Ministry of Higher Education and Scientific Research

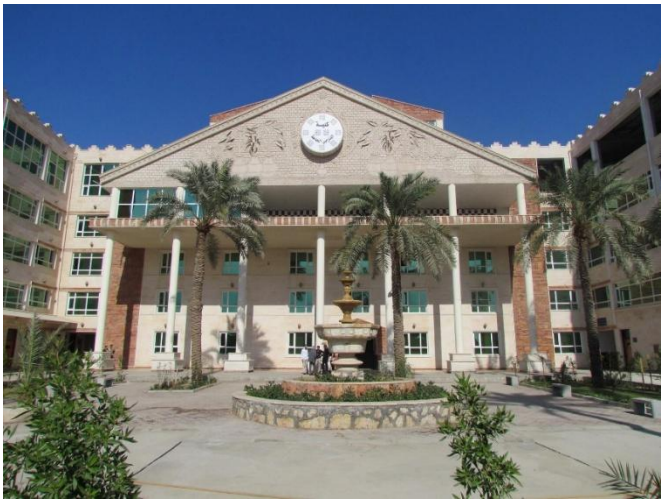
Al-Farabi University

College of Engineering

Oil And Gas Refinery Engineering

Academic Program Description and Courses for the Oil and Gas Refinery Engineering

(2024-2025)



Academic Program Description And Courses/College of Engineering/
Oil And Gas Refinery Engineering

Description of the academic program for Oil and Gas Refinery Engineering department

University Name:	**Al-Farabi University**
College/Institute:	**College of Engineering**
Scientific Department:	**Oil and Gas Refinery Engineering**
Academic Program Name:	**Oil and Gas Refinery Engineering**
Final Certificate Name:	**Bachelor's degree in Oil and Gas Refinery Engineering**
Academic System:	**Semester / Bologna System**
Description Preparation Date:	**May 13, 2025**
File Completion Date:	**May 13, 2025**

Signature:

Head of Department

Ass. Prof. Dr. Abdul-Fattah Mohammed Ali

Signature:

Asst. University President Dean for Scientific Affairs

Prof. Dr. Mazen Sameer Al-Hakeem

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Quality Assurance and University Performance Department

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Approval of University President

Asst. Prof. Dr. Mulyannad Mahdi Al-Jubouri

Academic Program Description

This academic program description provides a concise overview of the most important features of the Oil and Gas Refinery Engineering program and the expected learning outcomes for acquiring skills that prepare students to understand various petroleum refining processes and technologies. It is accompanied by a description of each course within the program.

1. Program Vision

- Obtaining high-quality education and conducting advanced research in the field of petroleum refinery and gas engineering, in response to industrial needs.
- Encouraging the practical, applied, and specialized aspects of petroleum refinery and gas engineering to support environmental protection through engineering designs that contribute to the economy of our country.
- Transforming theoretical knowledge and scientific data in petroleum refinery into practical reality by applying the principles and foundations of petroleum refinery and gas engineering, thereby equipping students with the skills and scientific understanding needed for diverse industrial and scientific applications.
- Preparing petroleum refinery and gas engineers with strong scientific competence and technical skills to contribute to the development of the refinery sector, gas technology, and petrochemical industries, in order to strengthen the national economy.

2. Program Mission

- Graduating engineering cadres with strong capabilities in both academic and applied aspects, specialized in petroleum refinery and gas engineering, by preparing innovative designs, integrated systems, pioneering plans, programs, and research projects, while fostering partnerships with oil institutions and industrial sectors.

- Preparing graduates who can effectively contribute to the petroleum refinery and gas engineering profession within the framework of modern industrial practices and sustainable development.

- Educating specialized engineers in petroleum refinery and gas engineering who are able to absorb advanced technologies and apply them in the preparation of specialized programs and designs for this sector, which has increasing importance in Iraq, in line with the major expansion witnessed by the oil industry.

- Supplying the petroleum refining sector with B.Sc. graduates in petroleum refinery and gas engineering who are capable of working responsibly and skillfully, in accordance with the latest scientific approaches and technological programs in the field.

3. Program Objectives

- Applying petroleum refinery and gas engineering sciences in an ethically responsible manner that aligns with legal frameworks and social responsibilities.

- Equipping graduates with extensive knowledge and critical thinking skills to effectively analyze industrial problems, with full consideration of safety and social impact.

- Contributing to the preparation of engineering projects aimed at addressing issues in petroleum refineries and industrial plants, while supporting monitoring, evaluation, and the development of modern treatment methods and alternative technologies.

- Promoting a culture of awareness in petroleum refinery and gas engineering across all aspects of professional practice, based on sound standards that encourage environmental protection and renewable energy projects.

- Enhancing the exchange of expertise and scientific consultation, providing laboratory services, and encouraging joint cooperation through shared experiences in the completion and implementation of research projects that serve both the oil industry and broader industrial sector.

4. Program Accreditation

Twinning with the Department of Chemical Engineering / University of Technology

5. Other External Influences

- Laboratory Practice
- Summer Training
- Training Courses
- Scientific Research
- Field Visits
- Extracurricular Activities
- Volunteer Campaigns
- Library
- Other

6. Program Structure

Program Structure	Credit hours	Percentage	Notes
Institution Requirements	6	4.5%	Basic
College Requirements	30	23%	Basic
Department Requirements	94	72.5%	
Summer Training	-	-	Complete
Total	130	100%	

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
First Year First Semester	OGRE1101	Technical English I	2	0
	OGRE1102	Mathematics I	2	2
	OGRE1103	Analytical Chemistry	2	2
	OGRE1104	Physis & Strength of Materials	3	2
	OGRE1105	Computer Science	2	1
	OGRE1106	Workshop I	2	4

First Year Second Semester	OGRE1201	Technical English II	2	0
	OGRE1202	Chemical Eng. Principles I	2	1
	OGRE1203	Mathematics II	2	1
	OGRE1204	Chemistry of Petroleum	3	2
	OGRE1205	Engineering Drawing and AutoCAD	3	3
	OGRE1206	Human Rights and democracy	2	0
	OGRE1207	Workshop II	2	4
Second Year First Semester	OGRE2101	Mathematics III	2	1
	OGRE2102	Chemical Eng. Principles II	2	1
	OGRE2103	Fluid Flow I	3	2
	OGRE2104	Physical Chemistry	3	2
	OGRE2105	Fuel Technology	2	2
	OGRE2106	Materials Engineering	3	2
Second Year Second Semester	OGRE2201	Mathematics IV	2	1
	OGRE2202	Chemical Eng. Principles III	2	1
	OGRE2203	Fluid Flow II	3	2
	OGRE2204	Computer Programming	2	2
	OGRE2205	Corrosion In Petroleum Refinery	2	1
	OGRE2206	Combustion	2	1
	OGRE2207	Crimes of the Baath Regime in Iraq	2	0
Third Year First Semester	OGRE3101	Thermodynamics I	2	1
	OGRE3102	Numerical Analysis	3	2
	OGRE3103	Mass Transfer	3	2
	OGRE3104	Chemical Reaction Kinetics	2	1
	OGRE3105	Heat Transfer I	2	1
	OGRE3106	Combustion	2	0
	OGRE3107	Chemicals from Petroleum	2	1
	OGRE3108	Equipment Design	2	1
Third Year Second Semester	OGRE3201	Thermodynamics II	3	2
	OGRE3202	Applied Mathematics in Chemical Engineering	2	1

	OGRE3203	Unit Operation I	2	2
	OGRE3204	Reactor Design	2	1
	OGRE3205	Heat Transfer II	2	1
	OGRE3206	Equipment Design Using CAD	3	2
	OGRE3207	Petroleum and Gas Field Processing	2	0
Fourth Year First Semester	OGRE3208	Project I	3	0
	OGRE4101	Unit Operations II	3	2
	OGRE4102	Process Dynamics	2	1
	OGRE4103	Petroleum Refinery Eng. I	2	1
	OGRE4104	Refinery Management & Ethics	2	1
	OGRE4105	Heterogeneous Reactor &Catalyst	2	1
	OGRE4106	Environment Pollution & Safety in Petroleum Refineries	2	1
Fourth Year Second Semester	OGRE4107	Project II	3	0
	OGRE4201	Unit Operations III	2	1
	OGRE4202	Process Control	3	2
	OGRE4203	Petroleum Refinery Eng. II	2	1
	OGRE4204	Optimization	2	1
	OGRE4205	Corrosion Eng. In Petroleum Refinery	2	0
	OGRE4206	Petroleum Refinery Economics	2	0

8. Expected learning outcomes of the program

A. Knowledge

A1 Mathematics, science and engineering underlying the practice of Oil and Gas Refinery Engineering.

A2 The interactions involved in Oil and Gas Refinery Engineering systems and analytical and computational tools to deal with these.

A3 The scope of chemical engineering from the molecular to the large scale.

A4 The economic, management and statutory requirements involved in the practice of Oil and Gas Refinery Engineering.

B. Skills

B1	Communicate clearly the findings of experiments, projects and other assignments using written reports, oral and visual presentations as well work effectively in a team, recognizing the roles played by different team members.
B2	Creatively employ applied science and engineering concepts in the design of industrial processes and equipment. Which in turn will demonstrate awareness of the importance of scaling techniques in design work.
B3	Perform complete mass and energy balances for chemical engineering plants. apply the principles of chemical equilibrium process thermodynamics to systems with chemical reactions.
B4	Oil and Gas Refinery Engineering graduates will be able to write coherent, concise, accurate technical reports, use computers effectively for solving Oil and Gas Refinery Engineering problems.

C. Ethics

C1	An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations.
C2	Apply the principles of the law as well as understanding of responsible research and innovation, data protection, ethics and bias relevant to AI research and innovation.
C3	know how to support the development of 'sustainability thinking.
C4	have developed an awareness of a chemical engineer's issues, obligations, and responsibilities with regard to ethics.

9. Teaching and Learning Strategies

The Oil and Gas Refinery Engineering program applies modern and diverse teaching methods aimed at developing students' technical knowledge, engineering skills, and professional competencies, preparing them for the oil and gas industry, petrochemical sector, and related research fields. This is achieved through a balanced integration of theoretical instruction, practical training, industrial exposure, classroom interaction, and extracurricular engineering activities.

A. Theoretical Lectures

Lectures are designed to build fundamental and advanced knowledge while stimulating students' analytical and problem-solving abilities. Technical information is presented systematically using modern engineering education tools such as:

- PowerPoint presentations illustrating refinery processes and plant layouts
- Technical videos demonstrating industrial operations and safety procedures
- Engineering diagrams, process flow charts, and simulation models

B. Practical Sessions

Practical training forms the backbone of the program and is conducted in specialized laboratories and pilot plant facilities equipped with the latest process equipment. Students are divided into small groups to ensure focused instruction and teamwork. Training covers:

- Operating and maintaining refinery and process equipment
- Using instrumentation and control systems
- Applying industrial safety and environmental protection procedures
- Conducting experimental process simulations and efficiency tests

C. Seminars and Workshops

Seminars promote active participation and collaboration in presenting engineering topics, enhancing skills in:

- Technical presentation and delivery
- Research and technical information analysis
- Engineering discussions, constructive criticism, and process improvement proposals

D. Group Work and Projects

Student teams work on refinery-related projects at various stages, focusing on:

- Process design and optimization studies
- Problem-solving in plant operations
- Developing innovative engineering solutions for industry challenges

E. Self–Directed Learning

Students are encouraged to use open-access and digital learning resources, simulation software, industrial standards, and engineering databases to deepen their technical expertise and understanding of course material.

F. Field and Lab Training

The program provides field training opportunities in oil refineries, petrochemical plants, and research institutions, offering students hands-on industrial experience and enhancing their professional readiness.

G. Interactive & Technology–Based Learning

Instructors integrate e-learning tools, simulation software, and university platforms to manage assignments, exams, and in-class/industrial activities, ensuring engagement with both theoretical and applied aspects.

H. Practical and Written Examinations

Assessment methods include:

- Short and final written exams testing theoretical knowledge
- Practical and laboratory reports on experiments and simulations
- Oral presentations of design and research findings
- Engineering project reports addressing refinery-related problems and solutions

10.Evaluation methods

Assessment methods in the Oil and Gas Refinery Engineering program rely on a variety of measurement and evaluation tools to ensure the achievement of targeted learning outcomes. These methods assess students' understanding of theoretical principles, their proficiency in practical engineering skills, and their ability to think analytically and solve industrial problems.

Evaluation is carried out through weekly assignments, technical reports, project presentations, classroom activities, participation, and monitoring of individual academic and professional progress.

This strategy aims to:

- Continuously monitor and evaluate student performance.
- Measure technical and practical competencies acquired in laboratories, pilot plants, and industrial training.
- Identify students' strengths and areas for improvement.
- Promote proactive learning and engineering problem-solving.
- Ensure that the educational objectives of each course are met effectively.

Evaluation Type	Evaluation Method	Score Weight (%)
Formative Assessment	Quizzes	10
	Assignments and Projects related to refinery topics	10
	Laboratory / Pilot Plant Practical	10
Exam Assessment	Midterm Exam	10
	Final Exam: Final Practical Exam	10
	Final Theoretical Exam	50
Total		**100**

Graduation Project Evaluation

The graduation project evaluation is based on:

- Research effort and professional commitment (supervisor's evaluation) – 40%
- Oral defense before the scientific committee – 60%

Total Score: 100%

Field Training Evaluation

Field training evaluation is conducted as follows:

- Performance evaluation by the industrial training provider (refinery, petrochemical plant, or related facility)
- Submission of a detailed technical report on the training activities and outcomes
- Oral evaluation and discussion in front of the department committee

11. Acceptance Criterion

General Admission Requirements

- The Oil and Gas Refinery Engineering Department follows the admission mechanism in accordance with the central admissions system of the Ministry of Higher Education and Scientific Research / Private Education Administration.

- The number of students admitted each year is determined according to the department's capacity, infrastructure, and academic requirements.

- Applicants must hold a preparatory school certificate in the scientific or applied branches, or an officially recognized equivalent.

