Identification	**Subject**	CHE313, Heat and Mass Transfer, 6 ECTS	
	Department	Chemistry and Chemical Engineering	
	Program	Undergraduate	
	Term	Autumn 2025	
	Instructor	Ahmad Galandarli	
	E-mail:	ahmadgalandarliuk@gmail.com	
	Phone		
	Classroom/hours	TBC	
	Office hours		
Prerequisites	• General Chemistry knowledge • Calculus • Introduction to Chemical Engineering		
Language	English		
Compulsory/ Elective	Compulsory		
Required textbooks and course materials	**Main:** • Heat and Mass Transfer for Chemical Engineers by Giorgio Carta (1st Edition, 2021) [1] **Extra**: • Fundamentals of Heat and Mass Transfer by F.P. Incropera, D.P. DeWitt, T.L. Bergman & A.S. Lavine [2] • Heat and Mass Transfer: Fundamentals and Applications by Yunus A. Çengel & Afshin J. Ghajar [3] • Transport Phenomena by R.B. Bird, W.E. Stewart & E.N. Lightfoot [4] • Mass Transfer Operations by Robert E. Treybal [5] • Separation Process Principles by J.D. Seader, E.J. Henley & D.K. Roper [6] • Principles of Heat and Mass Transfer by Frank Kreith, Raj M. Manglik & Mark S. Bohn [7] • Process Heat Transfer by Donald Q. Kern [8]		
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	15
	Midterm Exam	TBC	30
	Presentation/Group work	1st week of November	10
	Final Exam	TBC	40

	Total		100
Course outline	The Heat and Mass Transfer course provides students with a comprehensive understanding of the mechanisms and principles that govern energy and species transport in chemical engineering systems. The course covers conduction, convection, and radiation in heat transfer, as well as molecular diffusion, convective mass transfer, and interphase transport in mass transfer. Emphasizing both theoretical foundations and practical applications, it develops students' ability to model, analyze, and solve engineering problems involving heat and mass transport. Core applications include heat exchangers, evaporators, condensers, absorption, distillation, drying, and membrane processes. By integrating fundamental science with engineering problem-solving, the course equips students with the skills necessary for process design, optimization, and troubleshooting in industrial and environmental contexts. This subject is essential for students pursuing careers in chemical and process engineering, as it lays the groundwork for advanced studies in reaction engineering, process design, and transport phenomena.		

Course objectives	**Course Objectives:** • Develop fundamental knowledge of heat and mass transfer principles in chemical engineering • Understand conduction, convection, and radiation heat transfer mechanisms • Learn molecular diffusion and interphase mass transfer processes • Formulate and solve heat and mass balance equations for engineering systems • Analyze the performance of heat exchangers, evaporators, condensers, and related equipment • Understand mass transfer operations such as distillation, absorption, drying, and membrane processes • Apply theoretical concepts to practical chemical engineering problems and process design • Integrate heat and mass transfer knowledge into industrial and environmental engineering applications
Learning outcomes	**By the end of the course the students should be able:** • To build fundamental knowledge in heat and mass transfer principles • To apply conduction, convection, and radiation concepts to solve engineering problems • To understand and analyze molecular diffusion and interphase mass transfer • To formulate and solve heat and mass transfer equations for chemical processes • To evaluate the performance of heat exchangers, evaporators, condensers, and related equipment • To apply mass transfer principles in operations such as distillation, absorption, drying, and membrane processes • To interpret and construct process flow diagrams incorporating heat and mass transfer considerations

	• To apply heat and mass transfer concepts to solve practical industrial and environmental engineering problems
Policy	• **Participation** 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 Heat Transfer and Thermal Conductivity	[1] p. 7-70
2	Steady-State, One-Dimensional Heat Conduction	[1] p. 71-111
3	Combined Conductive and Convective Heat Transfer	[1] p. 112-140
5	Multidimensional and Transient Heat Conduction	[1] p. 141-200
6	Convective Heat Transfer	[1] p. 201-260
7	**Midterm exam**	
8	Thermal Design of Heat Exchangers	[1] p. 261-308
9	Introduction to Mass Transfer and Fick`s Law	[1] p. 308-341
10	Diffusivity and One-Dimensional Diffusion	[1] p. 342-421
11	Multi-Dimensional and Transient Diffusion	[1] p. 422-473
12	Convective Mass Transfer	[1] p. 474-532
13-14	Design of Packed Gas Absorption and Stripping Columns	[1] p. 450-596
15	Review	
Final Exam		