search for and evaluate the appropriate application of experimental methods in his own practice
Competencies:
● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● is able to work efficiently and independently;
● is able to properly and professionally present his own opinion;
● can comprehensively analyze basic biochemical phenomena during laboratory experiments;
● is able to propose solutions to specific professional problems in the field of analytical, critical and conceptual thinking;
● can apply simple analytical methods practically and safely when analyzing different samples;
● able to plan and manage simple laboratory tests and exercises.

Brief syllabus:

1. Laboratory safety. Fire protection. First aid in laboratory practice.
2. Determination of water and dry matter content - Gravimetric determination of dry matter and moisture content in biological samples.
3. Carbohydrates - Hydrolysis of carbohydrates.
4. Spectrophotometric determination of reducing sugars.
5. Amino acids - Thin layer chromatographic separation of a mixture of amino acids.
6. Proteins - Determination of the isoelectric point of proteins.
7. Isolation of natural dyes - leaf dyes.
8. Determination of antioxidant activity of fruits and vegetables.
9. Vitamins - semiquantitative determination of ascorbic acid.
10. Qualitative and semiquantitative determination of selected biochemical parameters in urine.
11. Spectrophotometric determination of creatinine in urine.

Literature:

Görbe A. et al. (2011): Biokémiai gyakorlatok . - 1. vyd. - Budapest : Medicina Könyvkiadó Zrt., - 95 s. - ISBN 978 963 226 320 5.
Sedlák E. a kol. (2020): Praktické cvičenia z biochémie. Univerzita Pavla Jozefa Šafárika v Košiciach, Prírodovedecká fakulta, Katedra biochémie. ISBN: 978-80-8152-902-3 (e-publikácia), dostupné na internete: https://unibook.upjs.sk/img/cms/2020/pf/prakticke-cvicenia-z-biochemie-.pdf
Vodrážka Z. a kol. (2007) : Biochemie. - 1. vyd. - Praha : Academia, 190 s. - ISBN 978-80-200-0600-4
Šajter V., (2006) : Biofyzika, biochémia a radiológia. - 1. vyd. - Martin : OSVETA - 272 s. - ISBN 80-8063-210-3
Lásztity R. (1995): Biokémia. Budapest, Nemzeti Tankönyvkiadó, 127 s. - ISBN 96 318 6565 7
Chikán Á., (2000) : Szegedi biológiai központ : Biofizika, biokémia, enzimológia, genetika, növénybiológia. - Budapest : MTA, - 56 s. - ISBN 963 508 255 x

Mandl J., Hrabák A., Mészáros Gy., (2006) : Biokémia. - 1. vyd. - Budapest : Semmelweis Kiadó, - 176 s. - ISBN 963 9656 18 6
Gasztonyi K.(1996): Élelmiszerkémia. Budapest. Nemzeti Tankönyvkiadó. ISBN 96 318 7419 2
Berg J.M., Tymoczko J.L., Stryer L.(2002): Biochemistry - 5. vyd. - New York, USA : W. H. Freeman - 1100 s. - ISBN 978-0716746843.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: doc. Ing. Ondrej Hegedűs, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ PC6/22	**Name:** Laboratory practices in physical chemistry
Types, range and methods of educational activities: **Form of study:** Practical **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 1	
Recommended semester/trimester of study: 6.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: During the semester, the student solves practical tasks within the subject and prepares a laboratory report on every laboratory practice. The student must submit the reports within one week of the laboratory practice. During the evaluation of the reports, their content, formal execution, and their submission on time are taken into account. Participation in laboratory practices is mandatory, the missed class can only be made up at the end of the semester if the absence is justified formerly. The final evaluation of the course is based on the evaluation of laboratory tasks and reports. Total student load: 1 credit = 25-30 hours - 26 hours of participation in contact classes; which includes the preparation of laboratory reports. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: ● has practical knowledge of the basic laboratory techniques and experimental methods of physical chemistry, which serve as the basis for future practice and research work; ● is able to measuring the speed of chemical reactions; ● knows and can routinely use basic physical and chemical techniques (spectrophotometer, combined pH electrode, conductometer and flame photometer); ● knows the experimental methods of characterizing acid-base and dissolution equilibria; ● knows the experimental techniques of characterizing the equilibrium state of adsorption and micelle formation; Skills: ● is able to apply solutions to methodological, professional and practical problems of chemistry; ● has the practical skills acquired in the field of laboratory activities in the framework of mandatory laboratory exercises; ● is able to independently evaluate experimental results by creating tables and graphs;	

● is able to prepare a plan for conducting an experiment investigating a physical-chemical phenomenon that has not been described so far;
● is able to perform partial tasks and work in a team;
Competencies:
● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● capable of independent and efficient activity.
● strives to perform laboratory work safely and warns others to observe the basic rules of safe laboratory work;
● is open to the development of new experimental techniques;
● strives to perform experimental work professionally and reproducibly, and is able to perform laboratory work independently;
● uses an active and responsible approach to practical problem solving in physical chemistry.

Brief syllabus:

1. Getting to know the chemical laboratory safety regulations and general laboratory regulations.
2. Methods of measuring the kinetics of chemical reactions.
3. Measuring conductivity of aqueous solutions. Conductometry.
4. Determination of the critical micellar concentration of ionic surfactants by conductometric titration.
5. Chemical equilibrium - observation of the factors influencing the equilibrium (changes in the concentration of starting materials and products).
6. Determination of dissolution equilibrium, solubility product.
7. Acid-base equilibrium. Determination of the dissociation constant of weak acids with a combined pH electrode.
8. Adsorption equilibrium. Determination of the adsorption isotherm of dyes at the solid/solution interface.
9. Electrochemical experiments and the equilibrium constant of redox processes.