- The applicant's GPA must meet or exceed the minimum set by the Ministry for admission to public or private colleges (according to the academic year system).

- The applicant must be physically fit, healthy, and free from any medical conditions that could hinder participation in practical training, fieldwork, or laboratory activities.

Required Documents for Application

- Original academic transcript (certified by the General Directorate of Education).

- Civil ID or unified ID.

- Residence ID or proof of residence.

- Six (6) recent personal photographs.

- Electronic application receipt (for private colleges).

- Medical examination form.

- Any other documents required by the Ministry of Higher Education and Scientific Research / Central Admissions Department.

12.Acceptance Criterion

- The official website of Al-Farabi University: http://www.alfarabiuc.edu.iq

- The electronic platform of the Oil and Gas Refinery Engineering Department at Al-Farabi University

- The curriculum approved by the Department of Oil and Gas Refinery Engineering / College of Chemical Engineering / University of Technology

- Announcements and updates posted in the university and department notice boards

- Official documents and reference files stored in the department archives

13.Program Development Plan

- Expand the integration of advanced technological tools, simulation software, and process modeling techniques in engineering education.

- Develop and periodically review the program curriculum to align with the latest advancements in oil and gas refinery engineering.

- Encourage applied scientific research, industrial innovation, and teamwork among students and faculty.

- Enhance the academic and professional skills of the teaching staff through specialized training and industry collaboration.

- Establish joint cooperation agreements with national and international universities and industrial partners in the oil and gas sector.

- Continuously update the program to match industry needs, technological developments, and employment market requirements.

- Review and improve learning outcomes to ensure graduates meet the competencies demanded by the petroleum and energy industries.

- Implement a quality improvement plan aimed at achieving national and international program accreditation standards.

Program Skills Outline

Year/Level	Course Code	Course Name	Basic / Optional	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
1st / Sem 1	OGRE1101	Technical English I	Basic	√	√			√			√		√	√	
	OGRE1102	Mathematics I	Basic	√	√			√	√	√					
	OGRE1103	Analytical Chemistry	Basic	√	√	√		√		√	√				
	OGRE1104	Physics & Strength of Materials	Basic	√	√			√	√		√				
	OGRE1105	Computer Science	Basic		√	√					√		√		
	OGRE1106	Workshop I	Basic		√	√	√	√		√	√	√			√
1st / Sem 2	OGRE1201	Technical English II	Basic	√	√			√			√		√	√	
	OGRE1202	Chemical Eng. Principles I	Basic	√	√			√	√	√					
	OGRE1203	Mathematics II	Basic	√	√			√	√	√					
	OGRE1204	Chemistry of Petroleum	Basic	√	√	√		√		√	√				
	OGRE1205	Engineering Drawing & AutoCAD	Basic		√	√	√				√		√		√
	OGRE1206	Human Rights & Democracy	Basic									√	√	√	√
	OGRE1207	Workshop II	Basic		√	√	√	√		√	√	√			√
2nd / Sem 1	OGRE2101	Mathematics III	Basic	√	√			√	√	√					
	OGRE2102	Chemical Eng. Principles II	Basic	√	√			√	√	√					
	OGRE2103	Fluid Flow I	Basic	√	√	√		√		√	√				
	OGRE2104	Physical Chemistry	Basic	√	√	√		√		√	√				
	OGRE2105	Fuel Technology	Basic	√	√	√		√		√	√				
	OGRE2106	Materials Engineering	Basic	√	√	√		√		√	√				
2nd / Sem 2	OGRE2201	Mathematics IV	Basic	√	√			√	√	√					
	OGRE2202	Chemical Eng. Principles III	Basic	√	√			√	√	√					
	OGRE2203	Fluid Flow II	Basic	√	√	√		√		√	√				

	OGRE2204	Computer Programming	Basic		√	√							√		
	OGRE2205	Corrosion in Petroleum Refinery	Basic	√	√	√		√		√	√				
	OGRE2206	Combustion	Basic	√	√	√		√		√	√				
	OGRE2207	Citizenship & Contemporary History	Basic									√	√	√	√
3rd / Sem 1	OGRE3101	Thermodynamics I	Basic	√	√			√	√	√					
	OGRE3102	Numerical Analysis	Basic	√	√			√	√	√					
	OGRE3103	Mass Transfer	Basic	√	√	√		√		√	√				
	OGRE3104	Chemical Reaction Kinetics	Basic	√	√	√		√		√	√				
	OGRE3105	Heat Transfer I	Basic	√	√	√		√		√	√				
	OGRE3106	Petroleum Geology & Reservoir Basics	Basic	√	√			√	√						
	OGRE3107	Chemicals from Petroleum	Basic	√	√	√		√		√	√				
	OGRE3108	Equipment Design	Basic		√	√	√	√		√	√			√	√
3rd / Sem 2	OGRE3201	Thermodynamics II	Basic	√	√			√	√	√					
	OGRE3202	Applied Mathematics in Chemical Eng.	Basic	√	√			√	√	√					
	OGRE3203	Unit Operations I	Basic	√	√	√		√		√	√				
	OGRE3204	Reactor Design	Basic	√	√	√		√		√	√				
	OGRE3205	Heat Transfer II	Basic	√	√	√		√		√	√				
	OGRE3206	Equipment Design Using CAD	Basic		√	√	√				√			√	√
	OGRE3207	Petroleum & Gas Field Processing	Basic	√	√	√		√		√	√				
	OGRE3208	Project I	Basic		√		√	√	√	√	√	√		√	√
4th / Sem 1	OGRE4101	Unit Operations II	Basic	√	√	√		√		√	√				
	OGRE4102	Process Dynamics	Basic	√	√	√		√	√	√	√				
	OGRE4103	Petroleum Refinery Engineering I	Basic	√	√	√	√	√		√	√			√	√

	OGRE4104	Refinery Management & Ethics	Basic	√				√		√	√	√	√	√	√
	OGRE4105	Heterogeneous Reactor & Catalyst	Basic	√	√	√		√		√	√				
	OGRE4106	Environmental Pollution & Safety in Refineries	Basic	√	√	√	√	√		√	√	√	√	√	√
	OGRE4107	Project II	Basic		√		√	√	√	√	√	√		√	√
4th / Sem 2	OGRE4201	Unit Operations III	Basic	√	√	√		√		√	√				
	OGRE4202	Process Control	Basic	√	√	√		√	√	√	√				
	OGRE4203	Petroleum Refinery Engineering II	Basic	√	√	√	√	√		√	√			√	√
	OGRE4204	Optimization	Basic	√	√	√		√	√	√					
	OGRE4205	Corrosion Eng. in Petroleum Refinery	Basic	√	√	√		√		√	√				
	OGRE4206	Petroleum Refinery Economics	Basic	√	√						√		√	√	√
	OGRE4207	Field Training / Internship	Basic			√	√				√	√	√	√	√

Course Description Form

1. Course Name:
Technical English I
2. Course Code:
OGRE1101
3. Semester / Year:
First Semester / First Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours:100 / Number of Units 4
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Lecturer Dhaha Sabbah Khudair Abbas Email: dhaha.sabbah@alfarabiuc.edu.iq

8. Course Objectives	
Course Objectives	This module aims to enhance the communication skills of students whose English language level is equivalent to the first-year undergraduate students in the Chemical Engineering Department. There will be a particular focus on developing the four language skills (speaking, listening, reading and writing) and on broadening students' vocabulary and grammatical range so that they can communicate easily on a wide range of topics. In addition, to teaching the technical English vocabulary that the student needs in his/her academic engineering studies and in his/her professional life as a chemical engineer in factories.

9. Teaching and Learning Strategies	
Strategy	A Communicative competences Listening - Understand and identify the main points of dialogues of 230-250 words on familiar topics that are regularly encountered in life, work, university, etc., within the scope of the syllabus. - Listen and guess the meanings of speakers' expressions and feelings in monologues and familiar conversations in everyday life. - Understand the main points of news programs, broadcasts, interviews, etc., on familiar topics given clearly, in simple language, or with illustrative images (pictograms). Speaking – Pronunciation of short dialogues clearly and accurately. - Speak and interact with fellow speakers about familiar topics, express personal points of view and share information on topics covered in the curriculum. - Describe in simple discourse familiar topics while telling a short story related to the topics covered. – Presenting projects related to curriculum topics in an accurately prepared manner. Reading - Read and comprehend the main points and specific contents of a 200-word text on current and familiar topics. - Read and understand the flow of argument for texts, identify key conclusions in texts using plain language. - Reading to find and summarize short texts for daily use, including those related to the work of the chemical engineer, such as excerpts from scientific books, and the use of words and structures from the original texts. Writing – write paragraphs (i.e., block and indented styles), Write simple connected and coherent texts of 180-200 words; write short reports based on suggestions, providing factual information and reasons for recommendations in the reports; collect short information from

	several sources and summarize it. - Complete (write/fill).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction to course aims and skills	Course Introduction	Lecture	Quizzes Assignment Midterm Exam
2	2	Understand basic sentence structure	Grammar Basics	Lecture	
3	2	Learn technical vocabulary	Technical Vocabulary I	Lecture	
4	2	Apply vocabulary in context	Technical Vocabulary II	Lecture	
5	2	Practice reading comprehension	Reading Skills I	Lecture	
6	2	Analyze technical texts	Reading Skills II	Lecture	
7	2	Mid-term exam review	Revision & Midterm	Exam	
8	2	Improve listening comprehension	Listening Skills I	Lecture	
9	2	Note-taking from lectures	Listening Skills II	Lecture	
10	2	Develop technical writing	Writing Skills I	Lecture	
11	2	Write short reports	Writing Skills II	Lecture	
12	2	Practice speaking skills	Speaking I	Lecture	
13	2	Deliver oral presentations	Speaking II	Lecture	
14	2	Summarize technical materials	Summary Skills	Lecture	
15	2	Prepare for final exam	Final Revision	Lecture	

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Analytical Chemistry
2. Course Code:
OGRE1103
3. Semester / Year:
First Semester / First Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours:150 / Number of Units 6
7. Course administrator's name (mention all, if more than one name)
Name: Lecturer Kafaa Fadel Abbas Ali Email: kafaa.fadel@alfarabiuc.edu.iq

8. Course Objectives	
Course Objectives	1-Preparing applied engineers in the field of sciences who are distinguished by ahigh level of knowledge and technological creativity, and develop problem solving skills by knowing important Laws of Chemistry. 2. Enable the student to know and understand calculation and methods of preparing solutions needed in many field. 3. Enable the student to understand theoretical principles in handicrafts and measurements.

9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand fundamentals of analytical chemistry	Introduction to Analytical Chemistry	Lecture	

2	3	Learn sampling techniques	Sampling Methods	Lecture	Quizzes Assignment Midterm Exam
3	3	Understand errors and statistical analysis	Errors & Statistical Analysis	Lecture	
4	3	Learn volumetric analysis principles	Volumetric Analysis I	Lecture	
5	3	Apply acid–base titrations	Volumetric Analysis II	Lecture	
6	3	Perform redox titrations	Redox Titrations	Lecture	
7	3	Midterm review and exam	Midterm Review	Exam	
8	3	Study precipitation titrations	Precipitation Titrations	Lecture	
9	3	Learn complexometric titrations	Complexometric Titrations	Lecture	
10	3	Understand gravimetric analysis	Gravimetric Analysis	Lecture	
11	3	Introduction to instrumental analysis	Instrumental Analysis Basics	Lecture	
12	3	Learn chromatography techniques	Chromatography	Lecture	
13	3	Study spectroscopic methods	Spectroscopic Methods	Lecture	
14	3	Apply instrumental methods	Instrumental Applications	Lecture	
15	3	Final revision	Final Revision	Lecture	

11. Course Evaluation

Mid-term exam	10%
HWs	10%
Quizzes	10%
Technical reports	10%
Attendance sheet	10%
Final Exam	50

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	-
Main references (sources)	الكيمياء التحليلية د. نجاة جمعة
Recommended books and references (scientific journals, reports...)	Analytical Chemistry....Skoog and West Holler
Electronic References, Websites	

3. Analytical Chemistry – Laboratory

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	3	Identify lab glassware and safety rules	Lab Safety & Glassware	Lab	Lab Report
2	3	Prepare standard solutions	Preparation of Standard Solutions	Lab	Lab Report
3	3	Conduct acid–base titrations	Acid–Base Titrations	Lab	Lab Report
4	3	Perform redox titrations	Redox Titrations	Lab	Lab Report
5	3	Carry out precipitation titrations	Precipitation Titrations	Lab	Lab Report
6	3	Perform complexometric titrations	Complexometric Titrations	Lab	Lab Report
7	3	Apply gravimetric analysis	Gravimetric Analysis	Lab	Lab Report
8	3	Use chromatography techniques	Chromatography	Lab	Lab Report
9	3	Apply UV/Vis spectrophotometry	Spectrophotometry	Lab	Lab Report
10	3	Conduct a mini project	Mini Project	Lab	Lab Report
11	3	Practical revision	Practical Revision	Lab	Practical Test
12	3	Final practical exam	Practical Exam	Lab	Practical Exam

Course Description Form

1. Course Name:
PHYSIS & STRENGTH OF Materials
2. Course Code:
OGRE1104
3. Semester / Year:
First Semester / First Year
4. Description Preparation Date:
3/8/2025

5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours:150 / Number of Units 6
7. Course administrator's name (mention all, if more than one name)

Name: Dr Farah Adil Sadiq Yaseen
Email: farah.adil@alfarabiuc.edu.iq

8. Course Objectives	
Course Objectives	1. Determine the components of linear motion (displacement, velocity, and acceleration). 2. Solve problems involving forces and work. 3. Apply Newton's laws to physical problems. 4. Identify the different types of energy. 5. Solve problems using principles of conservation of energy. 6. Define the principles of momentum and collisions. 7. This class is designed to study the effects of external forces on a group of solid objects. 8. This class is designed to study the resistance of materials and their applications in chemical engineering
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple problems and design involving activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	6	Understand units, dimensions, and basic physical quantities	Introduction & Units	Lecture	Quizzes
2	6	Apply vector analysis to physical problems	Vectors & Scalars	Lecture	Assignments
3	6	Explain Newton's laws and apply them to motion	Laws of Motion	Lecture	Quizzes
4	6	Analyze linear motion with constant acceleration	Kinematics	Lecture	Assignments
5	6	Understand work, energy, and power relationships	Work & Energy	Lecture	Quizzes
6	6	Apply momentum and impulse concepts	Momentum & Impulse	Lecture	Assignments
7	6	Review and complete midterm exam	Midterm Review	Lecture	Midterm Exam
8	6	Explain rotational motion and torque	Rotational Dynamics	Lecture	Quizzes
9	6	Understand equilibrium of forces	Static Equilibrium	Lecture	Assignments

