

Course description

Course abbreviation:	KCH/SZAFC	Page:	1 / 2
Course name:	Analytical and physical chemistry		
Academic Year:	2016/2017	Printed:	23.09.2017 20:12

Department/Unit /	KCH / SZAFC			Academic Year	2016/2017
Title	Analytical and physical chemistry			Type of completion	State Final Exam
Accredited/Credits	Yes, 0 Cred.			Type of completion	
Number of hours					
Occ/max	Status A	Status B	Status C	Course credit prior to	NO
Summer semester	7 / -	0 / 0	0 / 0	Counted into average	YES
Winter semester	0 / -	0 / 0	0 / 0	Min. (B+C) students	not determined
Timetable	Yes			Repeated registration	NO
Language of instruction	Czech			Semester taught	Winter, Summer
Substituted course	None				
Preclusive courses	N/A				
Prerequisite	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	N/A				

Course objectives:

- Aims
1. Gravimetry. General procedure of the gravimetric determination and procedure of the result calculation.
 2. Volumetry. General procedure of the volumetric determination and procedure of the result calculation.
 3. Acidobasic processes and their use in the quantitative analysis. Acidobasic titration curve. Methods of the end-point indication.
 4. Redox processes and their use in the analytical chemistry. Classification and examples of the redox titrations. Titration curve and method of the end-point indication.
 5. Qualitative inorganic analysis. Procedures of the cations and anions evidences. Criteria of selection of the analytical reactions. Sensitivity of the analytical reaction.
 6. The electrochemical methods in the chemical analysis (potentiometry, conductometry, polarography, electrogravimetry - principles, application).
 7. Electromagnetic radiation and its interaction with substances. Spectroscopy in visible, ultraviolet and infrared region.
 8. Electromagnetic radiation and its interaction with substances. Nuclear magnetic resonance, chemical shift, the multiplets formation, the chemical exchange.
 9. The separation methods. Chromatography - paper, thin-layer, gas, and liquid.
 10. General procedure of the chemical analysis. Accuracy and precision of the determination. Errors of determination, their formulation. The results testing.
 11. Ideal gas, equation of states, real gas, behaviour near the critical point.
 12. Phase diagram of a component existing in several phases, p vs. T diagram, Clausius - Clapeyron equation, triple point.
 13. The first law of thermodynamics, heat capacities, volume work, enthalpy (Mayer equation), perpetual mobile of the 1.type.
 14. The second law of thermodynamics, entropy and its significance and calculation, Boltzman relation.
 15. The third law of thermodynamics, criteria of thermodynamic equilibrium - Gibbs energy, chemical potential.
 16. The ideal solutions, Raoult law, T-x diagram, azeotropic mixtures.
 17. The condensed systems, phase diagram of the mixture NaCl - water, eutonic point.
 18. Equilibrium constant, its dependence on temperature, calculations of equilibrium constant by Gibbs energy.
 19. Thermochemistry, combustion and formation heats, enthalpy of bonds, determination of the Gibbs energy change from the reaction entropy and enthalpy.
 20. Electrodes, equilibrium potential of electrode, Nernst equation.
- Competences
- They orientate in the analytical and physical chemistry problems. They can use and integrate acquired knowledge to solving the chemical problems.

Requirements on student

Evaluation of the subject as well as the exam grading is made according to the articles No 31 - 33 in the Regulations on Study and Examinations University of Ostrava

Content

Analytical and physical chemistry.

Prerequisites - other information about course preconditions

The student must gain at least 180 credits during the study in the subjects stipulated by the curriculum of the degree specialization.

Competences acquired

The students orientate in the problems of analytical and physical chemistry. They can use and integrate the obtained knowledge to the chemical problems solutions.

Studijní opory

Guarantors and lecturers

- **Guarantors:** doc. RNDr. Václav Slovák, Ph.D.

Literature

Time requirements

Activities	Time requirements for activity [h]
Self-tutoring	15
Preparation for an exam	95
Consultation of work with the teacher/tutor (incl. electronic)	10
Total:	120

assessment methods

professional knowledge

Oral examination

prerequisite

professional knowledge

The student must gain at least 180 credits during the study in the subjects stipulated by the curriculum of the degree specialization.

learning outcomes

professional knowledge

The students orientate in the problems of analytical and physical chemistry. They can use and integrate the obtained knowledge to the chemical problems solutions.

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Chemistry	Bachelor	Full-time	Chemistry	1	2012	2016	Povinné předměty	A	3	LS