Literature:

Morovská Turoňová a kol. (2020): Praktické cvičenia z fyzikálnej chémie. Ústav chemických vied, Prírodovedecká fakulta UPJŠ v Košiciach. ISBN: 978-80-8152-935-1 (e-publikácia), dostupné na internete: https://unibook.upjs.sk/img/cms/2020/pf/prakticke-cvicenia-z-fyzikalnej-chemie.pdf
Reguli J. (2009): Laboratórne cvičenia z fyzikálnej chémie, Pedagogická fakulta Trnavskej univerzity v Trnave. ISBN: 978-80-8082-271-2, dostupné na internete: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjN2tTYqqr2AhX157sIHa9dBGgQFnoECA0QAQ%3A%2F%2Fpdf.truni.sk%2Fdownload%3Fe-skripta%2Flcfch.pdf&usg=AOvVaw2CC9cYI3jEjqtOJJGbCnCY
Ősz K., Bényei A. (2010): Fizikai kémia laboratóriumi gyakorlat II. Debreceni Egyetemi Kiadó. ISBN: 978 963 473 317 1, dostupné na internete: https://oszkdk.oszk.hu/storage/00/01/61/75/dd/1/fizkemia_labgyak_2k_beliv.pdf
Szilágyi A. a kol. (2011): Fizikai kémia laboratóriumi gyakorlatok. Typotex Kiadó. ISBN: 978-963-279-474-7, dostupné na internete: http://docplayer.hu/110135650-Fizikai-kemia-laboratoriumi-gyakorlatok.html
Atkins P.W., (1991) : Fizikai kémia I-III. a tankönyvi feladatok megoldására. Tankönyvkiadó, ISBN 96 318 4350 5
Atkins P. W., (2002): Fizikai kémia I. Egyensúly. Budapest: Nemzeti Tankönyvkiadó, ISBN: 96 319 3314 8

Atkins P. W.,(2002): Fizikai kémia II. Szerkezet. Budapest: Nemzeti Tankönyvkiadó, ISBN: 96 319 2145 X
Atkins P.W.,(2013): Fyzikální chemie, - 1. vyd. - Praha : Vysoká škola chemicko-technologická, 2013. - 915 s. - ISBN 978-80-7080-830-6.
Čipera J., (1990): Fyzikálna chémia. Bratislava: Osveta, ISBN 80 217 0134 x
Ulický L., a kol. (1972) : Štruktúra tuhej fázy. - 1. vyd. – Bratislava, SVŠT v Bratislave- 130 s.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Attila Kardos, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ RCU/22	**Name:** Solving chemical exercises

Types, range and methods of educational activities:
Form of study: Seminar
Recommended extent of course (in hours):
Per week: 2 **For the study period:** 26
Methods of study: present

Number of credits: 3

Recommended semester/trimester of study: 3.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
During the semester the assignments submitted by the student will be evaluated. When evaluating the submitted assignments, in addition to the right solutions (for which you can get a maximum of 8 points), the submission of the assignments by the deadline is also taken into account (max. 2 points).
The subject ends with a written examination, on which the student must achieve a minimum of 50% of the available score.
During the evaluation at the end of the semester, the final grade includes the student's performance on the written examination and on the submitted assignments based on the following relationship:
Final grade=(1 x the % expression of the performance achieved on the submitted assignments + 2 x the % expression of the performance achieved in the written examination)/3.
Total student load: 3 credits = 75-90 hours, of which
- participation in 26 hours of face-to-face education; 20 hours of calculation tasks or solving other chemical tasks; 29-44 hours of independent study and preparation for the written examination..
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.

Results of education:
After successfully completing the course, the student:
Knowledges:
● has the basic practical knowledge required for chemical calculations, which serve as the basis for future practical and research work;
● has special knowledge of mathematics and other natural science disciplines, which are necessary for the application of this knowledge;
● knows the concepts related to the formulas of chemical substances;
● understands the nature of the interpretation of chemical equations;
● knows the basic laws of balancing chemical equations;
● knows and can characterize the gas laws;
● knows and can characterize electrochemical processes;

● knows and can describe the concepts of heat of formation and heat of reaction;
● knows thermochemical laws;
● knows and can characterize the concept of electrolytic dissociation;
Skills:
● can creatively use the schemes, models, methods and tools of chemistry;
● is able to use basic chemical calculations to determine the quantity of the substance;
● actively applies the laws when balancing chemical equations;
● actively applies the laws during stoichiometric calculations;
● actively applies the gas laws in chemical calculations;
● actively applies Faraday's laws during chemical calculations;
● can calculate the heat of formation and reaction of thermochemical reactions;
● actively applies thermochemical laws during chemical calculations;
● is able to perform basic chemical calculations in the field of proton transfere equilibria;
Competencies:
● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● is capable of independent and efficient activity;
● takes an active and responsible approach to the completion of subject tasks.

Brief syllabus:
1. Classical problems of stoichiometry.
2. Stoichiometric problems.
3. Exercises for determining the excess reagent
4. Exercises for determining the purity of the product and the yield of the chemical reaction.
5. Solving thermochemical problems.
6. Thermochemistry - thermochemical laws.
7. Solving tasks related to gas laws and equations of state.
8. Solving the problems of proton transfer reactions.
9. Problem tasks - determination of acidity and alkalinity of solutions.
10. Solving problems in the field of proton transfer equilibria.
11. Solving tasks in the field of redox balances.
12. Solving electrochemistry problems.