10	6	Apply stress and strain relationships	Stress–Strain	Lecture	Quizzes
11	6	Analyze mechanical properties of materials	Material Properties	Lecture	Assignments
12	6	Understand bending and torsion in beams	Bending & Torsion	Lecture	Quizzes
13	6	Apply thermal expansion concepts	Thermal Expansion	Lecture	Assignments
14	6	Study basic heat transfer mechanisms	Heat Transfer	Lecture	Quizzes
15	6	Final review of course topics	Final Revision	Lecture	Final Exam

11. Course Evaluation

Mid-term exam	10%
HWs	10%
Quizzes	10%
Technical reports	10%
Attendance sheet	10%
Final Exam	50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1 Shipman, James, Jerry D. Wilson, Charles A. Higgins, and Bo Lou. An introduction to physical science. Cengage Learning, 2013. 2. Principle of Physics, Kinetic Books Company, 2007
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Principles of physics Kinetic book (1-877-4kbooks) Engineering Physics I&II Engineering mechanics by Ferdinand Engineering mechanics by R.C. Hibbeler
Electronic References, Websites	

Course Description Form

1. Course Name:
Computer Science
2. Course Code:
OGRE1105
3. Semester / Year:
First Semester / First Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours:100 / Number of Units 4
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Lecturer Dhaha Sabbah Khudair Abbas Email: dhaha.sabbah@alfarabiuc.edu.iq

8. Course Objectives	
Course Objectives	1- Learn the basics of computer and operation system Windows 7 and application program Office 2010 and programming language (Visual Basic) and used to solve the problems of chemical engineering. 2- emphasizes the general principles and techniques of computer programming, which can be applied to almost any programming language. Although the emphasis is on programming in any language, this course focuses on one language, in particular, called Visual Basic. It provides the students with a basic understanding and appreciation of the various essential programming-languages constructs, programming paradigms, evaluation criteria and language implementation issues. 3- develop the mathematical skills necessary to solve practical problems 4- Equip you with the knowledge and skills for a range of careers in technology and computer-based industry 5 developing critical thinking skills, solving open-ended problems and working in teams.-

9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple problems and design involving activities that are interesting to the students.

10. Course Structure

Week	Hours	Unit / Subject	Learning Outcomes	Teaching Method	Evaluation
1	3	Windows 7	Understand OS features, installation, configuration, file management, security, troubleshooting.	Lectures, hands-on practice, tutorials.	Lab exercises, quizzes, final exam.

2	3	Microsoft Word	Create, format, edit documents; use tables, images, headers/footers, review tools.	Demonstrations, practice tasks.	Assignments, quizzes, final project.
3	3	Microsoft Excel	Create, organize, analyze data; use formulas, charts, formatting.	Step-by-step demos, exercises.	Assignments, quizzes, project.
4	3	Intro to Visual Basic	Learn syntax, control structures, event-driven programming; build simple applications.	Lectures, coding practice.	Programming assignments, quizzes, project.
5	3	Toolbox Items	Use controls, properties; enhance functionality/UI design.	Demonstrations, guided practice.	Tasks, quizzes, project.
6	3	Mathematical Functions	Apply linear, quadratic, exponential, logarithmic, trigonometric functions in problem-solving.	Lectures, problem sets.	Tests, quizzes, final exam.
7	3	Conditional Sentences	Construct zero to mixed conditionals; express real/hypothetical situations.	Interactive lectures, exercises.	Quizzes, assignments, oral practice.
8	3	InputBox & MessageBox	Collect input, display messages in applications.	Demonstrations, coding tasks.	Assignments, quizzes, project.
9	3	Iteration Loops	Implement for/while/do-while loops to perform repetitive tasks.	Coding demos, exercises.	Assignments, quizzes, project.
10	3	Data & Variables	Declare, initialize, manipulate variables; use appropriate data types.	Theory + coding exercises.	Quizzes, assignments, test.
11	3	Arrays	Store/manage multiple values; access, modify, process arrays.	Lectures, coding practice.	Assignments, quizzes, project.
12	3	Menu Bar	Create functional menu bars for navigation.	Demonstrations, project work.	Tasks, quizzes, project.
13	3	Graphics	Draw shapes, images in Visual Basic; enhance UI.	Lectures, labs.	Assignments, quizzes, project.
14	3	Review	Consolidation of topics.	Review sessions.	—
15	—	Prep Week	Exam preparation.	—	—

Computer Science – Lab Weeks

Week	Hours	Lab Topic	Learning Outcomes	Teaching Method	Evaluation
1	2	Windows 7, Word, Excel	Basic operation, document creation, spreadsheet management.	Guided labs, exercises.	Practical tasks, quizzes, test.
2	2	Intro to Visual Basic	Write, run, debug simple programs.	Coding practice, demos.	Assignments, test, mini-project.

3	2	Mathematical Functions	Use math functions in programs.	Coding exercises, demos.	Tasks, quizzes, lab test.
4	2	Conditional Statements	Apply decision-making structures.	Guided coding practice.	Assignments, tasks, test.
5	2	InputBox & MessageBox	Build interactive user communication.	Coding activities.	Tasks, quizzes, test.
6	2	Iteration Loops	Create loops for repetitive tasks.	Coding demos, exercises.	Assignments, quizzes, test.
7	2	Variables, Arrays, Menu Bar	Data handling, array management, UI navigation.	Guided practice.	Assignments, quizzes, test.
8	2	Graphics	Implement shapes, images in applications.	Coding labs, exercises.	Tasks, quizzes, final lab project.

11. Course Evaluation

Mid-term exam	10%
HWs	10%
Quizzes	10%
Technical reports	10%
Attendance sheet	10%
Final Exam	50

12. Learning and Teaching Resources

Required textbooks (curricular books, if an	1- Microsoft® Making the Transition to Microsof Windows 7 – Just the Basics! © 2009 CustomGuide, Inc. / Bates College (October 2011) 2- Windows® 7 Step by Step by Joan Preppernau and Joyce Cox ©2009 Joan Preppernau and Joyce Cox, Early Content—Subject to Change, Microsoft Press. 3- Step by Step, Microsoft Office Word 2007, Published by Microsoft Press A Division of Microsoft Corporation, One Microsoft Way Redmond, Washington 98052-6399, Copyright © 2007 by Joyce Cox, Joan Preppernau, and Online Training Solutions, Inc. 4- Microsoft Office Word 2007 By: Torben Lage Frandsen & Ventus Publishing Aps, The eBookboon, The eBook company,2010 5- BEGINNING EXCEL, Barbara Lave, Diane Shingledecker, Julie Romey, Noreen Brown, & Mary Schatz, Portland Community College, 2021,Libretext: https://workforce.libretexts.org/@go/page/14525 6- Introduction: Visual Basic Basic 6.0, By:

	Gary Haggard, Wade Hutchison, Christy Shibata,1st edition, 2013, bookboon.com 7- Programming Microsoft Visual Basic 6.0, PUBLISHED BY:Microsoft Press, A Division of Microsoft Corporation,One Microsoft Way Redmond, Washington 98052-6399, 1999 by Francesco Balena
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

1. Course Name:	
Mathematics I	
2. Course Code:	
OGRE1102	
3. Semester / Year:	
Second Semester / First Year	
4. Description Preparation Date:	
3/8/2025	
5. Available Attendance Forms:	
Full Time	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150/ 6	
7. Course administrator's name (mention all, if more than one name)	
Name: Sahar Raad Rahim Ledeefy Email: sahar.raad@alfarabiuc.edu.iq	
8. Course Objectives	
Course Objectives	• To develop an understanding with the concepts of calculus and analytic geometry and the applications of these concepts to the solution of engineering problems. • Introduction to functions, limits, derivatives and their applications. • Provide practice at developing critical thinking skills, solving open ended problems and to work in teams.
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes,

	interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3		Indefinite integrals , Rules for indefinite integrals , Integration by substitution	Lecture	
Week 2	3		Definite integrals , Rules for definite integrals , Mean (average) value , One-to-one functions , Inverse functions , Derivatives of inverse of differentiable functions	Lecture	
Week 3	3		The derivative & integral of natural logarithms functions, exponential functions, logarithms functions, & a^x functions	Lecture	
Week 4	3		The derivative & integral of trigonometric functions, inverse trigonometric functions , hyperbolic functions, & inverse hyperbolic functions	Lecture	
Week 5	3		Integration by parts	Lecture	
Week 6	3		Integration of rational functions by partial fractions	Lecture	
Week 7	3		Trigonometric integrals , trigonometric substitutions , integration of rational	Lecture	

			functions of sine & cosine		
Week 8	3		Area between the graph & the x-axis , area between curves	Lecture	
Week 9	3		Volume by slicing & rotation about an axis , the disk method , the washer method , the shell method	Lecture	
Week 10	3		Length of plane curves , length of a parametric curves , length of curve y=f(x) , length of curve x=g(y)	Lecture	
Week 11	3		Area of surfaces of revolution , surface area for revolution about the x-axis , surface area for revolution about the y-axis , surface area of revolution for parameterized curves	Lecture	
Week 12	3		Partial derivatives with respect to x , partial derivatives with respect to y , functions of more than two variables , second order partial derivatives	Lecture	
Week 13	3		The mixed derivative theorem , partial derivatives of still higher order , the chain rule , implicit differentiation	Lecture	
Week 14	3		Definition , polar equation & graphs , relating polar & cartesian coordinates , polar equation	Lecture	
Week 15	3		Graphing in polar coordinates	Lecture	

Week 16			Final Exam		

11. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	"Thomas' Calculus Early Transcendentals", George B.Thomas, Jr. , Twelfth Edition, Addison-Wesley, 2010
Main references (sources)	
Recommended books and references (scientific journals, reports...)	"Mathematical Methods in Chemical Engineering", Jenson. V.J. and Jeffereys, G.V, 2nd Edition, Academic Press New York, 1977
Electronic References, Websites	

1. Course Name:
Chemical Engineering Principles I
2. Course Code:
OGRE1202
3. Semester / Year:
Second Semester / First Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Full Time
6. Number of Credit Hours (Total) / Number of Units (Total)
63/ 6
7. Course administrator's name (mention all, if more than one name)
Name: Khalid Abed Ali Abdul Ridha

Email: dr.khalid@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	• To understand how Dimensions, Units, Their Conversion and Dimensional Consistency (Homogeneity) • To understand how dealing with of Multicomponent Solutions and Mixtures • This course deals with the basic concept of material balance. • To understand how to solve material balance problems

9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple problems and design involving activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4		Introduction - Dimensions, Units, and Their Conversion	Lecture	
Week 2	4		Dimensional Consistency (Homogeneity)	Lecture	
Week 3	4		Operations with Units	Lecture	
Week 4	4		Introduction to Moles, Density and Concentration	Lecture	
Week 5	4		Mole Fraction and Mass (Weight) Fraction	Lecture	
Week 6	4		Analyses of Multicomponent Solutions and Mixtures	Lecture	
Week 7	4		Choosing a Basis: A basis is a reference chosen by you for	Lecture	

			the calculations you plan to make in any particular		
Week 8	4		An introduction to temperatures and temperature concepts and their effect on other thermal properties	Lecture	
Week 9	4		Mid-term Exam	Lecture	
Week 10	4		Introduction to Material Balances, the Concept of a Material Balance	Lecture	
Week 11	4		Steady-State and Unsteady-State Systems	Lecture	
Week 12	4		General Strategy for Solving Material Balance Problems	Lecture	
Week 13	4		Degree of Freedom Analysis	Lecture	
Week 14	4		Solving Material Balance Problems for Single Units without Reaction	Lecture	
Week 15	4		Preparatory Week	Lecture	
Week 16			Final Exam		

11. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	D.M.Himmelblau and J.B.Riggs ,Basic Principles and Calculations in Chemical Engineering ,8th Edition , 2012 .
Main references (sources)	
Recommended books and references (scientific journals, reports...)	R.M.Felder and R.W.Rousseau ,Elementary Principles of Chemical Processes , 3rd Edition ,2005 .

