



SYLLABUS
«Chemistry (V) Analytical»

Degree of Higher Education - Bachelor
Specialty 101 Ecology
Educational professional program - no
Year of training – the second; Semester: 4
Learning form – full-time
Amount of the ECTC credits 6
Language of instruction - English

Supervisor
Supervisor's contact
information (e-mail)
eLearn Course URL

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<https://elearn.nubip.edu.ua/course/view.php?id=2667>

DESCRIPTION OF COURSE

Analytical chemistry (chemical analysis) is the area of chemistry responsible for characterizing the composition of matter, both qualitatively (what is present) and quantitatively (how much is present). Course includes: (1) the qualitative tests of cations and anions; (2) methods of identification of soluble and insoluble substances; (3) gravimetric analysis; (4) volumetry (neutralization, RedOx methods, precipitation titrimetry; complexometry).

STRUCTURE OF COURSE

Chapter	Hours (lectures/labs)	Results of learning	Tasks	Grading, scores
The spring semester, the 2^d year of study				
Module the 1st. The Foundations of the Qualitative Analysis				
Chapter 1. Subjects and objects of the chemical analysis (analytical chemistry). Methods of quantitative analysis.	4/2	To know the safe rules in chemical laboratory; classification of the qualitative tests of cations and anions, basic techniques of the qualitative analysis; their series and limitation factors To know how to organize the working place and realize the lab techniques of semimicro qualitative tests To analyze the advantages and disadvantages of the different analytical techniques; the importance of sensitivity and selectivity of analytical reactions To understand the importance of the chemical analysis in the environmental sciences and planning of the environment monitoring strategy. To apply the qualitative analytical tests	Elern testing	2
Chapter 2. Qualitative	2/10	To know the principles of the analytical separations and	Experiment al tasks –	8

analysis of cations and anions.		determinations of the cations and anions To have skills of analytical manipulations at the analysis of aqua mixtures; choose and apply appropriate separation - and detection method to solve simple problems; To understand the pathway of systematic qualitative chemical analysis	analysis of cations mixture; chemical qualitative analyses of soluble salts, water solutions and insoluble substances	
Chapter 3. Analytical purity of reagents. Ukrainian and international degrees of purity. The methodology of cation mixture analysis. Partial and Systematic analysis. The strategy of cation mixture separation	4/10	To know the requirements to the analytical reagents; the main qualitative tests of cations and anions To understand the general principles of the creation for the experimental pathway of inorganic substances qualitative analysis To have skills to determine the qualitative composition of inorganic oxides, salts, acids, alkalis, account for some common sampling strategies for inorganic compounds	Module control tests Elern testing	6
Total 1st module	10/22			16
Module the 2^d. The Foundations of the Gravimetric Quantitative Analysis				
Chapter 1. Expression of Concentration in chemical and environmental analysis. Formulas of recalculations of concentration units. Preparation of solutions. Calculation in quantitative analysis.	2/2	To know the content and math expression of the main units of concentrations; Should be able to transform one unit into other ones; To analyze quantitative calculations via units of concentrations; To understand the application fields of the different units; To apply the qualitative expressions for the environmental objects; To use the basic ideas for the solution of calculations in qualitative analysis	Module control tests Elern testing	2
Chapter 2. Heterogeneous equilibrium. Molar and mass solubility. Factors effecting solubility.	4/2	To know the idea of solubility predicting based of value of solubility product; how to regulate solubility by acting of inner factors. To understand the natural processes controlled by precipitation and dissolving of slightly soluble substances. To apply calculated solubility for the creating of chemical barrier against anthropogenic pollution	Module control testing. Elern testing	12

Chapter 3. Gravimetric analysis.	2/6	To understand the pathway of gravimetric qualitative analysis. To have skills in physical and precipitation gravimetry	Experimental task – determination of barium content in barium chloride.	8
Total the 2^d module	8/8			22
Module the 3^d. The Foundations of the Volumetric Quantitative Analysis				
Chapter 1. Homogeneous equilibrium in solutions.	4/0	To know the foundations of the homogeneous equilibrium in solution; application of equivalent law in volumetry. To understand the concent of a pH; ionic product of water; biological function depending pH; concent of a pH buffering; acid-basic indicators. To should be able to measure a pH, to calculate the titration curves, to determine equivalent points, titration jump; to choice the acid-base indicators. To have skills of pH calculations (e.g., strong acids and bases, weak acids and bases, hydrolyzed salts; buffer solutions); to prepare buffer solutions.	Module control testing. Elern testing	12
Chapter 2. Volumetry methods: theoretical foundations and application	8/15	To know the theory of volumetric quantitative methods (neutralization, RedOx, complexometry); To have practical skills of qualitative determinations used above mentioned analytical methods; To understand the features of above mentioned methods application in the environmental analyses; To use the math treatment of experimental results.	Experimental tasks, theoretical quizzes, elern testing	20
Total the 3^d module	12/15			32
Total				70
Exam				30
Finally				100

EVALUATION POLICY

<i>Deadline policy and exam retake allowing:</i>	Works that are submitted in violation of deadlines without good reason are evaluated at a lower grade. Retake of tests takes place with the lecturer's permission if there are good reasons (for example, student was sick and has the hospital sheet).
<i>Academic Integrity Policy:</i>	Write-offs during tests and exams are prohibited (including using mobile devices).
<i>Attendance Policy:</i>	Attendance is a mandatory component of the grade for which points are earned. For objective reasons (such international internship, sickness), teaching may be provided on-line, in agreement with the Dean.

GRADING SYSTEM

Rating of Higher education applicant, scores	National grade according to the results of written examination	
	exam	test
90-100	Excellent	Pass
74-89	Good	
60-73	Satisfactory	
0-59	Unsatisfactory	Fail