Literature:
Krätsmár-Šmogrovič, J. a kol., (2007): Všeobecná a anorganická chémia. Osveta, ISBN 80 806 3245 8
Fajnor V.,(1992) Laboratórna technika, názvoslovie a chemické výpočty. Vysokoškolské skriptá, UK Bratislava, ISBN 80 223 0436 0
Kotočová A, Valigura D.(1993): Všeobecná chémia- Návody na laboratórne cvičenia. Bratislava: STU, ISBN 80 227 0560 8
Csányi C., (2002): Kémiai példatár és tesztgyűjtemény megoldásokkal. Budapest, ISBN 96 31 6211 2 X
Kiss Zs., (2004): Összefoglaló feladatgyűjtemény kémiából - Megoldások. Budapest, Nemzeti Tankönyvkiadó, ISBN 963 19 5394 7
Mayer J., (2002): Módszertani stratégiák 4. Országos Közoktatási Intézet, ISBN 9636825033
Borissza, E., Villányi, A. & Zentai, G. (2006). Ötösöm lesz genetikából . - 5. vyd. - Budapest: Műszaki Könyvkiadó Kft., 2006. - 319 s. - ISBN 963 16 2836 1.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Katarína Szarka, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ RMO/22	**Name:** Reaction Mechanisms in organic chemistry
Types, range and methods of educational activities: **Form of study:** Seminar **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 3	
Recommended semester/trimester of study: 4.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: During the semester the assignments submitted by the student will be evaluated. When evaluating the submitted assignments, in addition to the right solutions (for which you can get a maximum of 8 points), the submission of the assignments by the deadline is also taken into account (max. 2 points). The subject ends with a written examination, on which the student must achieve a minimum of 50% of the available score. During the evaluation at the end of the semester, the final grade includes the student's performance on the written examination and on the submitted assignments based on the following relationship: Final grade=(1 x the % expression of the performance achieved on the submitted assignments + 2 x the % expression of the performance achieved in the written examination)/3. Total student load: 3 credits = 75-90 hours, of which - participation in 26 hours of face-to-face education; 20 hours of calculation tasks or solving other chemical tasks; 29-44 hours of independent study and preparation for the written examination.. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledge: • can classify chemical compounds and chemical transformations, can identify the chemical composition of organic substances, can explain their structure and chemical properties; • is able to identify the basic conceptual, categorical and methodological apparatus of organic chemistry; • is able to establish relationships between chemical substances and their transformations, and draws conclusions regarding the expected products of chemical reactions; • acquires the basic knowledge of organic chemistry, is able to divide organic compounds based on the most important functional groups;	

• acquires knowledge of organic chemistry that can be used to solve theoretical and practical problems that arise during their work;
• knows and can apply the nomenclature of organic compounds;
• knows the basic structural principles and reactions of organic compounds;
• knows the physical and chemical properties of organic compounds and their effects on health and the environment;
• gets to know the basic principles of organic chemistry;
• recognizes the different types of isomers: constitutional, geometric (cis- and trans-) and stereo-(R/S) isomerism;
• acquires the theoretical knowledge necessary to study and understand biochemistry;
Skills:
• can comprehensively analyze basic chemical phenomena in the field of organic chemistry;
• knows the nomenclature of organic compounds, based on this knowledge the student can correctly describe the structural formula of these substances;
• can explain the structural, stereochemical variety of organic compounds and knows their chemical reactions;
• knows the problems of constitutional, geometric (cis- and trans-) and stereo(R/S) isomerism;
• understands the basic principles and mechanisms of chemical reactions of organic compounds;
• is able to design a synthesis aimed at producing a specific organic compound,
• is able to propose a chemical method to prove the chemical structure of a given compound;
Competencies:
• has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
• is committed to applying the chemical way of thinking;
• is open to learning higher level organochemical knowledge;
• understands the interactions of different groups of organic compounds.

Brief syllabus:

1. Chemical Bonds in organic compounds - bond polarity, dipole moment, inductive and mesomeric effect, conjugated π - systems.
2. Types of chemical reactions in organic chemistry. Reaction notation in organic chemistry.
3. Mechanism of radical substitution.
4. Mechanism of electrophilic substitution.
5. Mechanism of nucleophilic substitution.
6. Mechanism of electrophilic addition.
7. Mechanism of nucleophilic addition.
8. Polymerization reactions.
9. Elimination reactions.
10. Molecular rearrangements.

Literature:

Devínsky F., a kol.(2001) : Organická chémia pre farmaceutov. 1. vyd. – Bratislava, Osveta, - 750 s. ISBN 80-8063-056-9
Antus S., Mátyus P., (2010) : Szerves kémia I. Budapest, Nemzeti Tankönyvkiadó, ISBN: 978 963 195 716 7
McMurry J., (2007) : Organická chemie, ISBN 987-80-7080-637-1
Balogh Á., (1990): Szerves kémia. Budapest, Tankönyvkiadó, ISBN 96 318 2741 0
Halmos I., (1992): Szerves kémia. Budapest, Műszaki Könyvkiadó, ISBN 96 310 9743 9
Kajtár M.: Változatok négy elemre - Szerves kémia 1-2. ELTE Eötvös Kiadó Kft., ISBN: 9789 6328 4113 7

Svoboda J., (2013) : Organická chemie - 1. vyd. – Praha, Vysoká škola chemicko-technologická - 310 s, ISBN 978-80-7080-561-9.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Andrea Vargová, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ RSC/22	**Name:** The revision of secondary grammar school chemistry
Types, range and methods of educational activities: **Form of study:** Seminar **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 3	
Recommended semester/trimester of study: 1.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: The assignments submitted by the student will be evaluated during the semester. When evaluating the submitted assignments, in addition to the right solutions (for which you can get a maximum of 8 points), the submission of the assignments by the deadline is also taken into account (max. 2 points). The course ends with a written test, on which the student must achieve a minimum of 50% of the maximally achivable points. During the evaluation of the semester, the grade includes the followings: ● the student's performance on the written test ● the results of the assignments. Final grade will be calculated on the following basis: (1 x the % expression of the performance achieved on the assignments + 2 x the % expression of the performance achieved in the written test)/3. Total student load: 3 credits = 75-90 hours, of which: - participation in 26 hours of face-to-face education; 20 hours of calculation tasks or solving other chemical tasks; 29-44 hours of independent study and preparation for the written tests. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: possesses a comprehensive system of knowledge of secondary grammar school chemistry, which is basic for studying to prepare for the profession of a chemistry teacher, such as: • knows how to use chemistry terminology, and nomenclature; • can define terms, physical and chemical laws, and can use the physical and chemical quantity unit system; • can list, give examples, describe the characteristics of chemical substances, phenomenons, etc.; Skills:	