Electronic References, Websites	

1. Course Name:
Chemistry of Petroleum
2. Course Code:
OGRE1204
3. Semester / Year:
Second Semester / First Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Full time
6. Number of Credit Hours (Total) / Number of Units (Total)
150/ 6
7. Course administrator's name (mention all, if more than one name)
Name: Kafaa Fadel Abbas Ali Email: kafaa.fadel@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	1-Preparing applied engineers in the field of sciences who are distinguished by a high level of knowledge and technological creativity, and develop problem solving skills by knowing important organ compound. 2. Enable the student to learn the basic concept of organic chemistry.
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	4	1	Introduction of organic compound -Naming and physical properties of Alkanes. Representation of structure. -Cycloalkanes.	Lecture	
Week 2	4		Introduction of organic compound -Naming and physical properties of Alkanes. Representation of structure. -Cycloalkanes.	Lecture	
Week 3	4		-Preparing of Alkanes -Substitution Reactions -Reactions of Alkanes.	Lecture	Quizzes
Week 4	4		-Alkenes: -Naming, physical properties. -Representation of alkenes structure.	Lecture	Report
Week 5	4		-Preparing of Alkenes. -Elimination Reactions. -Reactions of Alkenes. Alkynes, Naming and physical properties	Lecture	

Week 6	4		Preparation of Alkynes. - Elimination Reaction of Alkynes,	Lecture	
Week 7	4		--Alkyl Halide: -Naming and physical properties. -Primary, Secondary, tertiary Alkyl Halide. Preparation of Alkyl Halides	Lecture	Quizzes
Week 8	4		Blacksmith Workshop -An exercise forming the number five in English. - Exercise forming the number nine in English. -An exercise in forming an iron model in the form of a circle .	Lecture	
Week 9	4		Blacksmith Workshop - S-shape exercise. - Air hammer hot barbell exercise. - Exercise to form a circle on an electric bending machine. - Exercising cold and hot ornament formation.	Lecture	Report

			A written exam in practical exercises.		
Week 10	4		-Reaction of Alkyl Halide -Examples. -Homework	Lecture	Midterm Exam
Week 11	4		Alcohols. -Naming and physical properties. -Primary, secondary and tertiary Alcohols. -Preparation of Alcohols.	Lecture	Quizzes
Week 12	4		-Reactions of Alcohols. -Example -Homework	Lecture	Lab
Week 13	4		-Aldehyde and Ketones: -Naming and physical properties. -Preparing of Aldehyde. -Preparing of Ketones. -Distinguish between Aldehyde and Ketones	Lecture	Quizzes
Week 14	4		Mechanism of Organic Reactions: Elimination Reactions. Substitution Reactions.	Lecture	

Week 15	4		Heterocyclic Compounds -Preparing and reaction of: -Furan. -Pyrrole. -Pyridine.	Lecture	Report
Week 16					Final Exam

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Ghatak, k (textbook of organic chemistry PHL learning 2014
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Morrison; Boyd (Organic chemistry) 6thed
Electronic References, Websites	

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	3		Lab 1: Melting Point	Lab	
Week 2	3		Lab 2: preparation of Aspirin	Lab	
Week 3	3		Lab 3: Simple Distillation	Lab	
Week 4	3		Lab 4: Esterification	Lab	
Week 5	3		Lab 5: Saponification Reaction	Lab	

Week 6	3		Lab 6: Identification of functional group I	Lab	
Week 7	3		Lab 7: Identification of functional group II	Lab	

1. Course Name:
Engineering Drawing and AutoCAD
2. Course Code:
OGRE1205
3. Semester / Year:
Second Semester / First Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Full Time
6. Number of Credit Hours (Total) / Number of Units (Total)
150/ 6
7. Course administrator's name (mention all, if more than one name)
Name: Farah Adil Sadiq Yaseen Email: farah.adil@alfarabiuc.edu.iq

Course Objectives	
ırse Objectives	Engineering Drawing 4.The aims of the course provide a deep knowledge, wide scope and improved understanding of the engineering drawing. 5.The students should gain knowledge to apply the engineering drawing in engineering applied. Auto CAD 6. Understand the fundamental concepts and features of Auto CAD.

	7. Learn sketching and taking field dimensions. 8. Take Data and transform it into graphic drawings. 9. Learn basic engineering drawing formats. 10. Learn basic Auto CAD skills. 11. Learn how draw 2D and 3D drawings in Auto CAD.

eaching and Learning Strategies

ıtegy	The main strategy that will be adopted in the delivery of this module is to encourage students to participate in the exercises, while improving and expanding their critical thinking skills at the same time. This will be achieved through classes, giving engineering designs, participating in solving them, and competing in giving ideas and skills for the solution.

Course Structure

ek	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
ek	6		Introduction and Planning of Drawing paper.		
ek	6		Types of line and Engineering operation.		Assignments
ek	6		Projection Drawing, first angle projection and third angle projection.		Quizzes, Assignmen
ek	6		Full section, half section, the finding of third view and application Example.		Quizzes, Assignmen
ek	6		Pictorial Drawing (Isometric and Oblique) and Application Example.		Quizzes, Assignmen
ek	6		Dimensions, examples of chemical engineering drawing and exercises.		Quizzes, Assig nts, Midterm Exam

ek	6		Final Exam.		Quizzes, Assignmen
ek	6		Introducing the AutoCAD program and interfaces and Drawing settings, preparing the drawing screen and worksheet.		Quizzes, Assignmen
ek	6		Create two-dimensional graphics (line drawing methods)(rectangle, circle).		Quizzes, Assignmen
ek	6		Create two-dimensional graphics (polygon, Arc, polyline, Ellipse).		Quizzes, Assignmen
ek	6		Modification Operations (Erase, Copy, Mirror, Offset, Move, Explode,Fillet,chamfer, Trim,).		Assignments
ek	6		Modification Operations (Rotate, Scale,Extend , Array, Break, Stretch)		Assignments
ek	6		Drawing with layers		Assignments, Repor
ek	6		3D drawing methods: Surfaces drawing		Midterm Exam
ek	6		3D drawing methods: Solids		
ek			Final Exam		Final Exam

Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Engineering Drawing

	1. الرسم الهندسي،تاليف (عبد الرسول الخفاف) الطبعة الثانية١٩٩٣ 2. R.P Hoelscher and C.H Springer "Engineering Drawing and Geometry AutoCAD 1-Terry T. Wohler, applying AutoCAD 2002 fundamentals, Glencoe /McGraw-Hill. 2-James A. Leach, AutoCAD 2002 Companion Essentials of AutoCAD plus Solid modeling ,2003, McGraw-Hill, Boston. 3- Terry T. Wohler, applying AutoCAD a step by step approach for AutoCAD release 13, 1996, Glencoe McGraw-Hill. 4- James A. Leach, AutoCAD 14 Companion Essentials of AutoCAD plus Solid modeling ,1999, WCB / McGraw-Hill, Boston.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	David Byrnes and Mark Middlebrook, AutoCAD® 2007 For Dummies , Wiley Publishing, Inc.
Electronic References, Websites	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3		Lab 1: Drawing rectangular using lines in absolute coordinate, polar coordinate, relative coordinate	Lab	

Week 2	3		Lab 2: Drawing line,rectangular,circle	Lab	
Week 3	3		Lab 3: Drawing Arc, polygon, point –SP line, Ellipse	Lab	
Week 4	3		Lab 4: Drawing simple 2D shape and applying Modify commands such as copy, mirror, offset, array , trim, move, rotate , stretch, Lengthen, Extend, Scale, Chamfer, and Fillet	Lab	
Week 5	3		Lab 5: Drawing a simple 2D chemical engineering drawing and applied layers.	Lab	
Week 6	3		Lab 6:3D drawing methods: Surfaces drawing	Lab	
Week 7	3		Lab 7: 3D drawing methods: Solids	Lab	

1. Course Name:
Human Rights and democracy
2. Course Code:
OGRE1206
3. Semester / Year:
Second Semester / First Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Full Time
6. Number of Credit Hours (Total) / Number of Units (Total)
50/ 2
7. Course administrator's name (mention all, if more than one name)

Name: Razaa Nazar Saeed Kazem

Email: razaa.nazar@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	1-Define the concept of human rights democracy and their characteristic 2-To promote the culture of human rights and democracy in society

9. Teaching and Learning Strategies

Strategy	1.محاضرات نضريه مباشره 2. استخدام طريقه العصف الذهني 3 .تقارير علميه لكل طالب وباختيارهم 4.سيمنر لمناقشه البحوث التي تقدم من قبل الطلبه 5سؤال فكري ك.واجب بيتي 6 - في النية استخدام الداته شو لعرض فلم عن حقوق الانسان من اجل استخلاص العبر والمضامين الانسانية.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2		Introduction to Human Rights and Human Rights and Secularism	Lecture	
Week 2	2		The concept of human rightsand Characteristics of human rights	Lecture	
Week 3	2		Human Rights Classification	Lecture	
Week 4	2		Human Rights in Ancient Civilizations and Human Rights and Islam	Lecture	

Week 5	2		Human rights sources	Lecture	Quizzes, Assignments
Week 6	2		Universal Declaration of Human Rights Human Rights and the Constitution of the Republic of Iraq 2005	Lecture	
Week 7	2		Human rights and political parties Human Rights and Globalization	Lecture	Midterm Exam
Week 8	2		Positions of the Arab intellectual currents of human rights and Human rights between universality and privacy	Lecture	
Week 9	2		The historical development of democracy and Forms of democracy	Lecture	
Week 10	2		Types of democratic systems	Lecture	Quizzes
Week 11	2		Concept of Election	Lecture	
Week 12	2		Challenges to democratization	Lecture	Assignments
Week 13	2		Democracy between universality and privacy	Lecture	Report
ek 14	2		Democracy and development	Lecture	

Week 15	2		The pros and cons of democracy	Lecture	
Week 16			Final Exam		Final Exam

11. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. عبد الكريم خليفة، القانون الدولي لحقوق الإنسان، بدون طبعة)الإسكند رية: دار الجامعة الجديدة، 2013 2. مبادئ و قواعد عامة في حقوق الأنسان , د. صلاح حسن مطرود
Main references (sources)	
Recommended books and references (scientific journals, reports...)	1. محمد علي الشجيري , حقوق الأنسان بين الأسلامي و العالمي 2. زكريا أبراهيم , مشكلة الحرية .
Electronic References, Websites	

1. Course Name:
Workshops
2. Course Code:
OGRE1207
3. Semester / Year:
Second Semester / First Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Full Time
6. Number of Credit Hours (Total) / Number of Units (Total)
200/ 8

7. Course administrator's name (mention all, if more than one name)
Name: Saad Taher Ahmed Kadhim Al-Taie Email: saad.taher@alfarabiuc.edu.iq

8. Course Objectives	
Course Objectives	1-Preparing applied engineers in the field of engineering sciences who are distinguished by a high level of knowledge and technological creativity, in line with the strict standards adopted globally in quality assurance and academic accreditation of the corresponding engineering programs, while adhering to the ethics of the engineering profession. 2. Enable the student to know and understand work systems, risks, and the factors surrounding them. 3. Enable the student to know and understand theoretical principles in handicrafts and measurements.

9. Teaching and Learning Strategies	
Strategy	

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	6		Turning Workshop	Practical	Projects / Practice, Final Exam
Week 2	6		- Making shaft with different diameter exercises using (left and right pen)	Practical	Projects / Practice, Final Exam
Week 3	6		- Workout (Tube Connection).	Practical	Projects / Practice, Final Exam
Week 4	6		-Written exam in practical exercises.	Practical	Projects /

					Practice, Final Exam
Week 5	6		Fitting workshop	Practical	Projects / Practice, Final Exam
Week 6	6		Occupational safety and its importance in filing workshops	Practical	Projects / Practice, Final Exam
Week 7	6		-An introduction to the basics of filing	Practical	Projects / Practice, Final Exam
Week 8	6		-Pen holder exercise "preparation and preparation"	Practical	Projects / Practice, Final Exam
Week 9	6		Fitting workshop	Practical	Projects / Practice, Final Exam
Week 10	6		Pencil holder exercises finishing and assembling.	Practical	Projects / Practice, Final Exam
Week 11	6		Fitting workshop	Practical	Projects / Practice, Final Exam
Week 12	6		-The catcher exercise.	Practical	Projects / Practice, Final Exam
Week 13	6		- Clamping exercise.	Practical	Projects / Practice, Final Exam
Week 14	6		Written exam in practical exercises.	Practical	Projects / Practice, Final Exam
Week 15	6		Carpentry workshop	Practical	Projects / Practice, Final Exam
11. Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc					
12. Learning and Teaching Resources					

Required textbooks (curricular books, if any)	Workshop technology and measurements, Ahmed Salem Al-Sabbagh,
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Chemical Engineering Principles II
2. Course Code:
OGRE2102
3. Semester / Year:
First Semester / Second Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours:125 / Number of Units 5
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Khalid Abed Ali Email: dr.khalid@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	
9. Teaching and Learning Strategies	
Strategy	• Have a deep knowledge, wide scope and improved understanding of the mechanisms in heat balance as well as a better insight into analytical and empirical methods applied in analysis of material balance related problems. • Gain knowledge for applying the material (equation) balance in chemical engineering problems. • To provide experience for students to solve material balance for different process

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	Definition of chemical engineering. Chemical process industries (CPI). Generalized chemical process.	**General Knowledge of Chemical Engineering**	Lecture, Data show	daily preparation and discussion
2	4	Generalized chemical process. Flow sheet and block diagram of a chemical process The difference between the Chemist and the chemical engineer.	Chemical Engineering Principles		daily preparation and discussion
3	4	Units and Dimensions	Physical and Chemical Principles	Lecture, Data show	daily preparation discussion
4	4	Dimensional Consistency (Homogeneity) Nondimensional Groups:	Physical and Chemical Principles		
5	4	Operations with Units Addition, Subtraction, Equality Multiplication and Division	Physical and Chemical Principles		daily preparation discussion
6-7	8	Four types of temperature Temperature Conversion	Concepts of flow rates, density, specific gravity, temperature and pressure	Lecture, Data show	daily preparation discussion
8-9	8	Heat capacity Pressure and Its Units Types of pressures Measurement of Pressure	Concepts	Lecture, Data show	Questions and answer
10-11	8	Pressure and Its Units Types of	Concepts	Lecture, Data show	Questions answers

		pressures Measurement of Pres			
12-13	8	The Concept of a Material Balance Open and Closed Systems Steady-State and Unsteady-State Systems	Introduction to Material Balances	Lecture, Data show	daily preparation discussion
14-15	8	Multiple Component Systems	Material Balance	Lecture, Data show	daily preparation discussion Exam

11. Course Evaluation

Daily preparation:
15 Daily orals:5
Reports:15
Quiz:15
Monthly Exam: 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	R.M.Felder and R.W.Rousseau ,Elementary Principles of Chemical Processes ,3rd Edition ,2005
Main references (sources)	Himmelblau, D. M., & Riggs, J. B. (2012). Basic principles and calculations in chemical engineering. FT press.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Smith, J. M., Van Ness, H. C., Abbott, M. M Swihart, M. T. (2018). Introduction to Chem Engineering Thermodynamics 8th Ed.

