СИЛАБУС ДИСЦИПЛІНИ
«___ANALYTICAL CHEMISTRY_»

Ступінь вищої освіти - Бакалавр
Спеціальність Біотехнології та біоінженерія
Освітня програма «____«Бакалавр» (денної форми навчання)__»
Рік навчання ___1_____, семестр ___1_____
Форма навчання _____денна_____(денна, заочна)
Кількість кредитів ЄКТС____6____
Мова викладання ___, англійська ___(українська, англійська, німецька)

Лектор курсу Лаврик Р.В.	_____ Лаврик Р.В._____
Контактна інформація лектора (e-mail)	_____ ruslan_lav@ukr.net _____
Сторінка курсу в eLearn	https://elearn.nubip.edu.ua/course/view.php?id=2590

ОПИС ДИСЦИПЛІНИ
(до 1000 друкованих знаків)

Analytical chemistry is the branch of chemistry dealing with the separation and analysis of chemical substances. Traditionally, analysis has been concerned largely with chemical composition, but it is coming more and more to include the determination of chemical structure and the measurement of physical properties. Analytical chemistry includes both qualitative and quantitative analysis. Qualitative analysis is concerned with what is present, quantitative analysis - with how much, exclusively with the analysis of inorganic materials. Nevertheless, analytical chemistry properly includes the analysis of organic material too. Analytical chemistry finds extensive application in the analysis of organic compounds, fertilizers, pesticides, agrochemicals, plants, soils, pharmaceuticals, biochemicals, body fluids, hair, the atmosphere, polluted water, foods, alloys, and in many other areas.

Analytical Chemistry is the Chemistry of the differences. From an analytical point of view, analogies of elements, of a same column or period of the periodic table, are left aside in the same way that analogy of organic compounds, having the same functional groups, in order to pay more attention to the specific identity of elements and compounds. In this sense, Analytical Chemistry is closer to the evidences of the life experiences than other chemical disciplines and it can be well understood by our students, who appreciate the different effects of sodium and potassium on soil fertility, in spite of the fact that both are alkaline elements, or the tremendous differences between the toxicity of methanol and ethanol, which have the small difference of a carbon and two hydrogen atoms.

СТРУКТУРА КУРСУ

Тема	Години (лекції/ лабораторні роб.)	Результати навчання	Завдання	Оцінювання
1 семестр				
Модуль 1				
Тема1 Lecture # 1. Subjects and objects of the chemical analysis (analytical chemistry).	2/2	What is necessary to know , What one should be able to do, What one should be concerned in: Methods of quantitative analysis – chemical and physical-chemical. Subjects of qualitative and quantitative analyses. Methods of qualitative analysis – macro-, semimicro-, micro-, and ultramicromethods.	lab works preparation;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 2. Analytical reactions and requirements to analytical reactions. Examples of qualitative reactions of different visual effects (sedimentation, colorizing etc.).	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: "Dry" and "wet" qualitative tests. Pyrochemical methods (idea of borax bead tests, flame tests), microcrystalline analysis, analysis in drops in filter paper. Notions of specific, selective, and group reactions and reagents. Examples.	lab works preparation;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 3. Principles of cations classification – acid-base, sulfide, ammine-phosphate.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: The main group reagents. Analytical purity of reagents. Ukrainian and international degrees of purity (classification техн,	lab works preparation;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;

		ч, чда, хч, осч; Analytical reagent AR, Guaranteed Reagent (GR) etc.).		
Lecture # 4. The methodology of cation mixture analysis.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: Partial and Systematic analysis. Centrifugation, fullness testing.	lab works preparation; tests;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Модуль 2				
Lecture # 5. Expression of Concentration:	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: percent (mass) concentrations (percentage weight by weight; volume by volume etc; Molar, Normal (equivalent), and Titr.	lab works preparation;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 6. Formulas of recalculations of concentration units.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: Preparation of solutions. Calculation in quantitative analysis.	lab works preparation; experimental problems; tests;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 7. Heterogeneous equilibrium.	2/	What is necessary to know , What one should be able to do, What one should be concerned in: Equilibrium In Saturated Solutions of Slightly Soluble Substances. Solubility product. Molar and mass solubility. Examples of calculations.	lab works preparation; experimental problems;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;

Lecture # 8. Factors effecting solubility	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: temperature, common ion effect, pH effect. Notion of ionic power (strength), active coefficients, and active concentrations.	lab works preparation; lab works preparation;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 9. Subject of gravimetric analysis.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: Equipment and tools (filter paper series). The experimental strategy. Calculations in gravimetric analysis. Tananaev's rule. Amorphous and crystalline sediments. Requirements to sediments in gravimetric analysis. Rules of sedimenting.	lab works preparation; experimental problems; tests;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 10. Homogeneous equilibrium. Ionic product of water.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: pH notion. Biological function depending pH. Measuring pH. pH calculations of strong acids and bases, weak acids and bases.	lab works preparation; experimental problems;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 11. Hydrolysis and pH calculations of different salts solutions. Buffer solutions.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: Calculate of a pH of buffer solutions. Titration curves, equivalent points, titration jump. Acid-	lab works preparation; experimental problems;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;

		base indicators. Choice of indicators. Equivalent law in volumetry.		
Lecture # 12. Neutralization method.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: Standard and working solutions, possibilities of method. Determination of water temporary hardness.	lab works preparation; tests;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 13. RedOx volumetry. Nernst equation.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: Electrode potential of redox systems. Electromoving force (EMF) of redox systems. RedOx indicators.	lab works preparation; experimental problems;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 14. Foundations of permanganatometry and iodometry.	2/6	What is necessary to know , What one should be able to do, What one should be concerned in: Bases of method of permanganatometry and iodometry.	lab works preparation; experimental problems;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;
Lecture # 15. Complexonometry. Bases of method.	2/4	What is necessary to know , What one should be able to do, What one should be concerned in: Standard and working solutions, possibilities of method. Metal-lochromic indicators. Determination of total temporary hardness.	lab works preparation; experimental problems; tests;	-Control of lab works preparation; -Theoretical control tests; -Control experimental problems;

		Precipitation titration. Mohr' method of chloride determination. Fixation of equivalent point. Experimental strategy.		
Total	30/60			
Course work	44			(70/30) 100
Всього за 1 семестр				70
Екзамен				30
Всього за курс				100

ПОЛІТИКА ОЦІНЮВАННЯ

Політика щодо дедлайнів та перескладання:	Роботи, які здаються із порушенням термінів без поважних причин, оцінюються на нижчу оцінку. Перескладання модулів відбувається із дозволу лектора за наявності поважних причин (наприклад, лікарняний або довідка з деканату).
Політика щодо академічної доброчесності:	Списування під час контрольних робіт та екзаменів заборонені (в т.ч. із використанням мобільних девайсів). Курсові роботи, реферати повинні мати коректні текстові посилання на використану літературу
Політика щодо відвідування:	Відвідування занять є обов'язковим. За об'єктивних причин (наприклад, хвороба, міжнародне стажування) навчання може відбуватись індивідуально (в он-лайн формі за документальним погодженням із деканом факультету)

ШКАЛА ОЦІНЮВАННЯ СТУДЕНТІВ

Рейтинг здобувача вищої освіти, бали	Оцінка національна за результати складання екзаменів заліків	
	екзаменів	заліків
90-100	відмінно	зараховано
74-89	добре	
60-73	задовільно	
0-59	незадовільно	не зараховано