• possesses a comprehensive system of theoretical skills of secondary grammar school chemistry, which is basic for studying to prepare for the profession of a chemistry teacher, such as:
o able to compare, classify, assign, classify chemical substances, properties, and phenomenons, look for relations and analyze them;
o know and explain the principles of chemical events and phenomena and, based on this, conclude about their consequences, assess the relationships between the properties of substances and the chemical phenomenons;
o apply knowledge in solving chemical tasks and problems;
• can apply and integrate the knowledge of secondary grammar school chemistry into his studies at the bachelor's level of education.
Competencies:
● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● capable of independent and efficient activity;
● takes an active and responsible approach to the completion of course tasks.

Brief syllabus:
1. Chemical substances - division, characteristics.
2. Structure of atoms and ions.
3. Periodic system of elements.
4. Chemical nomenclature of inorganic substances.
5. Chemical bond and structure of chemical substances.
6. Chemical reactions and chemical equations.
7. Energy and enthalpy in chemical systems.
8. Chemical kinetics.
9. Equilibrium in chemical systems.
10. Types of chemical reactions.
11. Protolytic equilibria reactions.
12. Oxidation-reduction equilibria reactions.

Literature:
Csányi Cs., (2002): Kémiai példatár és tesztgyűjtemény megoldásokkal. Budapest, ISBN 96 316 2112 X
Gyorbíró K., (1994): Általános kémia. Budapest, Műszaki Könyvkiadó, ISBN 00 0255 3
Kmeťová, J., Silný, P., Medveď, M. & Vydrová, M. (2010): Chémia 1. Expol Pedagogika s.r.o., ISBN 978-80-8091-174-4. (dostupný na internete: https://www.chemkagymtop.sk/docs/01.pdf, cit. 31-01-2022)
Kotočová A., (1993): Všeobecná chémia. Bratislava, Slovenská technická univerzita, ISBN 80 227 0560 8
Kiss Zs., (2004): Összefoglaló feladatgyűjtemény kémiából - Megoldások. Budapest, Nemzeti Tankönyvkiadó, ISBN 963 19 5394 7
Rózsahegyi M.,(1996): Érettségi felvételi feladatok. Mozaik Oktatási Stúdió, ISBN 963 697 017 3

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0
Teacher: Mgr. Katarína Szarka, PhD.					
Date of last update: 06.07.2022					
Approved by: doc. RNDr. Róbert Gyepes, PhD.					

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ RSM/22	**Name:** The revision of secondary grammar school mathematics

Types, range and methods of educational activities:
Form of study: Seminar
Recommended extent of course (in hours):
Per week: 2 **For the study period:** 26
Methods of study: present

Number of credits: 3

Recommended semester/trimester of study: 1.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
The assignments submitted by the student will be evaluated during the semester. When evaluating the submitted assignments, in addition to the right solutions (for which you can get a maximum of 8 points), the submission of the assignments by the deadline is also taken into account (max. 2 points).
The course ends with a written test, on which the student must achieve a minimum of 50% of the maximally achivable points.
During the evaluation of the semester, the grade includes the followings:
● the student's performance on the written test
● the results of the assignments.
Final grade will be calculated on the following basis: (1 x the % expression of the performance achieved on the assignments + 2 x the % expression of the performance achieved in the written test)/3.
Total student load: 3 credits = 75-90 hours, of which:
- participation in 26 hours of face-to-face education; 20 hours of calculation tasks or solving other chemical tasks; 29-44 hours of independent study and preparation for the written tests.
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.

Results of education:
After successfully completing the course, the student:
Knowledges:
• has basic knowledge regarding mathematical concepts, properties and relationships necessary for studying for the profession of a chemistry teacher.
Skills:
• possesses a comprehensive system of high school mathematical skills that are necessary for studying to prepare for the profession of a chemistry teacher, such as:
o able to apply mathematical relationships when solving chemical problems;
o knows normal form of the number and the scientific notation,
o can complete the square of a quadratic trinomial;

o can use the basic mathematical operation of algebraic expressions;
o can express the unknown from the formula;
o able to find all solutions of the linear equation ax + b = 0 and the quadratic equation ax2 + bx + c = 0;
o can solve chemical problems leading to equations and inequalities;
o can find all solutions on the given interval (if not possible exactly, then approximately using a calculator) of the equation f (x)= A, where A#R and f is a function - xa ,bx , log x (a # Q, b is a positive number different from 1);
o can solve the equation system of 2 equations with 2 unknowns;
o find the set of all solutions of the inequality f (x)# L , where L is a real number, # is one of the relation signs <, ≤, ≥, > , f is one of the functions (ax + b)α, bx , logb x,
x − a
;
o able to calculate the approximate values of numerical expressions and function ;
o can mark the function value on the graph of the function;
o from the given graph of the function he knows
to determine with sufficient accuracy the functional value at a given point,
to determine global and local extreme values,
to determine the monotonicity of the functions,
find out if it is bounded from below (above).
o can find the value of the dependent variable for the given values of the independent variables, if the relationship between the dependent and one or two independent variables is described by a formula or table;
o can find the scope of the given function, or decide whether the given number belongs to the definition range of the given function;
o able to decide whether the given number belongs to the domain of the given function;
o can find the value of the function at a given point, determine its intersections with coordinate axes;
o can find intersections of graphs of two functions;
o able to characterizes the properties of the constant function and functions ax + b , ax2 + bx +c , xa , ax , loga x;
o can sketch the graph of the inverse function f −1 if you know the graph of the simple function f;
o can find inverse functions to the functions ax + b , ax2 + bx +c , xa , ax , loga x
Competencies:
● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● capable of independent and efficient activity;
takes an active and responsible approach to the completion of course tasks.