Course Description Form

1. Course Name:	
Fluid Flow I	
2. Course Code:	
OGRE2103	
3. Semester / Year:	
First Semester / Second Year	
4. Description Preparation Date:	
3/8/2025	
5. Available Attendance Forms:	
Central / Full	
6. Number of Credit Hours (Total) / Number of Units (Total)	
125 hr / 5 Unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Mona Youssef Abdulhadd Samaan Email: mona.youssef@alfarabiuc.edu.iq	
8. Course Objectives	
Course Objectives	• Demonstrate knowledge of incompressible fluid flows, two phase flow, fluid statics, kinematics of flows and essential basic hydrodynamics. • Define and solve problems in fluid dynamics in various engineering applications. Provide the ability to describe energy variation and its application in flow and pressure measurement and frictional energy losses calculations. • Provide the ability to estimate the required energy for fluid pumping (selection the size and type of appropriate pumping for liquid). • Predict necessary fluid parameters of full-scale projects by performing simple model experiments • Share ideas and work in a team in an efficient and effective manner under controlled • supervision or independently.
9. Teaching and Learning Strategies	
Strategy	• Lectures, notes tutorials and discussion sessions. • Submitting and discussions, the reports in fluid flow. • Improve the work skills in teams. • Team working and presentation skills are developed by carrying out LAB

	experiments and submitting periodical reports.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 & 2	6	Ability to characterize and specify of the fluids types issues related to the fluid mechanics.	Introduction, Types of fluids, Physical properties, mass and energy Conservation laws, Newton laws of motion. Newton law of viscosity with applications.	Lectures, tutorials, example classes, practical applications	partial test (oral questions: – multiple choice, alternative response), open questions that have a definite answer, or do not have a definite answer
3&4	6	Ability to characterize and specify of the units and their fundamental dimensions, dimensional homogeneity of equations.	Dimensional analysis, definition, dimensional homogeneity, dimensional analysis methods,	Lectures tutorials, example classes, practical applications	partial test (oral questions: – multiple choice, alternative response), Quiz, open questions that have a definite answer, or do not have a definite answer
5&6	6	Ability to characterize and specify the pressure measurement methods and devices used.	Fluid statics, definition, pressure measurement devices with applications	Lectures, tutorials, example classes, practical applications	partial test (oral questions: – multiple choice, alternative response), open questions that have a definite answer, or do not have a definite answer
7,8 & 9	9	Ability to estimate the pressure drop and energy losses for fluid	Fluid dynamics, Reynolds experiment and flow patterns, derive the Euler equation of motion	Lectures, tutorials, example classes, practical	partial test (oral questions:– multiple choice, alternative response), Quiz, open questions that have a

		(single-phase), flow through piping systems, and specify the major and minor frictions,	and Bernoulli's equation. Derive the velocity distribution and average velocity in laminar and turbulent flow, Poiseuille's equation, Darcy equation and, types of frictions (major, minor) Modification of Bernoulli's equation with applications.	application ns	definite answer, or do not have a definite answer
10&11	6	Ability to estimate the pressure drop and energy losses for fluid (two phase) flow through piping systems,	Selection of pump and pipe size, unsteady state and network problems. Define momentum boundary layer. Two phase flow in horizontal and vertical pipes, flow	Lectures, tutorials, example classes, practical applications	partial test (oral questions:- multiple choice, alternative response), open questions that have a definite answer, or do not have a definite answer
12&13	6	Ability to specify the pumps types, heads, NPSH, cavitation and how avoid it, characterization pump curves.	Pumping of liquids, types of pumps, heads types, NPSH, cavitation, characterization pump curves with applications centrifugal pump relations, pumps connection in series and in parallel with applications	Lectures, tutorials, example classes, practical applications	partial test (oral questions: - multiple choice, alternative response), Quiz, open questions that have a definite answer, or do not have a definite answer
14&15	6	Ability to characterize and specify the	Non-Newtonian fluids types, specification, apparent viscosity	Lectures, tutorials, example	partial test (oral questions: - multiple choice, alternative

		non-Newtonian fluids, types, apparent viscosity, energy losses.	Drive the velocity distribution of power law fluid, pressure drop calculations, with applications.	classes, practical applications	response), Quiz, open questions that have a definite answer, or do not have a definite answer

11. Course Evaluation

• Written exams (Quizzes, midterms and finals) to assess the understanding of the basic concepts and the ability to solve problems.

• Oral and written LAB exams to assess the skills of analysis and discussion, for submitted reports.

• Class and home work to assess the ability to appropriate solution.

Seminar discussion of the submitted report.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Lecturer Notes • Curricular Books 1. Coulson, J.M and Richardson J.F. "Chemical Engineering, volume 1", Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford 2. Coulson, J.M and Richardson J.F. "Chemical Engineering, volume 2", Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford 3. F.A. Holland and R. Bragg "Fluid Flow for Chemical Engineers", 2nd Ed. (1995) Elisevier Ltd. 4. DARBY. R. , M. Dekker "Chemical Engineering Fluid Mechanics", 2nd Ed. (2001) 5. James O. Wilkes "Fluid Mechanics for Chemical Engineers", Prentice Hall PTR, New Jersey, USA, 1999. 6. De Nevers, N. "Fluid Mechanics for Chemical Engineers", (1991) McGraw-Hill, Singapore. Streeter and Wylie "Fluid Mechanics", McGraw-Hill, (1981).
Main references (sources)	1. Coulson, J.M and Richardson J.F. "Chemical Engineering, volume 1", Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford 2. Coulson, J.M and Richardson J.F. "Chemical Engineering, volume 2", Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford 3. F.A. Holland and R. Bragg "Fluid Flow for Chemical Engineers", 2nd Ed. (1995) Elisevier Ltd.
Recommended books and references (scientific journals,	1. DARBY. R., M. Dekker "Chemical Engineering Fluid Mechanics", 2nd Ed. (2001) 2. James O. Wilkes "Fluid Mechanics for Chemical Engineers", Prentice Hall

reports…)	PTR, New Jersey, USA, 1999. 3. De Nevers, N. "Fluid Mechanics for Chemical Engineers", (1991) McGraw-Hill, Singapore. 4. Streeter and Wylie "Fluid Mechanics", McGraw-Hill, (1981).
Electronic References, Websites	Many various videos websites submitted consequently during the course

Course Description Form

1. Course Name:
Corrosion Eng. In Petroleum Refinery

2. Course Code:
OGRE2205

3. Semester / Year:
Second Semester / Second Year

4. Description Preparation Date:
3/8/2025

5. Available Attendance Forms:
Central / Full

6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours 75/ Number of Units 3

7. Course administrator's name (mention all, if more than one name)
Name: Dr. Saad Taher Abdul Razzaq Hamoud
Email: saad.taher@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	Understanding the concept of corrosion. The form of corrosion, How material destroyed by corrosion. • Determine the corrosion rates and electrochemical behavior of the metals and the thermodynamics of corrosion reactions. • Applying the corrosion prevention technology. • Selection of materials involved in applying the corrosion preventior technology in petroleum refineries.

9. Teaching and Learning Strategies

Strategy	Theoretical /2

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	2	. Understanding the con of corrosion. The form corrosion, How the mat destroyed by corrosion	Introduction Corrosion Eng.	Lecture, Data show	daily preparation
2-3	4	Understanding the typ of corrosion	Classification corrosion	Lecture, Data show	Reports
4-5	4		Kinetics aqueous corrosion:	Lecture, Data show	Questions and answe
6-7	4	Study thermodynamics Corrosion	Thermodyna s and application corrosion	Lecture, Data show	daily preparation , Qu
8-9	4	Determine the corros rates and electrochem behavior of the metals	Determining corrosion rate	Lecture, Data show	daily preparation , da oral
10	2	Study the passivity Metals	Passivity	Lecture, Data show	daily preparation
11	2	Study the types reference electrodes	Reference electrodes	Lecture, Data show	daily oral
12	2	The effects of petrole and products on corrosion of equipmen	Corrosion prevention in Industry	Lecture, Data show	Questions and answe
13	2	Study the effect of pH potential on m corrosion	Pourbaix diagram:	Lecture, Data show	daily preparation , Qu
14 15-	4 4	Study the types cathodic protection	Cathodic Protection:	Lecture, Data show	Exam

11. Course Evaluation

daily preparation: 10 daily
oral:10 Reports:10
Quiz:20
Monthly Exam: 50

12. Learning and Teaching Resources

Required textbooks (curricular books any)	
Main references (sources)	Zaki Ahmed, "Principle of Corrosion Engineering and Corrosion Control",1ST Edition, ,IChemE ,ELSEVIER, 2006.
Recommended books and references (scientific journals, reports…)	Denny A. Jones, "Principle and Prevention of Corrosion nd Edition, Prentice Hall, 1996.
Electronic References, Websites	

Course Description Form

1. Course Name:
Combustion
2. Course Code:
OGRE2206
3. Semester / Year:
Second Semester / Second Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours 75/ Number of Units 3
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Lect. Ali Hussein Ali Email: ali.hassin2@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	Study the nature of combustion ,scope of internal combustion engine Types of flame ,study the effect of temp and pressure study the types of solid fuels and the drying of solid fuels Study the types of furnaces and furnaces efficiency
9. Teaching and Learning Strategies	
Strategy	Theoretical lectures, discussion and dialogue, brainstorming, examples are used to achieve the goals.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding the general information, concepts, and importance of combustion nature.	Scope and history of combustion: The nature of combustion, Historical perspective of fuels.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams

2	2	Understanding the general information, concepts, and and importance of combustion nature and combustion engines	Historical perspective of combustion technology (lighting /steam boilers/ internal – combustion engines/compression ignition engines/gas turbines/rocket engines).	Theoretical lectures, discussion and examples	Discussio during th lectures a daily exa
3	2	Apply course concepts in solving interdisciplinary problems of Combustion of Gaseous and Vapourized Fuels in Furnaces	Combustion of gaseous and vapourized fuels : Furnaces and tubular furnace	Theoretical lectures, discussion and examples	Discussio during th lectures a daily exa
4	2	An ability to apply effective solutions, both independently and cooperatively, for problems in Chemical Engineering Principle and furnace efficiency	Chemical Engineering Principle II and furnace efficiency (Furnace efficiency and heat loss calculations).	Theoretical lectures, discussion and examples	Discussio ns during the lectures and daily exams
5	2	Student teams are asked to help solve sample problems in class. Illustrate and analyze information and ideas in burners types and heat transfer in furnace and ,chimney height calculation.	Burners types, radiation and convection rooms in furnace, furnace wall layers and refractories ,chimney height calculation, tube layers in furnaces.		
6	2	Understanding the general information, concepts, and and importance of first law combustion calculations and tyes of flames and effected parameter.	Flames: First law combustion calculations (adiabatic flame temperature), Laminar premixed flames: (effect of stoichiometry on laminar burning velocity /effect of reactant pressure and temperature on laminar burning velocity/stabilization of a premixed flame),	Theoretical lectures, discussion and examples	Discussio ns during the lectures and daily exams
7	2	Apply course concepts in solving interdisciplinary problems, solve the problems through logic and improve their ability to work effectively in a group of peers	Laminar flame theory(laminar burning velocity theory /simplified laminar flame model).	Theoretical lectures, discussion and examples	Discussio ns during the lectures and daily exams

8	2	An ability to apply effective solutions, both independently and cooperatively, for problems in Diffusion flames, combustion zones and temperature profiles. An ability to apply effective solutions,	Diffusion flames, combustion zones and temperature profiles.	Theoretical lectures, discussion and examples Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams Discussions during the lectures and daily exams
9	2	both independently and cooperatively, for problems in flammability limits, flame stability, flame and combustion speed.	Flammability limits, flame stability, flame and combustion speed.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
10	2	Understanding the general information, concepts, and importance Combustion of Liquid Fuels	Combustion of Liquid Fuels: 1- Spray Formation And Droplet Behavior Spray formation, size distributions, fuel injectors, spray dynamics (diesel spray dynamics, single – droplet dynamics),	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
11	2	An ability to apply effective solutions, both independently and cooperatively, for problems in vaporization of single liquid droplets	vaporization of single droplets.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
12	2	An ability to apply effective solutions, both independently and cooperatively, for oil – fired furnaces combustion and combustor design	2- Oil –Fired Furnaces Combustin Gas turbine sprays combustion, Gas turbine operating parameters, combustor design, combustion rate, Liner heat transfer.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
13	2	An ability to apply effective solutions, both independently and cooperatively, for Direct – Injection Engine Combustion.	3- Direct –Injection Engine Combustion introduction to diesel engine combustion, fuel injection, combustion rates	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
14	2	An ability to apply effective solutions, both independently and cooperatively, for combustion of solid fuels:	Combustion of solid fuels: Solid fuel combustion mechanisms Solid fuel, drying of solid fuels, devolatilization of solid fuels.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams

15	2	An ability to apply effective solutions, both independently and cooperatively, for		Theoretical lectures,	Discussions during the lectures and daily exams Discussions during the

12. Course Evaluations

Oral questions and discussions during the lectures, daily exams, quarterly exams documented examinations, and final exams

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Gary L.borman,(Combustion Engineering),1998 by Mc Grawhill
Main references (sources)	Gary L.borman,Combustion(Engineering),1998 by Mc Grawhill
Recommended books and references (scientific journals, reports…)	Stephen R.turns,(An introduction to Combustion), 2000 by Mc Grawhill. F .ElMahallawy and S.ElD in Habik ,"(Fundamentals and Technology of Combustion)",2002 by Elsevier
Electronic References, Websites	

Course Description Form

1. Course Name:
Fuels Technology
2. Course Code:
OGRE2105
3. Semester / Year:
1st Semester / Second Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours 100/ Number of Units 4
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Kafaa Fadel Abbas Ali Email: kafaa.fadel@farabiuc.edu.iq

8. Course Objectives

The objective of this course: The objective of this course to underst and the types and properties of fuel (solid, liquid and gas), and the properties of crude oil, the physical and chemical properties of fuel and the five or six basic products of crude oil, the purification and the distillation of crude oil to obtain different products and explain in details all the properties of the products. Course Objectives: at the end of the semes the student should be able to

1- Describe and solve problems on atomic arrangement and geometry of imperfections.

