Identification	**Subject**	CHE 412 Chemical Process Design and Optimization, 6 ECTS	
	Department	Chemistry and Chemical Engineering	
	Program	Undergraduate	
	Term	Fall 2025	
	Instructor	Rauf Javadov	
	E-mail:		
	Phone		
	Classroom/hours		
	Office hours		
Prerequisites			
Language	English		
Compulsory/Elective	Compulsory		
Required textbooks and course materials	▪ Chemical Engineering Design (4th edition) written by Coulson and Richardson in pdf published in 2005 [1] ▪ Gas Conditioning and Processing (Volume 2: Equipment Modules) written by John M. Campbell in pdf published in 1992 [2] ▪ Chemical Engineering Design: Principles, Practice and Economics of Plant and Process Design (2nd edition) written by Ray Sinnott and Gavin Towler 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**
	Simulation tasks		**X**
Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm exam	28 November	30
	Activity	TBA	5
	Equipment Sizing	TBA	15
	HAZOP Study	TBA	10
	Final exam (Presentation)	TBA	40
	Total		100
Course outline	This course provides students with a comprehensive understanding of the principles and practices of chemical process design and optimization. Students will learn how to conceptualize, synthesize, and optimize chemical processes with a focus on safety, and economic efficiency. The course will involve researching into several industrial processes and evaluating the conditions to determine the feasibility of the project.		

Course objectives	The following are common course objectives that are typically associated withChemical Process Design and Optimization • Drawing a Process Flow Diagram for a production process • Understanding the concepts of mass and heat balance • Preparing a specification sheet for an equipment • Performing HAZOP study
Learning outcomes	Here are some common learning outcomes associated with process design courses: • Knowledge of engineering drawings • Ability to prepare heat and material balances for a process • Optimize the unit for higher efficiency • Manage costs to find optimum economics • Perform HAZOP study
Policy	• **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 generalsuccess of both the individual students and the class as a whole. • **Presentation** The students should research and select a production process in divided groups. Then they should prepare a detailed presentation about their projects in the including process description, heat and material balance, economical evaluation, safety and sustainability and environmental sections. • **HAZOP study** Students should perform a detailed HAZOP study for the selected process including the hazard, consequences and mitigation methods. Referred risk matrix should be provided as a supplementary document. • **Activity** The students should participate in all the classes. However class activity will mainly depend on the level of interaction between students in the groups. • **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 in the project will result in the cancellation of the report. In this scenario, the student will receive a scoreof zero (zero) without any further consideration. • **Illness** Student with an illness may miss midterm 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 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 withoutpermission 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 Chemical Process Design	[1] Chapter 1
2	Selection of Process Design topic	[3] Chapter 1
3-4	Preparation of Process Flow Diagram	[3] Chapter 2
5	Developing Heat and Material Balance of the unit	[1] Chapter 2,3
6-7	Process Equipment Design	[2] Chapter 11,14,15
8	Process Optimization	[3] Chapter 12
9	Utilities calculation	[3] Chapter 3
10	**Midterm Exam**	
11-12	Economic evaluation	[3] Chapter 7,8,9
13-14	HAZOP study	[3] Chapter 10
15	**Final Exam**	