Brief syllabus:

1. Numbers, variables and expressions.
2. Operations with algebraic expressions.
3. Solving equations, inequalities and their systems of the type ax + b , ax2 + bx +c , xa , ax , loga x.
4. Selected elementary functions and characteristics of their properties.

Literature:

Czondi, J., Kassay, I. & Szabó,B. (1997). Fogalmak, definíciók, tételek középiskolásoknak és főiskolásoknak. Budapest : Nemzeti Tankönyvkiadó, 1997. - 314 s. - ISBN 963 18 7778 7.
Parízek, B. (1978). Matematické úlohy na prijímacie skúšky na vysoké školy. Debrecen : KLTE BTK H, 1978. - 240 s. - ISBN 0002313.

Czeglédy, I. Matematika : Előkészítő feladatok az érettségihez és az egyetemi-főiskolai felvételihez. - 1. vyd. - 186 s.
Blázsovics, J. (2000). Matematika - Ennyit KELLene tudnod. Akkord, 2000. - 416. - ISBN 963 780 371 8.
Hajnal, I. (2004). Matematika 11. a gimnáziumok számára. - 2. vyd. - Budapest : Nemzeti Tankönyvkiadó, 2004. - 224 s. - ISBN 963 19 4884 6.
Hajnal, I. et al.(2004). Matematika 12. : a gimnáziumok számára - 1. vyd. - Budapest : Nemzeti Tankönyvkiadó, 2004. - 230 s. - ISBN 963 19 3919 7.
Hajnal, I. (2001). Matematika 9. a gimnáziumok számára. Budapest: Nemzeti Tankönyvkiadó, 2001. - 295 s. - ISBN 9631948765.
Smida, J. (1985). Matematika a gimnázium 1. osztálya számára. - 1. vyd. - Bratislava : SPN, 1985. - 339 s.
Buša,J. – Schrötter, Š. (2015). Stredoškolská matematika. Košice: FEI TU. ISBN 978-80-553-2193-6 (dostupný na internete: http://people.tuke.sk/jan.busa/SM/Busa_Schrotter_Stredoskolska_matematika_2015.pdf, cit.: 31-01-2022)

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Katarína Szarka, PhD.

Date of last update: 06.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ VKB/22	**Name:** Selected chapters of biochemistry

Types, range and methods of educational activities:
Form of study: Seminar
Recommended extent of course (in hours):
Per week: 2 **For the study period:** 26
Methods of study: present

Number of credits: 2

Recommended semester/trimester of study: 5.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
During the semester the assignments submitted by the student will be evaluated. When evaluating the submitted assignments, in addition to the right solutions (for which you can get a maximum of 8 points), the submission of the assignments by the deadline is also taken into account (max. 2 points).
The subject ends with a written examination, on which the student must achieve a minimum of 50% of the available score.
During the evaluation at the end of the semester, the final grade includes the student's performance on the written examination and on the submitted assignments based on the following relationship:
Final grade=(1 x the % expression of the performance achieved on the submitted assignments + 2 x the % expression of the performance achieved in the written examination)/3.
Total student load: 2 credits = 50-60 hours, of which
- participation in 26 hours of face-to-face education; 13 hours of calculation tasks or solving other chemical tasks; 11-21 hours of independent study and preparation for the written examination..
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%

Results of education:
After successfully completing the course, the student:
Knowledges:
• can classify chemical compounds and chemical transformations, can identify the chemical structure of natural macromolecular substances, can explain their structure and chemical properties;
• is able to identify the basic conceptual, categorical and methodological apparatus of biochemistry;
• knows and can apply the nomenclature of biologically important compounds;
• knows the basic principles of the primary, secondary, tertiary and quaternary structure of hydrocarbons, peptides and proteins;

• can explain the connections between biological function and the chemical structure of the cell membrane;
• knows the role of organic molecules in biological processes, from their entry into the body to their removal from the body;
• acquires knowledge of the basic biochemical processes taking place in living organisms and gets a comprehensive picture of the chemical laws of living organisms;
• is able to create interdisciplinary connections between chemistry and biology.
Skills:
• can comprehensively analyze basic chemical phenomena in the field of biochemistry;
• is able to describe the structure of macromolecular organic substances;
• can explain the variety of their structures, their stereochemistry and knows their chemical reactions;
• is able to explain the biological function of macromolecular substances based on their structure;
• understands the basic principles and mechanisms of chemical reactions of biochemical compounds;
• is able to propose a chemical method to prove the chemical structure of a given compound.
Competencies:
• has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
• applies chemical thinking in biological systems;
• is able to understand the principle of the structure of organic macromolecules and explain their biological function;
• is open to learning higher level organochemical knowledge;
• understands the interactions between different groups of organic compounds;
• is able to explain everyday, common biochemical problems.

Brief syllabus:

1. The chemical structure and properties of substances that form the basis of living matter.
2. D/L configurations of monosaccharides. Terms: enantiomer, diastereomer, epimer, anomer.
3. The structure and function of triacylglycerol for the cell.
4. Membrane lipids - phospholipids, glycolipids and cholesterol.
5. Proteinogenic L-amino acids.
6. The importance of different types of bonds in the protein molecule.
7. Vitamins and coenzymes - biological significance and mechanism of action
8. The structure and function of chloroplasts in photosynthesis.
9. Structure and function of mitochondria in the cell. Photochemical system I, II. Cyclic and non-cyclic phosphorylation.
10. CO2 sequestration. Calvin cycle.
11. The function of carnitine in lipid metabolism.
12. The essence of ammonia decomposition in the urea cycle.