2. Describe and solve problems on mechanical, thermal and electrical properties of materials.

9. Teaching and Learning Strategies

Strategy	Theoretical - Practical

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	To provide an derstanding of the fuel hnology and the important fuel fractions and the ssification of fuel	**Introduction to F Technology:** Types of fuel and importance	Lecture, Data show	Daily preparation
2	2		**Solid Fuel:** Coal classificati composition and ba Coal preparation washing	Lecture , Data show	Reports
3-4	4	A comprehensive understanding of the petroleum product wh they appear in visible form ,such as gasoline ,diesel , kerosene , an in less visible form ov the entire	**Different types coal combust techniques** Combustion of c and coke making Coal liquefaction	Lecture , Data show	Questions and answers
5	2	spectrum of industry such as automobile	**Liquid Fuel:** Theories of petrole formation, Classification as Hydrocarbon	Lecture , Data show	Daily reparation Quiz
		lubricants , greases, carbon black for truck tires	Resource,Product of Petroleum, Composition of Cr Oils		

6-111	12	Evaluation of crud - Crude oil assays - Properties of cr oil and petrole products: - Types of Gasolin it's Import Properties and t such as AS Distillation, R Octane Number, Oxidat Stability, Sulp Content etc, - Various Types Naphtha and t Important Propertie Applications. Important Tests Properties of Keros such as Flash& Point, Smoke Poin Aniline Point etc., - Types of Diesel & Important Propertie Tests such as P Point, Diesel Ind Cetane Number etc. - Lubricating Production properties, methods Heavy Fractions l Lube Oil, Bitum Asphalt etc. & t Important.	**Lecture, Data show**	daily reparation ,daily oral

12-13	4		Gas Fuel: History of Gase Fuel Producing of Gas Natural G composition, classification, sweeting:	**Lecture, Data show**	daily preparat ion
14-15	4	Ability to think that a refinery may produce five or six basic products such as LPG, naphtha, kerosene, diesel, and fuel oils, but specialty manufactures may produce a large number of their products from these basic refinery products	Properties of L composition, production, T methods,	**Lecture, Data show**	daily oral

	11. Course Evaluation	
	daily preparation: 10 daily oral:10 Reports:10 Quiz:20 Monthly Exam: 50	
	12. Learning and Teaching Resources	
	Required textbooks (curricular books, if any)	Speight,J.G, Handbook of petroleumproduct analysis, John Willey & Sons,2002.
	Main references (sources)	Speight J.G. and Ozum,B; Petroleum Refinery processes, Macel Dekker, New York, 2002.
	Recommended books and references (scientific journals, reports…)	Speight J.G., The chemistery and Technology of petroleum, 3rd Edition. Marcel Dekker, New York 1999
	Electronic References, Websites	

Course Description Form

1. Course Name:	
Physical Chemistry	
2. Course Code:	
PHCH214	
3. Semester / Year:	
First Semester / Second Year	
4. Description Preparation Date:	
3/8/2025	
5. Available Attendance Forms:	
Central / Full	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Credit Hours 150 / Units 6	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Lect. Dhaha Sabah Hamid Abbas Email: dhaha.sabbah@alfarabiuc.edu.iq	
8. Course Objectives	
Course Objectives Course Objectives: at end of the semester student should be able	1- Be able to solve problems related to the macroscopic equilibrium properties of gases and liquid. 2- Understand how the thermodynamics of non simple system is applied to electrochemical cells. 3- Be able to calculate cell voltages for standard conditions and other conditions using standard reduction potentials and the nerst equation. 4- Be able to solve problems relating equilibrium constants and Gibbs energy changes to electrochemically measured quantities.
9. Teaching and Learning Strategies	
Strategy	Lectures / Tutorial / Pictures and video clips

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1-5	10	Be able to solve problems related to the macroscopic equilibrium properties of gases and liquid	Phase Equilibria: Equilibrium between phases, one component systems, binary systems involving vapor, liquid vapor equilibria of two component system, liquid vapor equilibrium in system not obeying Raoults law, temperature composition diagram (boiling point curves), distillation, azeotropes, solubility of gases in liquids.	Lectures, Data show	Oral questions.
6-10	10	Be able to solve problems related to the macroscopic equilibrium properties of gases and liquid Be able to calculate cell voltages for standard conditions and other conditions using standard reduction potentials and the nerst equation.	Solutions of electrolytes : Electrical units, Faradays laws of electrolysis, molar conductivity, weak electrolytes, strong electrolytes, activity and ionic strength, determination of activity coefficient from solubility, the Debye-Hackle theory, acid- base catalysis and their dissociation constant	Lectures and solving examples. ,Data show	Oral questions, Reports
11-15	10	Be able to solve	Electrochemical cells:	Lectures, Data	Quiz,

		problems relating equilibrium constants and Gibbs energy changes to electrochemically measured quantities	Electromotive force (EMF) of a cell, measurements of EMF–the potentiometer, the polarity of electrodes, the cell reactions and reversible cells, free energy and reversible cells, typical of half–cell's classification EMF, standard electrode potentials, standard free energy	show	Questions and answers.

11. Course Evaluation

Attendance	2.5%
Homework, assignments	2.5%
Mid–term Exam	20%
In–class quizzes:	5 %
Final:	70 %
Total:	100 %

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	J. Laidler, physical chemistry, Bosten; Houghton M, ffl.n company, 1
Main references (sources)	G. Mortimer, physical chemistry , San Francisco; Altarcourt science and technology company, 2000.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Materials Engineering
2. Course Code:
MAEN216
3. Semester / Year:
First Semester / Second Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours 125 / Units 5
7. Course administrator's name (mention all, if more than one name)
Name: assist prof. Mona Youssef Abdel Ahad Othman Email: mona.youssef@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	• Have a deep knowledge, wide scope and improved understanding of the mechanisms in heat balance as well as a better insight into analytical and empirical methods applied in analysis of material balance related problems. • Gain knowledge for applying the material (equation) balance in chemical engineering problems. • To provide experience for students to solve material balance for different process

9. Teaching and Learning Strategies	
Strategy	Theoretical /4

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Definition of chemical engineering. Chemical process industries (CPI). Generalized chemical process.	General Knowledge of Chemical Engineering	Lecture, Data show	daily preparation and discussion

2	4	Generalized chemical process. flow sheet and block diagram of a chemical process The difference between the chemist and the chemical engineer.	Chemical Engineering Principles		daily preparation and discussion
3	4	Units and Dimensions	Physical and Chemical Principles	Lecture, Data show	daily preparation discussion
4	4	Dimensional Consistency (Homogeneity) Nondimensional Groups:	Physical and Chemical Principles		
5	4	Operations with Units Addition, Subtraction, Equality Multiplication and Division	Physical and Chemical Principles		daily preparation discussion
6-7	8	Four types of temperature Temperature Conversion	Concepts of flow rates, density, specific gravity, temperature and pressure	Lecture, Data show	daily preparation discussion
8-9	8	Heat capacity Pressure and Its Units Types of pressures Measurement of Pressure	Concepts	Lecture, Data show	Questions and answe
10-11	8	Pressure and Its Units Types of pressures Measurement of Pres	Concepts	Lecture, Data show	Questions answers
12-13	8	The Concept of a Material Balance Open and Closed Systems Steady-State and Unsteady-State Systems	Introduction to Material Balances	Lecture, Data show	daily preparation discussion

14-15	8	Multiple Component Systems	Material Balance	Lecture, Data show	daily preparation discussion Exam

11. Course Evaluation
Daily preparation: 15 daily oral:5 Reports:15

11. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	R.M.Felder and R.W.Rousseau ,Elementary Principles of Chemical Processes ,3rd Edition ,2005
Main references (sources)	Himmelblau, D. M., & Riggs, J. B. (2012). Basic principles and calculations in chemical engineering. FT press.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Smith, J. M., Van Ness, H. C., Abbott, M. M Swihart, M. T. (2018). Introduction to Chem Engineering Thermodynamics 8th Ed.

Course Description Form

1. Course Name:
Chemical Engineering Principles III
2. Course Code:
OGRE2202
3. Semester / Year:
Second Semester / Second Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Students' attendance is recorded in the classroom and on Excel lists based on number of lectures and according to the dates in the schedule and is sent wee via email to the Absences Committee.
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours 150 / Units 6
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Lect, Ronaq Adnan Kazim Mansour Email: rung.adnen@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	• Have a deep knowledge, wide scope and improved understanding of mechanisms in heat balance as well as a better insight into analytical and empirical methods applied in analysis of energy balance related problems. • Gain knowledge for applying the energy (equation) balance in chemical engineering problems. • To provide experience for students to solve energy balance for different process

9. Teaching and Learning Strategies

Strategy	**1.1** Knowledge and Understanding The terminology associated with energy balances, concepts, and units. Define or explain energy, system, closed system, nonflow system, open system, flow system, surroundings, property, extensive property, intensive property, state ,heat, work, kinetic energy, potential energy internal energy, enthalpy, initial state, final state, state variable, cyclical process, and path function. **1.2** Introduction to energy balances for processes without reaction. Calculate enthalpy and internal energy changes from heat capacity equations, graphs and charts,and tables given the initial and final states of the material .Express the general energy balance in words write it down with symbols and variables for open system .write it down with symbols and variables for closed system. **1.3** Calculation of enthalpy changes. Calculation of enthalpy change without change in phase and enthalpy change with phase change, also explain of sensible heat and latent heat principles. **1.4** Energy balances: how to account for chemical reaction. Explain the meaning of standard heat of formation , heat of reaction, Standard Heat of consumption, Standard Heat of Reaction, Heat of reaction temperature dependence, Heat effects of industrial reactions. **1.5** Interactive Lectures: Instead of traditional lectures, use interactive lectures that involve students actively in the learning process. Ask questions, encourage discussions, and use multimedia resources to illustrate key concepts. **6** Use formative assessment techniques such as quizzes, pre-tests, and classroom polls to gauge students' understanding and progress throughout the course. Provide timely feedback to address misconceptions and guide further learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	**1.1** Knowledge and Understanding The terminology associated energy balances, concept and units.	Energy : Terminology , Concept , and units	Lectures.	Midterm exams , Final exam , Quiz
2	3	1.1 Knowledge and Understanding The terminology associated w energy balances, concept and units.	Energy : Terminology , Concept , and units	Lectures and solved examples.	Weekly homework Team and homework problem , partial test
3	3	1.1Introduction to energ balances for processes without reaction.	Introduction to Energy Balances for Processes without Reaction The concept of the conservation of energy ,	Lectures and tutorials. Lectures.	(Oral questions :– multi choice ,alternativ response),
4	3	1.2 Introduction to energ balances for processes without reaction.	Introduction to Energy Balances for Processes without Reaction The concept of the conservation of energy	Lectures and solving examples.	Open questions that ha definite answer , do not have a definite answer
5	3	1.3 Calculation of enthal changes.	Application of Energy Balances in the Absence o Chemical Reaction	Lectures and tutorials. Lectures	
6	3	1.4 Energy balances: how account for chemical reaction.	Energy Balances : How to Account for Chemical Reaction Energy Balances that Incl the Effects of Chemical Reaction	Lectures and solving examples.	
7	3	1.5 Ideal process, efficien and the mechanical ener balance.	Ideal Processes , Efficienc and the Mechanical Energ Balances	Lectures and tutorials. Lectures	
8	3	**2.1** Heat of solution	Calculation Heat of	Lectures and solving	

		and mixing	Soluti and Mixing	examples.	
9	3			Lectures and tutorials. Lectures	
10	3			Lectures and solving examples.	
11	3			Lectures and tutorials. Lectures	
12	3			Lectures and solving examples.	
13	3			Lectures and tutorials.	
14	3			Lectures	
15	3				

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

Quiz (20%)
Home work (10%)
Final exam (70%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**1)** D.M.Himmelblau and J.B.Riggs ,Basic Principles and Calculations in Chemical Engineering ,7th Edition , 2004 . **2)** Nayef Ghasem and Redhouane Henda, Principle Chemical Engineering Processes, Material And Ene. Balances,Second Edition,2015.

Main references (sources)	
Recommended books and references (scientific journals, reports…)	Skogestad, S. (2008). Chemical and energy process engineering. CRC press.
Electronic References, Websites	

Course Description Form

1. Course Name:
Fluid Flow II

2. Course Code:
OGRE2203

3. Semester / Year:
Second Semester / Second Year

4. Description Preparation Date:
3/8/2025

5. Available Attendance Forms:
Central / Full

6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours 150 / Units 6

7. Course administrator's name (mention all, if more than one name)
Name: assist prof. Mona Youssef Abdel Ahad Othman
Email: mona.youssef@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	• Define the operation principles of the different types flow measurement, solve problems in fluid flow through flow measurement devices with applications for steady and unsteady flow. • Demonstrate knowledge of compressible fluid flows, with differences of equations using depending on compressible flow conditions, sonic, sub, super, sonic flow, conversion– diversion nozzle, types of gas pumping devices. • Provide the ability to estimate the energy (power) consumption for liquid mixing equipment and to design it by predict necessary fluid parameters of full scale projects by performing simple model experiments. • Provide the ability to estimate the terminal falling velocity and description drag coefficient for flow through packed columns and pressure drop calculation for fixed and fluidized beds and transport of particles… • Predict necessary fluid parameters of full scale projects by performing simple model experiments • Share ideas and work in a team in an efficient and effective manner under controlled supervision or independently.

