Identification	**Subject**	CHEM 220 Physical and analytical chemistry 6 ECTS	
	Department	Chemistry and Chemical Engineering	
	Program	Undergraduate	
	Term	Spring 2024	
	Instructor	Tahir Javadzade	
	E-mail:	tjavadzade@khazar.org	
	Phone		
	Classroom/hours	TBC	
	Office hours	Monday to Friday 09:30-17:30	
Prerequisites			
Language	English		
Compulsory/Elective	Compulsory		
Required textbooks and course materials	▪ Physical Chemistry by Gilbert Castellan [1] ▪ Atkin's Physical Chemistry (11 th edition) written by Peter Atkins, Julio de Paula and James Keeler in pdf published in 2018 [2] ▪ Fundamentals of Analytical Chemistry (9th Edition) written by F.James Holler and Stanley R.Crouch in pdf published in 2013 [3]		
Website of course	This course is based on traditional face-to-face classes.		
Teaching methods	**Lecture**		**X**
	Group discussion		**X**
	Practical tasks		**X**

Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Laboratory work	10 May 2024	5
	Activity		5
	Quiz	2nd week of each month	15
	Midterm Exam	TBC	30
	Presentation/Group work	1st week of May	5
	Final Exam	TBC	40
	Total		100
Course outline	The course of Physical and Analytical chemistry covers fundamentals of physical chemistry, study of processes at the solid surface both in a theoretical and experimental aspect. Besides this the methods, technologies and analytical processes used in analytical chemistry are thoroughly explained. Students will learn analytical approaches such as sample collection, preparation and selection of appropriate equipment, sample analysis using classical and modern methods. In addition, they will learn in detail the principles, usage and application of modern analytical instruments.		

Course objectives	The following are common course objectives that are typically associated withPhysical and analytical chemistry: • Fundamental Knowledge of analytical chemistry • Chemical Nomenclature • Stoichiometry • Adsorption • Chemical Bonding • Surface Processes • Acids and Bases
Learning outcomes	Here are some common learning outcomes associated with introductoryphysical and analytical chemistry courses: • Recognize the essential principles and ideas of physical and analytical chemistry. • Understanding Processes at solid surfaces • Use mathematical calculations to model surface processes. • Recognize and group acids and bases. • Determine the pH and pOH of basic and acidic solutions. • Essential information about complex compounds and determination of complex compounds chemical formulas • Understanding basics of gravimetric analysis
Policy	• **Laboratory work** The topics covered in class are corresponding followed by laboratory works related with each topic. By this way student will strengthen their knowledge practically by understanding of the important chemical calculations and experiments. • **Participation** For a variety of reasons, participation in a classroom context is essential. It isessential to the learning process, promotes teamwork, and aids in the general success of both the individual students and the class as a whole. • **Presentation/Group work** Students frequently must explain difficult chemical ideas to their classmates when they work in groups or make presentations. As they must break it down into simpler terms and respond to inquiries from their classmates, teaching others can help students get a deeper knowledge of the content. • **Activity** The students should participate in the seminars, conferences, and other events related to their courses to build new connections between academic and non-academic institutions. By 10 May 2024, a one-page report on the students' activities will be required. • **Quiz** A consistent method of gauging your understanding of the content covered in class is through quizzes. They assist you and your teacher in evaluating your comprehension of important ideas and identifying any areas that can benefit from more explanation. Each quiz will consist of 5 questions, and each question will be marked with 5 point. There will be two quizzes. • **Withdrawal (pass/fail)** The School Science and Engineering grading guidelines are carefully adhered to throughout this course. To pass, a student must typically receive a mark of at least 60%. If the student fails, the course. • **Cheating/plagiarism** Any form of plagiarism or cheating on a test, quiz, or project will result in the cancellation of the assignment. In this scenario, the student will receive a score of zero (zero) without any further consideration. • **Illness** Student with an illness may miss a quiz or presentation. This might be because the student needs to go to the hospital, recover at home, or attend regular medical appointments. In this case, the student must inform the instructor in advance about the illness and must present a document from their doctor. After considering the situation,

	the instructor may set a new date for the quiz or project presentation. Only one opportunity will be given to the student. The students who don't inform the instructor in advance will not be given a chance to retake the quiz or give a presentation. • **Professional behavior guidelines** During class hours, students are expected to conduct themselves in a way that fosters a positive academic and professional atmosphere. Discussions without permission and unethical conduct are absolutely forbidden. • **Ethics** In class, students must not be late. During class, mobile phones must be put away and turned off.

Tentative Schedule		
Weeks	**Topics**	**Reference books**
1	Introduction to Physical Chemistry	[1] p.1-6
2	The Properties of Gases	[2] p. 4-27
3	Processes at solid surfaces	[2] p. 823-831
4-5	Adsorption and desorption	[2] p.837-840
6	Adsorption isotherms	[2] p.832-837
7	**Midterm exam**	
8	Tools of analytical chemistry	[3] p.15-48
9	Complex acid/base systems	[3] p.348-381
10	Gravimetric methods of analysis	[3] p.280-302
11	Titration in analytical chemistry	[3] p.302-322
12	Complex compounds	[3] p.400-441
13	Spectrochemical analysis	[3] p.650-722
14	Molecular Absorption spectrometry	[3] p.722-760
15	Analytical separation	[3] p.847-935
Final Exam		