Identification	**Subject**	CHE 310 – Separation Process – 6 ECTS
	Department	Chemistry and Chemical Engineering
	Program	Undergraduate
	Term	Fall 2024
	Instructor	Azar Tapdigzade
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	Phone	+994 516320176 +994 772553340
	Classroom/hours	11 Mehseti str. (Neftchilar campus) 407N/ 18:40 - 21:00
Prerequisites	Engineering Mathematics Knowledge of how to use of charts and tables Heat and material balance calculation	
Language	English	
Compulsory/Elective	Compulsory	
Course outline	Separation is common phenomena which has been classified into distillation, evaporation, absorption, adsorption, filtration and etc. which plays crucial part in the industry by forming pure raw materials or treat produced components from undesired parts.	
Required textbooks and course materials	Main textbooks (References): • Heriot-Watt University, Separation Process A, Edinburgh EH14 4AS, 2016 • Heriot-Watt University, Separation Processes B, Edinburgh EH14 4AS, 2016 • Heriot-Watt University, Oil and Gas B, Edinburgh EH14 4AS, 2016 • "Operations of Chemical Engineering (7th edition) (McGraw Hill Chemical Engineering Series) by Warren McCabe Hardcov • Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016	
Course objectives	• Provide full understanding of separation, treatment techniques • Have an overview about the different process unit equipment • Know how to apply theoretical methods for separation systems • Understand operation conditions of separators	

<table>
<tr><td></td><td colspan="3">• Consider and understand advanced separation processes</td></tr>
<tr><td>Learning outcomes</td><td colspan="3">By the end of this topic, you should be able to:
• Understand to be able to use design methods of separators
• Understand and calculation of mass balance, separator dimensions and etc.
• Understand the effect of upstream conditions on separation efficiency
• Understand binary and multi-stage separations
• Understand flash calculations and use McCabe-Thiele Method</td></tr>
<tr><td rowspan="3">Teaching methods</td><td colspan="2">Lecture</td><td>X</td></tr>
<tr><td colspan="2">Problem-based learning (Real industry examples)</td><td>X</td></tr>
<tr><td colspan="2">Simulation Software</td><td>X</td></tr>
<tr><td rowspan="6">Evaluation</td><td>Methods</td><td>Date/deadlines</td><td>Percentage (%)</td></tr>
<tr><td>Midterm Exam</td><td>Week 7th</td><td>25</td></tr>
<tr><td>Assignment</td><td>Week 4th & 12th</td><td>10/10</td></tr>
<tr><td>Topic Presentation</td><td>Week 14th</td><td>5</td></tr>
<tr><td>Final Exam</td><td>Week 14th</td><td>50</td></tr>
<tr><td>Total</td><td></td><td>100</td></tr>
<tr><td>Policy</td><td colspan="3">• Preparation for class
The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems and cases from the end of the chapter and sample exam questions.
• Assessment
Midterm will be in the middle of term which contains 25% of total mark. Students will be evaluated based on half term learning that help them to summarize all learnings.
Before and after midterm, quizzes will be arranged to get students be focused and recall what has been taught within 3-4 weeks and each quiz will give 10, 20 marks in total.
Presentations will be not only at week 14, but also during the semester on different topics to improve students` skills to investigate, present and learn more about chemical engineering industry. But only presentation at week 14 will be assessed by 5 percent of total mark.</td></tr>
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	Final exam will be assessed based on all learnings throughout the semester and will consist of 50% of total mark. • **Withdrawal (pass/fail)** This course strictly follows grading policy of the School of Engineering and Applied Science. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year. • **Cheating/plagiarism** Plagiarism and Cheating of any kind on an examination, quiz, or project will lead to assignment cancellation. In this case, the student will automatically get zero (0), without any considerations. • **Professional behavior guidelines** The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited. • **Ethics** Students should not arrive in late to class. All electronic devices must be silenced and stowed during class.

	Tentative Schedule	
Weeks	**Topics**	**Textbook/Assignments**
1	Introduction to Distillation (Bubble Point and Dew Point)	Heriot-Watt University, Separation Process A, Edinburgh EH14 4AS, 2016, topic 1, page 3-21
1	Introduction to Distillation (Vapor - Liquid Equilibrium Diagrams)	Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016, topic 1, page 5-23
2	Distillation of Binary Mixtures (Fundamentals of binary distillation)	Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016, page 13- 17, topic 1 Separation Process A, Edinburgh EH14 4AS, 2016, topic 2, page 3-34
2	Binary Distillation (Flash Stages)	Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016, topic 2, page 24-31

3	Binary Distillation (Feed Stage Considerations)	Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016, topic 2, page 26-37
3	Binary Distillation (McCabe-Thiele Method for Trayed Towers)	Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016, topic 3, page 15-23 Separation Process A, Edinburgh EH14 4AS, 2016, topic 2, page 16-23 "Operations of Chemical Engineering (7th edition) (McGraw Hill Chemical Engineering Series) by Warren McCabe Hardcov, page 45-51
4	Multi component Distillation (Introduction)	Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016, topic 3, page 41-56
5	Operation Conditions & Sequencing of Columns (Selecting Column Pressure))	Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016, topic 4, page 101-109
6	Operation Conditions & Sequencing of Columns (Selecting Column Pressure)	Heriot-Watt University, Unit Operation, Edinburgh EH14 4AS, 2016, topic 4, page 109-118
7	Distillation Column Design (Condensers and Reboilers)	Heriot-Watt University, Separation Process A, Edinburgh EH14 4AS, 2016, topic 3, page 3-34
Midterm Exam		
8	Surface Processing (Typical Processing Scheme)	Heriot-Watt University, Oil and Gas B, Edinburgh EH14 4AS, 2016, topic 1, page 5-21
9	Surface Processing (Treatment Overview)	Heriot-Watt University, Oil and Gas B, Edinburgh EH14 4AS, 2016, topic 1, page 5-

10	Surface Processing (Gravity Separators)	Heriot-Watt University, Oil and Gas B, Edinburgh EH14 4AS, 2016, topic 3A, page 6-15
10	Surface Processing (Design Methods)	Heriot-Watt University, Oil and Gas B, Edinburgh EH14 4AS, 2016, topic 3A, page 12-59
11	Gas Treatment (Dew Point Control)	Heriot-Watt University, Oil and Gas B, Edinburgh EH14 4AS, 2016, topic 3A, page 13-25
12	Gas Treatment (Dew Point Control)	Simulation on Aspen Hysys
13	Gas Treatment (Adsoprtion/Absorption)	Heriot-Watt University, Oil and Gas B, Edinburgh EH14 4AS, 2016, topic 3A, page 25-36
14	Gas Treatment/Sweetening Process Selection	Heriot-Watt University, Oil and Gas B, Edinburgh EH14 4AS, 2016, topic 3A, page 36-44
15	Final Presentation	N/A
Final Exam		