9. Teaching and Learning Strategies

Strategy	• Lectures, notes tutorials and discussion sessions. • Submitting and discussions, the reports in fluid flow. • Improve the work skills in teams. • Team working and presentation skills are developed by carrying out LAB experiments submitting periodical reports.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Ability toCharacterize and specify the flow rate measurement methods and devices used.	Define the flow measurements methods and devices and their principles	Lectures, tutorials, example classes, practical applications	partial test (oral questions:- multiple choice, alternative response), Quiz, open questions that have a definite answer, or do not have a definite answer
2	3		Derive of local velocity equation of Pitot tube and flow rate in Venturi meter with applications		
3	3	Ability to characterize and specify the flow rate measurement methods and devices used	Derive of flow rate in orifice meter, nozzle, Rotameter with applications.	Lectures, tutorials, example classes, practical applications	partial test (oral questions :- multiple choice, alternative response), open questions that have a definite answer, or do not have a definite answer
4	3		Define weirs and weirs types, derive of flow rate in weirs with applications		
5	3	Ability to characterize and specify the compressible fluid flow at various velocities (subsonic, sonic,or supersonic), the energy losses and energy equations	Define the compressible fluids, derive of velocity of propagation of pressure wave, Mach Number and general equation of energy for compressible fluid flow.	Lectures, tutorials, example classes, practical applications	partial test (oral questions:- multiple choice, alternative response),Quiz, open questions that have a definite answer, or do not have a definite answer
6	3		Derive the energy equation for compressible fluid flow at isothermal conditions and equation of maximum flow and equation of critical pressure with applications		

7	3	Applications of the energy losses and energy equations (isothermal,or adiabatic) maximum flow conditions, Laval nozzle,	Derive the energy equation for compressible fluid flow at adiabatic conditions and equation of maximum flow and equation of critical pressure with applications	Lectures, tutorials, example classes, practical applications	partial test (oral questions:- multiple choice, alternative response), open questions that have a definite answer, or do not have a definite answer
8	3		Derive the equation of velocity and flow and area of flow through conversion /diversion (Laval) nozzle with describe the flow at sonic and supersonic velocity through Laval nozzle with applications.		
9	3	Define the types of gas pumping and devices, estimate the work done by the compressor (single and multistage).	Define the gas pumping devices (fans, blowers, compressors), ideal and real gas compression cycle, clearance and swept volume with applications	Lectures, tutorial,example classes, practical applications	partial test (oral questions:- multiple choice, alternative response), Quiz, open questions that have a definite answer, or do not have a definite answer
10	3		Drive the equation of work done for compression in single stage and multi-stages for ideal and real compression cycles with applications		
11	3	Ability to characterize and specify the liquid mixers types, Devices power consumption, power curves.	Define the mixing of liquids and types of mixing equipments, design of standard mixing system with applications	Lectures, tutorials, example classes, practical applications	partial test (oral questions:- multiple choice, alternative response), open questions that have a definite answer, or do not have a definite answer
12	3		Define the forces arise in mixing process and dimensionless numbers and power consumption calculation and power curves with application.		

13	3	Ability to characterize and specify the backed columns,	Define the packing types and packed columns, derive the		
		packing types, pressure drop estimation, fluidization, transport of particles.	terminal falling velocity, drug coefficient with applications	Lectures, tutorials, example classes, practical applications	partial test (oral questions:- multiple choice, alternative response), Quiz, open questions that have a definite answer, or do not have a definite answer
14	3		Darcy law and permeability, pressure drop equations and Ergun equation with applications		
15	3		Define fluidization, types, drive the minimum velocity and porosity for fluidization, pressure drop calculation and transportation of particles with applications.		

37. Course Evaluation

- Written exams (Quizzes, midterms and finals) to assess the understanding of the basic concepts and the ability to solve problems.
- Oral and written LAB exams to assess the skills of analysis and discussion, for submitted reports.
- Class and home work to assess the ability to appropriate solution.
- Seminar discussion of the submitted report.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Lecturer Notes • Curricular Books 8. Coulson, J.M and Richardson J.F. "Chemical Engineering, volume 1", Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford 9. Coulson, J.M and Richardson J.F. "Chemical Engineering, volume 2", Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford 10. F.A. Holland and R. Bragg "Fluid Flow for Chemical Engineers", 2nd Ed. (1995) Elisevier Ltd. 11. DARBY. R. , M. Dekker "Chemical Engineering Fluid Mechanics", 2nd Ed. (2001) 12. James O. Wilkes "Fluid Mechanics for Chemical Engineers",

	Prentice Hall PTR, New Jersey, USA, 1999. 13. De Nevers, N. "Fluid Mechanics for Chemical Engineers", (1991) McGraw-Hill, Singapore. Streeter and Wylie "Fluid Mechanics", McGraw-Hill, (1981).
Main references (sources)	4. Coulson, J.M and Richardson J.F. "Chemical Engineering, volume 1", Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford 5. Coulson, J.M and Richardson J.F. "Chemical Engineering, volume 2", Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford F.A. Holland and R. Bragg "Fluid Flow for Chemical Engineers", 2nd Ed. (1995) Elisevier Ltd.
Recommended books and references (scientific journals, reports...)	5. DARBY. R. , M. Dekker "Chemical Engineering Fluid Mechanics", 2nd Ed. (2001) 6. James O. Wilkes "Fluid Mechanics for Chemical Engineers", Prentice Hall PTR, New Jersey, USA, 1999. 7. De Nevers, N. "Fluid Mechanics for Chemical Engineers", (1991) McGraw-Hill, Singapore. Streeter and Wylie "Fluid Mechanics", McGraw-Hill, (1981).
Electronic References, Websites	Many various videos websites submitted consequently during the course

Course Description Form

1. Course Name:
Mathematics III
2. Course Code:
OGRE2101
3. Semester / Year:
First Semester / Second Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
Credit Hours 125/ Units 5
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Lect. Dhurgham Quasim Younis Email: dhurgham.kasem@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	1. To develop an understanding with the concepts of calculus and analytic geometry and the applications of these concepts to the solution of engineering problems. 2. Introduction to functions, limits, derivatives and their applications. 3. Provide practice at developing critical thinking skills, solving open ended problems and to work in teams. 4. Able to evaluate double, triple integrals and the area, volume by double & Triple Integrals respectively. 5. Understand the concept of Fourier-series representation of periodic functions and their applications..... **6.** Develop the technical knowledge and understanding of mathematical techniques and the ability to apply them appropriately in context.

9. Teaching and Learning Strategies

Strategy	The main strategy that will be adopted is to encourage students' participation in the exercises forms, while at the same time refining and expanding their critical thinking skills. This will be achieved through a homework, classes, interactive tutorials and by considering type of simple problems and design involving activities that are interesting to the students. The lectures are given in terms of questionable manner and answers are shared among the students.

10. Course Structure

Week	Material Covered
Week 1	Double Integral
Week 2	Area and volume by using double integral
Week 3	Double Integral in polar coordinates
Week4	Triple Integral in rectangular coordinates, physical application of double and triple integration.
Week 5	The error function, the gamma function
Week 6	The beta function, factorial function.
Week 7	The beta function, factorial function.
Week 8	Sequences, Convergence, Geometric series, nth partial sum,
Week 9	Sequences, Convergence, Geometric series, nth partial sum,
Week 10	Tests of convergence, alternating series, power and Taylor's series
Week 11	Tests of convergence, alternating series, power and Taylor's series
Week 12	Periodic functions, Fourier series
Week 13	Periodic functions, Fourier series
Week 14	Even and odd functions, Half range expansion.
Week 15	Even and odd functions, Half range expansion
Week 16	Final Exam

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	"Thomas' Calculus Early Transcendentals", George B.Thomas, Jr., Twelfth Edition, Addison-Wesley, 2010
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Mathematical Methods in Chemical Engineering", Jenson. V.J. and Jeffereys, G.V, 2nd Edition, Academic Press New York, 1977 Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition, 2007.
Electronic References, Websites	

Course Description Form

1. Course Name:	
Mathematics IV	
2. Course Code:	
OGRE2201	
3. Semester / Year:	
Second Semester / Second Year	
4. Description Preparation Date:	
3/8/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
Credit Hours 125/ Units 5	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Lect. Dhurgham Quasim Younis Email: dhurgham.kasem@alfarabiuc.edu.iq	
8. Course Objectives	
Course Objectives	1. Develop the technical knowledge and understanding of mathematical techniques and the ability to apply them appropriately in context 2.Giving student the skills to use the method to solve problems. 3.Enable students to demonstrate appropriate transferable skills and the ability to work with relatively little guidance and support.

	4.Give the learner the skills necessary to accommodate considered and disclosure of new relationships 5. Equip students with the confidence and study skills to enable them to progress both in the workplace and in post-graduate study

9. Teaching and Learning Strategies

Strategy	The teaching strategy planned through the lectures, and team based home works. Exercises assigned weekly to stimulate the students to actively use and revise the learned concepts, which also help the students to express their way of solving the problems fluently in written form. Most critical concepts and mistakes emphasized.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	3	Understand the concept of first and second order ordinary differential equations and classify them (linear, nonlinear, homogeneous, etc.)	Introduction to Ordinary Differential Equations	Lecture + Worked Examples	Quiz + Homework
2	3	Solve first order ODEs using the variable separable method	First Order ODEs: Variable Separable Equation	Lecture + Problem Solving	Homework
3	3	Understand and solve first order homogeneous equations	Homogeneous Equation	Lecture + In-class Exercises	Quiz
4	3	Solve exact equations and verify exactness	Exact Equation	Lecture + Practical Applications	Homework
5	3	Solve linear equations and Bernoulli's equation	Linear Equation & Bernoulli's Equation	Lecture + Problem Solving	Quiz
6	3	Understand and solve second order nonlinear differential equations	Second Order Nonlinear ODEs	Lecture + Applied Problems	Homework
7	3	Solve equations with missing dependent or independent variables	Dependent & Independent Variable Missing	Lecture + Examples	Quiz
8	3	Solve second order homogeneous and linear differential equations	Homogeneous & Linear ODEs	Lecture + Problem Solving	Homework
9	3	Solve equations with constant coefficients and variable coefficients	Constant & Variable Coefficient Equations	Lecture + Problem Solving	Quiz
10	3	Understand and solve higher order and simultaneous differential equations, and series solutions	Higher Order & Simultaneous ODEs, Series Solutions	Lecture + Problem Solving	Homework
11	3	Apply Taylor series to solve differential equations	Series Solution by Taylor Theorem	Lecture + Applications	Quiz
12	3	Apply Frobenius method for cases I and II	Frobenius Method (Case I, II)	Lecture + Problem Solving	Homework

13	3	Apply Frobenius method (Cases IIIa, IIIb), solve Bessel's equation, and study properties of Bessel functions	Frobenius Method (IIIa, IIIb), Bessel Functions	Lecture + Applied Examples	Quiz
14	3	Apply ODEs in chemical engineering processes (Tubular Gas Preheater)	Applications in Chemical Engineering	Lecture + Case Study	Research Assignment
15	3	Study reaction in axisymmetric spherical and cylindrical pellets	Reaction in Axisymmetric Pellets	Lecture + Case Study	Research Assignment
16	3	Final review and conduct the final exam	Final Exam	Review Session+ Exam	Final Exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

Assessment Type	Weight (Marks)
Quizzes	15% (5)
Online Assignments	12% (4)
Onset Assignments	6% (2)
Report	5% (5)
Midterm Exam	10% (10)
Final Exam	50% (60)
Total Assessment	**100% (100)**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	"Thomas' Calculus Early Transcendentals", George B.Thomas, Jr. , Twelfth Edition, Addison-Wesley, 2010
Main references (sources)	
Recommended books and references (scientific journals, reports…)	"Mathematical Methods in Chemical Engineering", Jenson. V.J. and Jeffereys, G.V, 2nd Edition, Academic Press New York, 1977 Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition, 2007.
Electronic References, Websites	

Course Description Form

1. Course Name:

Computer Programming

2. Course Code:

OGRE2204

3. Semester / Year:

Second Semester / Second Year

4. Description Preparation Date:

3/8/2025

5. Available Attendance Forms:

Central/ Full

6. Number of Credit Hours (Total) / Number of Units (Total)

Credit Hours 125/ Units 5

7. Course administrator's name (mention all, if more than one name)

Name: Assist Lect. Rida Nizar Abdul Kazim
Email: razaa.nazar@alfarabiuc.edu.iq

8. Course Objectives

Course Objecti	To introduce chemical engineering students to modern calculating tools used in the practice of engineering to: • Develop problem-solving skills through algorithmic thinking and problem decomposition • Apply programming concepts to solve real-world problems and implement solutions efficiently.

9. Teaching and Learning Strategies

Strategy	Incorporate interactive lectures where students can engage with the material through discussions, demonstrations, and real-world examples. Use multimedia presentations to illustrate programming concepts and demonstrate their application in chemical engineering. Problem-Based Learning: Present students with real-world engineering problems that can be solved using programming. Encouraging students to work collaboratively in small groups to analyze the problem, develop algorithms, and implement solutions using computational tools. This approach helps students develop problem-solving skills and apply programming concepts in context.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	3	Understand MATLAB interface, basic commands, arithmetic operations, and script file creation	Introduction to MATLAB	Lecture + Hands-on Lab	Quiz + Lab Assignment
2	3	Apply symbolic math in MATLAB including calculus, limits, solving equations, and ODEs	Symbolic Math	Lecture + Lab Exercises	Quiz + Homework
3	3	Create and manipulate 1D arrays, use built-in functions, and handle strings	One-dimensional	Lecture + Practical Exercises	Quiz

			Arrays (Vectors)		
4	3	Work with 2D arrays (matrices), perform addressing, and solve simultaneous algebraic equations	Two-dimensional Arrays (Matrices)	Lecture + Lab Work	Homework
5	3	Perform mathematical operations with arrays, use built-in math functions, solve algebraic and linear equations	Mathematics with Arrays	Lecture + Lab Exercises	Quiz
6	3	Apply polynomial operations, interpolation, and curve fitting in MATLAB	Polynomials & Curve Fitting	Lecture + Hands-on Lab	Homework
7	3	Implement conditional statements and loops to solve iterative problems	Conditionals & Loops	Lecture + Practical Coding	Quiz
8	3	Create 2D plots, customize plots, and format visual data	Two-dimensional Plot (Part 1)	Lecture + Lab Practice	Homework
9	3	Use specialized 2D plotting functions and sub-plotting techniques	Two-dimensional Plot (Part 2)	Lecture + Lab Work	Quiz
10	3	Create 3D plots using MATLAB built-in functions for engineering visualization	Three-dimensional Plot	Lecture + Hands-on Lab	Homework
11	2	Assess knowledge and skills covered in previous weeks	Midterm Exam	Written Exam	Midterm Exam
12	3	Create and manage MATLAB functions, use anonymous functions and function handles	Functions in MATLAB	Lecture + Lab Exercises	Quiz
13	3	Apply numerical analysis to solve initial value problems using Euler's method	Numerical Analysis & ODEs (Part 1)	Lecture + Lab Practice	Homework
14	3	Solve ODEs using Runge-Kutta, ode45, fsolve, and handle higher-order equations	ODEs (Part 2)	Lecture + Practical Coding	Quiz
15	3	Review all course topics and prepare for the final exam	Review Week	Discussion + Q&A	Participation
16	3	Evaluate comprehensive understanding of the course	Final Exam	Written Exam	Final Exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Chapra, Steven C. Applied numerical methods with MATLAB for engineers and scientists. Mcgraw-hill, 2018. 2. Yeo, Yeong Koo. Chemical engineering computation with MATLAB®.

