Identification	**Subject**	CHE 310 Separation Processes, 6 ECTS	
	Department	Chemistry and Chemical Engineering	
	Program	Undergraduate	
	Term	Fall 2025	
	Instructor	Mail Babashov	
	E-mail:	mail.babashov@khazar.org	
	Phone		
	Classroom/hours	18:40-21:00	
	Office hours	Monday to Friday 09:30-17:30	
Prerequisites			
Language	English		
Compulsory/ Elective	Compulsory		
Required textbooks and course materials	**Main:** • Heriot-Watt University, *Separation Processes,* 2016 [1] **Extra:** • Richardson, J.F. Harker, J.H. Backhurst, J.R.., Coulson and Richardson's Chemical Engineering Volume 2 - *Particle Technology and Separation Processes*, 5th Edition, 2002, Elsevier [2] • Seader, J.D. Henley, E.J. and Harriott, P., *Separation Process Principles*, 3rd edition, John Wiley & Sons, Inc, 2010[3] • Benitez, J. *Principles and Modern Applications of Mass Transfer Operations,* 2nd Edition, John Wiley & Sons, Inc. 2009 [4]		
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 (%)**
	Activity		5
	Quiz	2nd week of each month	10
	Midterm Exam	TBC	30
	Presentation/Group work	2nd week of December	15
	Final Exam	TBC	40

Course outline	This course introduces the principles and applications of separation processes in chemical engineering. It emphasizes the fundamental concepts of mass transfer, equilibrium, and equipment design applied to distillation, extraction, and absorption. Students will gain the ability to analyze separation units, design basic equipment configurations, and apply both theoretical and graphical methods to solve practical problems.

Course objectives	• Fundamental Principles of Separation • Phase Equilibria and Mass Transfer • Distillation Design and Operation • Extraction Methods and Applications • Absorption Processes • Equipment Design (Columns, Trays, Packing) • Process Analysis and Simulation of Separation Units
Learning outcomes	By the end of this course, students will be able to: • Understand the concepts of vapour–liquid equilibrium and apply them to separation operations. • Analyze binary distillation systems, including single-stage, multi-stage, and batch distillation. • Apply the McCabe–Thiele method and reflux calculations for distillation column design. • Evaluate equipment design aspects such as plates, packing, condensers, and reboilers. • Understand the principles of liquid–liquid extraction, including partition coefficients, graphical methods, and stage calculations. • Apply mass transfer fundamentals (diffusion, film theory, overall mass transfer coefficients) to real systems. • Perform calculations related to absorption processes, including NTU/HTU methods, solvent flow requirements, and temperature effects. • Select appropriate separation methods and equipment based on feed characteristics and process requirements.
Policy	• **Precipitation** For a variety of reasons, participation in a classroom context is essential. It is essential 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 otherscan 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. • **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 to 10 questions and each question will be marked according to its difficulty. 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 markof 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 Distillation	[1], pg. 7-18
2	Exercises of Topic 1	[1], pg. 19-20
3	Distillation of Binary Mixtures	[1], pg. 31-64
4	Exercises of Topic 2	[1], pg. 35-68
5-6	Distillation Column Design	[1], pg. 73-91
7	**Midterm Exam**	
8-9	Liquid-Liquid Extraction	[1], pg. 95-133
10-11	Mass Transfer	[1], pg. 137-181
12-13	Absorption	[1], pg. 185-200
14-15	In-Class Activities, Presentations, Group Works	
Final Exam		