Literature:

Vodrážka Z., a kol. (2007) : Biochemie. - 1. vyd. - Praha : Academia, 190 s. - ISBN 978-80-200-0600-4
Šajter V., (2006) : Biofyzika, biochémia a radiológia. - 1. vyd. - Martin : OSVETA - 272 s. - ISBN 80-8063-210-3
Lásztity R. (1995): Biokémia. Budapest, Nemzeti Tankönyvkiadó, 127 s. - ISBN 96 318 6565 7
Chikán Á., (2000) : Szegedi biológiai központ : Biofizika, biokémia, enzimológia, genetika, növénybiológia. - Budapest : MTA, - 56 s. - ISBN 963 508 255 x

Mandl J., et al., (2006) : Biokémia. - 1. vyd. - Budapest : Semmelweis Kiadó, - 176 s. - ISBN 963 9656 18 6
Gasztonyi K.(1996): Élelmiszerkémia. Budapest. Nemzeti Tankönyvkiadó. ISBN 96 318 7419 2
Berg J.M., Tymoczko J.L., Stryer L.(2002): Biochemistry - 5. vyd. - New York, USA : W. H. Freeman - 1100 s. - ISBN 978-0716746843.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Andrea Vargová, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ VKO/22	**Name:** Selected chapters of organic chemistry
Types, range and methods of educational activities: **Form of study:** Seminar **Recommended extent of course (in hours):** **Per week:** 2 **For the study period:** 26 **Methods of study:** present	
Number of credits: 3	
Recommended semester/trimester of study: 4.	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: During the semester the assignments submitted by the student will be evaluated. When evaluating the submitted assignments, in addition to the right solutions (for which you can get a maximum of 8 points), the submission of the assignments by the deadline is also taken into account (max. 2 points). The subject ends with a written examination, on which the student must achieve a minimum of 50% of the available score. During the evaluation at the end of the semester, the final grade includes the student's performance on the written examination and on the submitted assignments based on the following relationship: Final grade=(1 x the % expression of the performance achieved on the submitted assignments + 2 x the % expression of the performance achieved in the written examination)/3. Total student load: 3 credits = 75-90 hours, of which - participation in 26 hours of face-to-face education; 20 hours of calculation tasks or solving other chemical tasks; 29-44 hours of independent study and preparation for the written examination.. The condition for successful completion of the course is to obtain at least 50% of the maximum score. The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.	
Results of education: After successfully completing the course, the student: Knowledges: • can classify chemical compounds and chemical transformations, can identify the chemical structure of organic substances, can explain their structure and chemical properties; • is able to identify the basic conceptual, categorical and methodological apparatus of organic chemistry; • can establish relationships between chemical substances and their transformations, and can draw conclusions regarding the expected products of chemical reactions; • acquires the basic knowledge of organic chemistry, within which he/she is able to divide organic compounds based on the most important functional groups;	

• acquires knowledge of organic chemistry that can be used to solve theoretical and practical problems that arise during work;
• knows and can apply the nomenclature of organic compounds;
• knows the basic structural principles and reactions of organic compounds;
• knows the physical and chemical properties of organic compounds and their effects on health and the environment;
• gets to know the basic principles of organic chemistry;
• recognizes the different types of isomers: constitutional, geometric (cis- and trans-) and stereo- (R/S) isomerism;
• acquires the theoretical knowledge necessary to study and understand biochemistry;
Skills:
• can comprehensively analyze basic chemical phenomena in the field of organic chemistry;
• knows the nomenclature of organic compounds, based on this knowledge he/she can write down the structural formulas of these substances correctly;
• can explain the structural, stereochemical variety of organic compounds and knows their chemical reactions;
• knows the problems of constitutional, geometric (cis- and trans-) and stereo(R/S) isomerism;
• understands the basic principles and mechanisms of chemical reactions of organic compounds;
• is able to design a synthesis for the production of a specific organic compound;
• can design a chemical method to prove the chemical structure of a given compound;
Competencies:
• • has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
• is committed to applying the chemical way of thinking;
• is open to learning higher level organochemical knowledge;
• understands the interactions of different groups of organic compounds.

Brief syllabus:

1. Organic chemistry in everyday life.
2. The main sources of hydrocarbons. The processing of crude oil into primary products.
3. The importance and occurrence of conjugated bonds in organic compounds.
4. Polymers and plastics.
5. Bonds in organic compounds. Electron effects.
6. The effect of organic substances on health and the environment. Freons.
7. Organic compounds as acids and bases, the effect of structure on acidity.
8. Reactivity of organic compounds. The division of chemical reactions according to the method of bond breaking, according to the type of reagent, according to the changes occurring on the substrate.
9. The mechanism of basic types of organic reactions. Marking of reactions using a chemical equation and reaction scheme.
10. Isomerism - isomer types, structural (constitutional), stereoisomers (conformational, configurational), optical isomerism, enantiomers.
11. New trends in organic chemistry. Unconventional reaction conditions in green chemistry.

Literature:

Devínsky F., et al. (2001) : Organická chémia pre farmaceutov. 1. vyd. – Bratislava, Osveta, - 750 s. ISBN 80-8063-056-9
Antus S., Mátyus P., (2010) : Szerves kémia I. Budapest, Nemzeti Tankönyvkiadó, ISBN: 978 963 195 716 7
Balogh Á., (1990): Szerves kémia. Budapest, Tankönyvkiadó, ISBN 96 318 2741 0
Halmos I., (1992): Szerves kémia. Budapest, Műszaki Könyvkiadó, ISBN 96 310 9743 9

Kajtár M.: Változatok négy elemre - Szerves kémia 1-2. ELTE Eötvös Kiadó Kft., ISBN: 9789 6328 4113 7
McMurry J., (2007) : Organická chemie, ISBN 987-80-7080-637-1
Svoboda J., (2013) : Organická chemie - 1. vyd. – Praha, Vysoká škola chemicko-technologická - 310 s, ISBN 978-80-7080-561-9.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Andrea Vargová, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ ZMA/22	**Name:** The Basics of mathematics

Types, range and methods of educational activities:
Form of study: Lecture / Seminar
Recommended extent of course (in hours):
Per week: 1 / 1 **For the study period:** 13 / 13
Methods of study: present

Number of credits: 3

Recommended semester/trimester of study: 2.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
The seminar ends with a written examination, which can be divided into two during the semester if needed. In the case of a division in two, the final evaluation of the seminar is given by the average result of the two written examinations. Only students who have passed the written examination with at least 50% are allowed to participate in the oral examination. During the termtime of the semester, the student can earn additional points by solving and submitting assignments.
The exam consists of a written and an oral part. Only those students who have passed the written part with a score of over 50% are allowed to take the oral part, otherwise the exam will be evaluated as insufficient (Fx) at the given time.
The final assessment of the course is as follows:
0.15 x the % of points awarded for the submitted assignments + 0.25 x the % of points awarded for the evaluation of the seminar's written examinations + 0.6 x the % of points awarded for the exam part.
Total student load: 3 credits = 75-90 hours
- 26 hours of participation in contact classes; 26 hours of preparing and solving seminar tasks; 23-38 hours of self-study, preparation for written and oral exams.
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%.

Results of education:
After successfully completing the course, the student:
Knowledges:
● has knowledge of basic high school math calculations at a level that serves as a basis for practice and research;
● has the special knowledge of mathematics and other natural science disciplines that are necessary for the application of the obtained knowledge;
● knows the basic concepts of algebra;
● knows the definition and properties of vectors; can characterize the linear dependence of vectors;

● knows and can define matrices; know equivalent matrix arrangements;
● knows the concept of the determinant of a matrix and can calculate its value;
● knows and can write a system of linear equations;
● knows the methods of solving the system of linear equations;
● knows and can characterize the properties of functions;
● knows the concept of limits and derivatives of functions and their application in chemistry;
● knows the concept and application of primitive function and indefinite integral in chemistry;
Skills:
● knows the method of solving linear differential equations with separable variables;
● applies basic mathematical calculations in the mentioned subject areas;
● actively uses mathematical tools when solving chemical problems;
● actively applies the methods of solving algebraic equations in chemistry;
● actively applies the derivation and integration of functions in chemistry;
● is able to perform basic mathematical calculations in reaction kinetics;
Competencies:
● has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
● is capable of independent and efficient activity;
● takes an active and responsible approach to completing the course assignments.

Brief syllabus:

1. Basics of high school mathematics - repetition.
2. Basics of high school mathematics - solving examples.
3. Introduction to algebra.
4. Vectors, linear dependence of vectors - definition of concepts and solution of examples.
5. Matrices and determinants - definition of concepts and solution of examples.
6. Systems of linear equations - definition of concepts and solution of examples.
7. Solving algebraic equations - solving examples.
8. Introduction to mathematical analysis.
9. Functions - properties of functions and elementary functions - definition of concepts and solution of examples.
10. Limit value and continuity of functions - definition of concepts and solution of examples.
11. Derivation of functions and local extreme values of functions - definition of concepts and solution of examples.
12. Primitive function and indefinite integral - definition of concepts and solution of examples.
13. Solving differential equations - examples.

Literature:

Valo, Dušan: Matematika pre chemikov – pracovné listy z vybraných kapitol, Fakulta prírodných vied, Univerzita Konštantína Filozofa v Nitre, 2006, ISBN 80-8094-049-5, http://www.km.fpv.ukf.sk/upload_publikacie/20110913_115157__1.pdf
Krajňáková D., Míčka J., Machačová Ľ., (1988): Zbierka úloh z matematiky. Bratislava, Alfa, 538 s. - ISBN 0002566
Obádovics, J. Gyula: Matematika, Scolar Kiadó Budapest, 1996
Buša J., Schrötter Š. (2015): Stredoškolská matematika pre študentov FEI TU v Košiciach. ISBN 978-80-553-2193-6, dostupné na internete: http://people.tuke.sk/jan.busa/SM/Busa_Schrotter_Stredoskolska_matematika_2015.pdf
Turzík D. a kol. (2011): Základy matematiky pro bakaláře. Vysoká škola chemicko-technologická v Praze. ISBN: 978-80-7080-787-3, dostupné na internete: http://147.33.74.135/knihy/uid_isbn-978-80-7080-787-3/978-80-7080-787-3.pdf

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Dr. habil. PaedDr. György Juhász, PhD.

Date of last update: 06.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ ZMB/22	**Name:** The Basics of molecular biology

Types, range and methods of educational activities:
Form of study: Seminar
Recommended extent of course (in hours):
Per week: 2 **For the study period:** 26
Methods of study: present

Number of credits: 2

Recommended semester/trimester of study: 5.

Level of study: I.

Prerequisites:

Conditions for passing the subject:
During the semester the assignments submitted by the student will be evaluated. When evaluating the submitted assignments, in addition to the right solutions (for which you can get a maximum of 8 points), the submission of the assignments by the deadline is also taken into account (max. 2 points).
The subject ends with a written examination, on which the student must achieve a minimum of 50% of the available score.
During the evaluation at the end of the semester, the final grade includes the student's performance on the written examination and on the submitted assignments based on the following relationship:
Final grade=(1 x the % expression of the performance achieved on the submitted assignments + 2 x the % expression of the performance achieved in the written examination)/3.
Total student load: 2 credits = 50-60 hours, of which
- participation in 26 hours of face-to-face education; 13 hours of calculation tasks or solving other chemical tasks; 11-21 hours of independent study and preparation for the written examination..
The condition for successful completion of the course is to obtain at least 50% of the maximum score.
The course is graded on the following grading scale: A – 100–90%, B – 89–80%, C – 79–70%, D – 69–60%, E – 59–50%

Results of education:
After successfully completing the course, the student:
Knowledges:
• can identify the basic conceptual, categorical and methodological apparatus of the topic;
• can classify chemical compounds and chemical transformations;
• can identify the structure of nucleic acids, can explain their structure and chemical properties;
• has expanding knowledge of related sciences and understands and categorizes the relationships with other disciplines;
• knows the basic structural principles of nucleic acids and polypeptides;
• knows the role of nucleic acids in genetic and protein formation;
• acquires knowledge about the mechanisms of replication, transcription and translation - the molecular basis of inheritance, the transfer of genetic information;

Skills:
• can comprehensively analyze basic chemical phenomena in the field of molecular biology;
• is able to characterize the alpha-helix structure of nucleic acids in connection with their biological significance, in connection with the understanding and interpretation of their reproductive function;
• is able to create interdisciplinary connections between chemistry and biology;
Competencies:
• has creative thinking, is independent within his own educational process, is capable of making autonomous and responsible decisions within the framework of chemistry;
• understands the relationships between proteins and nucleic acids, and thus acquire the basic molecular knowledge necessary to understand genetics;
• in the course of his work, he/she is able to discover and understand the genetic connections between organic chemistry, molecular biology and genetics.

Brief syllabus:
1. A brief history of molecular biology. The subject and content of molecular biology.
2. Nucleic acids. Division of nucleic acids. Primary and secondary structure of nucleic acids.
3. Nucleoside and nucleotide.
4. DNA - chemical structure; Watson-Crick's double-stranded DNA model. Physical and chemical properties of DNA.
5. RNA - chemical structure; types of RNA; properties and differences between RNA and DNA.
6. The central dogma of molecular biology.
7. DNA replication. Semi-conservative mechanism.
8. Translation.
9. Transcription. Genetic code.
10. Molecular basis of gene expression regulation.
11. Recombinant DNA. Application of recombinant DNA technology.
12. DNA cloning, DNA sequencing and its importance.

Literature:
Gálová, Z. (2007): Molekulárna biológia, SPU Nitra. 165 s. ISBN 978-80-8069-951-2.
Erdei, A., ET AL. (1986): Immunológiai gyakorlatok, Tankönyvkiadó, Budapest
Watson a kol. (1980): A gén molekuláris biológiája. 3. vyd. - Budapest : Medicina Könykiadó, 680 s. ISBN 963 240 725 3.
Watson J.D. (2004): DNS az élet titka. 1. vyd. - Budapest : HVG Könyvek, 446 s. ISBN 963 7525 564.
Watson J.D. (1972): A kettős spirál : Személyes beszámoló a DNS szerkezetének felfedezéséről. 2. vyd. - Budapest : Gondolat, 177 s.

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher: Mgr. Andrea Vargová, PhD.

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.

INFORMATION SHEET

Name of the university: J. Selye University	
Name of the faculty: Faculty of Education	
Code: KCH/CHdb/ŠS/22	**Name:** State Examination
Types, range and methods of educational activities: **Form of study:** **Recommended extent of course (in hours):** **Per week: For the study period:** **Methods of study:** present	
Number of credits: 2	
Recommended semester/trimester of study:	
Level of study: I.	
Prerequisites:	
Conditions for passing the subject: All students who have met the requirements of the programme of study in the final year of their studies may take the state examination at the regular time according to the study schedule. In the oral state examination, the student gives an account of his/her knowledge and skills in his/her field of specialisation and the interdisciplinary connection with the relevant fields of specialisation. The student demonstrates the ability to communicate information, ideas, problems and solutions to professional and lay audience. The state examination takes the form of a colloquium in which the student's performance is assessed on a scale from A to FX. The grade counts for the overall state examination grade. The oral examination is graded on the following scale: A - 100-90%, B - 89-80%, C - 79-70%, D - 69-60%, E - 59-50%. A student who fails to achieve 50% receives no credit. The results of the state examination and the thesis defence are publicly announced by the chair of the board.	
Results of education: Knowledge: - the student has acquired knowledge in the compulsory and profile subjects of the study programme, - the student is able to define and interpret basic concepts in his/her own words, to explain and describe basic processes, to characterise and to apply academic methods of research in the areas indicated in the subject's thematic plan, - the student is able to analyse and evaluate the knowledge acquired in the subject. Skills: - the student is able to present his/her expertise, - the student is able to hand over his/her knowledge - the student is able to organise and apply the theoretical knowledge acquired, - the student has the ability to organise and apply the knowledge acquired in the course of his (her) studies. Competences: - the student is able to express his/her linguistic and professional culture in the oral examination, - the student is able to use the knowledge acquired in a wider context, - the student is able to put the knowledge acquired into practice and organise it,	

- the student is able to use his/her knowledge in a creative way while solving problems, as well as to analyse the problem and organise new solutions,
- the student is able to answer the questions of the committee at the expected level.

Brief syllabus:
I. General chemistry and physical chemistry
II. Inorganic chemistry and analytical chemistry
III. Organic chemistry and biochemistry

Literature:
Literature indicated in the information sheets of the study programme

Language, knowledge of which is necessary to complete a course:
Hungarian or Slovak

Notes:

Evaluation of subjects
Total number of evaluated students: 0

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

Teacher:

Date of last update: 07.07.2022

Approved by: doc. RNDr. Róbert Gyepes, PhD.