	CRC Press,2020. (ebook)http://www.taylorandfrancis.com 3. Kattan, Peter. Matlab for beginners. Vol. 1. Petra books, 2022.Schilling.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	1. Otto, Stephen Robert, and James P. Denier. An introduction to programming and numerical methods in MATLAB. Springer Science & Business Media, 2005. 2. Yang, Won Y., et al. Applied numerical methods using MATLAB. John Wiley & Sons, 2020.
Electronic References, Websites	https://www.mathworks.com/

Course Description Form

1. Course Name:
Mass Transfer
2. Course Code:
OGRE3103
3. Semester / Year:
First Semester / third Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Students' attendance is recorded in the classroom and on Excel Based on the number of lectures and according to the dates in the sched and is sent weekly via email to the Absences Committee.
6. Number of Credit Hours (Total) / Number of Units (Total)
2 theoretical hours/1 tutorial hours during one semester. 45 / 3
7. Course administrator's name (mention all, if more than one name)
Name: Walid Mohamed Saleh Qasim Email: walid.mohamed@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	1- The course aims to provide deeper knowledge, a wide scope and impro understanding of the mechanisms in mass transfer as well as better insight analytical and empirical methods applied in analysis a synthesis of m transfer related problems. 2- The students should gain knowledge to apply the theories to relev engineering problems. 3- Ability to lead a team, allocate tasks and assemble results.

9. Teaching and Learning Strategies	
Strategy	1- Understanding the basic information, concepts and termi of the general principles of diffusion processes of gas-liqui diffusion. 2- Gain and/or improve their ability to synthesize, integrate utilize process information in solving separations and analogy proble 3- An ability to apply effective solutions, both independentl Cooperatively for problems in separation processes 4- Demonstrating a broad and integrated knowledge and a understanding of issues related to separation processes chemical process and important role it plays in the succes the process both economically and environmentally. 4- Apply course concepts in solving interdisciplinary prob solve.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
1	3	Ability to Understand the steady state ordinary molecu diffusion.	,Definition unit operati Introduction diffusion, Steady-state ordinary molecules diffusion.	Lecture	partial test (Oral questions).
2	3	Ability to deriv the Fick,s law.		Lecture	
3	3	Understand the Characterizatio the process for Equimolar coun diffusion.	Equimolar counter diffusion.	Lecture Tutorial	Quizzes
4	3	determine the ti required to drop level in vessel.	Diffusion in conical vessel	Lectures, Exam Classes, Practica Applications.	Assignments
5	3	Ability to estimate the diffusion coefficients.	Diffusivity in gases and vapors.	Lecture	Quizzes
6	3	Understand the basic principle for the Maxwell,s law of diffusion for binary and multi-component systems.	Maxwell,s law of diffusion for binary system, Maxwell,s law of diffusion for multi- componen t mass transfer.	Lecture	Assignments
7	3	Understand the mass transfer models for fluid fluid interface (phase boundary)	Methods for mass transfe at fluid-flui interface (phase boundary). Molecular diffusion in liquid phase Diffusivities liquids, Diffusion of (A) through multi-component stagnant lay mixture. Molecular	Lecture	Midterm Exam
8	3	Ability to estimate the rate of diffusion and diffusivities in liquid phase.		Lecture	Quizzes
9	3	Ability to estimate the rate of diffusion and diffusivities in solid phase.		Lecture	Assignments

			diffusion in solid phase.		
10	3	Ability to derive the rate of convection mass transfer for binary gas mixture.	Convection mass transfer for binary g mixture.	Lecture	Quizzes
11	3	Understand and analyze the empirical correlations to determine the mass transfer coefficient.	Methods to determine the mass transfer coefficient.	Lecture	Assignments
12	3	Understand and analyze the empirical correlations to determine the mass transfer coefficient.		Lecture	Quizzes
13	3	Understand the mass transfer models	Film – Pentration theory	Lecture	Assignments
14	3	Understand the mass transfer models (Two film theory)	One film theory (gas- liquid case).	Lecture	Quizzes
15	3	Pentration theory) (gas- liquid case).	Two – film theory (gas- liquid case).	Lecture	Final Exam

11. Course Evaluation

- Daily Preparation: 10 points
- Daily Oral Presentations: 10 points
- Monthly Written Exams: 30 points

- Reports/Assignments: 25 points
- Final Exam: 25 points

Total Score = (Daily Preparation Score x 10%) + (Daily Oral Presentations Score x 10%) + (Monthly
Written Exams Score x 30%) + (Reports/Assignments Score x 25%) + (Final Exam Score x 25%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	o Lecturers o Book "Coulson and Richardson,s Chemical Engineering volume 1, 6th Edition (International Edition), Butterworth-Heinemann, 1999."

	o Book "Coulson and Richardson,s Chemical Engineering volume 2, 5th Edition (International Edition), Butterworth-Heinemann, 2002." o Other support books :- R.E. Treybal, Mass transfer operations (3nd edit), McGraw Hill-2003
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Heat Transfer I

2. Course Code:
OGRE3105
3. Semester / Year:
Two semester / 3ed year
4. Description Preparation Date:
20/3/2024
5.Available Attendance Forms:
6.Number of Credit Hours (Total) / Number of Units (Total)
Theoretical (3hr/week) / 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Salim Mohamed Jaber Aalami Email: salim.mohamed@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	- To introduce and develop an understanding the modes of heat transfer (conduction, convection and radiation). Derive and discuss all types of the equation in these modes of heat transfer. - Analyze heat transfer rate data in different modes.

9. Teaching and Learning Strategies	
Strategy	Lectures, Tutorials, Example Classes, Informal and formal teamwork, Weekly homework problems Team working.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Modes of Heat Transfer: Conduction, Convection and Radiation.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do
					not have a definite answer and homeworks.
2	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Steady State Heat Conduction in One Dimension, Plane wall.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a Definite Answer and homeworks.
3	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Steady State Heat Conduction in One Dimension, Radial systems.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response),

					Open questions that have a Definite answer or do not have a definite Answer and homeworks.
4	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Heat source systems.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite Answer and homeworks .
5	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Boundary surrounded by fluids.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
6	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Overall heat transfer coefficient.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite

					answer or do
					not have a definite answer and homeworks.
7	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Extended surface.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
8	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Conduction-convection systems and fins.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.

9	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Unsteady State Heat Transfer, Temperature as a function of time	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
10	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Lumped capacity system, quenching of small bodies and heating of tank reactor.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
11	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Principles of Convection, Transport equations.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite Answer or
					do not have a definite answer and homeworks.

12	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Fluid mechanism aspect of convection.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
13	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Laminar boundary layer, Thermal boundary layer.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
14	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Empirical and practical relations for pipe.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have

					a definite answer and homeworks.
15	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Tube flow and flow normal to single and tube banks.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.

12. Course Evaluation

This course is an introduction to the principal concepts and methods of heat transfer. The objectives of this integrated subject are to develop the fundamental principles and laws of heat transfer (conduction, convection and radiation), and to explore the implications of these principles for system behaviour; to formulate the models necessary to study, analyze and design heat transfer systems through the
application of these principles; to develop the problem-solving skills essential to good engineering practice of heat transfer in real-world applications.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	J.P.Holman , "Heat Transfer", Nin edition. - Frank P. Incropera & David P. Dewitt, "Fundamentals of Heat an Mass Transfer", Fifth Edition. - Colulsson ,J.M and Richardson J.F. "Chemical Engineering , volume 1 Third edition ,Robert Maxwell. M. Google classroom

Course Description Form

1. Course Name:
Combustion
2. Course Code:
OGRE3106
3. Semester / Year:

1st. Semester /2024-2025
4. Description Preparation Date:
Sep-2024
5. Available Attendance Forms:
Full time
6. Number of Credit Hours (Total) / Number of Units (Total):
2 hrs.-week/30 hrs.-Semester
7. Course administrator's name (mention all, if more than one name)
Name: Lamees Raad Jabbar Shuaibi Email: lamees.raad@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	• Study the nature of combustion ,scope of internal combustion engine • Types of flame ,study the effect of temp and pressure • study the types of solid fuels and the drying of solid fuels • Study the types of furnaces and furnaces efficiency
9. Teaching and Learning Strategies	
Strategy	Theoretical lectures, discussion and dialogue, brainstorming, and examples are used to achieve the goals.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding the general information, concepts,and Importance of combustion nature.	Scope and history of combustion: The nature of combustion, Historical perspective of fuels.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
2	2	Understanding the general information, concepts, and importance of combustion nature and combustion engines	Historical perspective of combustion technology (lighting /steam boilers/ internal – combustion engines/compression ignition engines/gas turbines/rocket engines).	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams

3	2	Apply course concepts in solving interdisciplinary problems of Combustion of Gaseous and Vapourized Fuels in Furnaces	Combustion of gaseous and vapourized fuels : Furnaces and tubular furnace	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
4	2	An ability to apply effective solutions, both independently and cooperatively, for problems in Chemical Engineering Principle and furnace efficiency	Chemical Engineering Principle II and furnace efficiency (Furnace efficiency and heat loss calculations).	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
5	2	Student teams are asked to help solve sample problems in class. Illustrate and analyze information and ideas in burners types and heat transfer in furnace and ,chimney height calculation.	Burners types, radiation and convection rooms in furnace, furnace wall layers and refractories ,chimney height calculation, tube layers in furnaces.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
6	2	Understanding the general information, concepts, and and importance of first law combustion calculations and tyes of flames and effected parameter.	Flames: First law combustion calculations (adiabatic flame temperature), Laminar premixed flames: (effect of stoichiometry on laminar burning velocity /effect of reactant pressure and temperature on laminar burning velocity/stabilization of a premixed flame),	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
7	2	Apply course concepts in solving interdisciplinary problems, solve the problems through logic and improve their ability to work effectively in a group of peers	Laminar flame theory(laminar burning velocity theory /simplified laminar flame model).	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams

8	2	An ability to apply effective solutions, both independently and cooperatively, for problems in Diffusion flames, combustion zones and temperature profiles. An ability to apply effective solutions.	Diffusion flames, combustion zones and temperature profiles.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams

9	2	both independently and cooperatively, for problems in flammability limits, flame stability, flame and combustion speed.	Flammability limits, flame stability, flame and combustion speed.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
10	2	Understanding the general information, concepts, and importance Combustion of Liquid Fuels	Combustion of Liquid Fuels: 5- Spray Formation And Droplet Behavior Spray formation, size distributions, fuel injectors, spray dynamics (diesel spray dynamics, single – droplet dynamics),	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
11	2	An ability to apply effective solutions, both independently and cooperatively, for problems in vaporization of single liquid droplets	vaporization of single droplets.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
12	2	An ability to apply effective solutions, both independently and cooperatively, for oil –fired furnaces combustion and combustor design	6- Oil –Fired Furnaces Combustion Gas turbine sprays combustion, Gas turbine operating parameters, combustor design, combustion rate, Liner heat transfer.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
13	2	An ability to apply effective solutions, both independently and cooperatively, for Direct – Injection Engine Combustion.	7- Direct –Injection Engine Combustion introduction to diesel engine combustion, fuel injection, combustion rates Combustion of solid fuels: Solid fuel combustion mechanisms	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams

14	2	An ability to apply effective solutions, both independently and cooperatively, for combustion of solid fuels:	Solid fuel, drying of solid fuels, devolatilization of solid fuels.	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
15	2	An ability to apply effective solutions, both independently and cooperatively, for		Theoretical lectures,	Discussions during the

Course Description Form

1. Course Name:
Applied Mathematics in Chemical Engineering
2. Course Code:
OGRE3202
3. Semester / Year:
Year: 2nd Semester/ third year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Students' attendance is recorded in the classroom and on Excel Based on the number of lectures and according to the dates in the sched and is sent weekly via email to the Absences Committee.
6. Number of Credit Hours (Total) / Number of Units (Total)
2 theoretical hours/1 tutorial hours during one semester. 45 / 3
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Khalid Abd Ali Abdul Ridha Email: dr.khalid@alfarabiuc.edu.iq

8. Course Objectives	
Course Objectives	at the end of the semester the student should be able to Apply different analytical methods to solve chemical engineering problems

9. Teaching and Learning Strategies	
Strategy	This course introduces students to: Solve ordinary differential equations: apply Laplace transform to solve various systems of ordinary differential equations: Solve different types of partial differential equations. At the end of the course students should be able to apply these methods to tackle all kinds of problems that appear in chemical engineering.

10. Course Structure

Week	Hours	Unit Name	Required Learning Outcomes	Learning Method	Evaluation Method
1–2	4	Review of Ordinary Differential Equations	Solve first, second, and higher-order ODEs in chemical engineering contexts.	Lecture, Blackboard exercises	Homework, Quizzes, Exams
3–5	6	Partial Differential Equations	Apply direct integration, separation of variables, and variation of parameters to PDEs.	Lecture, worked examples	Homework, Quizzes, Exams
6	2	Laplace Transforms – Fundamentals	Understand definitions, basic rules, and the first shifting theorem.	Lecture, problem-solving	Homework, Quizzes

7–8	4	Laplace Transforms – Advanced	Apply inverse Laplace transforms, convolution, unit step, and impulse functions; solve ODEs with constant and variable coefficients.	Lecture, Blackboard	Homework, Quizzes, Exams
9–12	8	Formulation of Chemical Engineering Problems (Modeling)	Develop mathematical models for storage tanks, mixing tanks, reactors, heat/mass/momentum transfer, and process control systems.	Lecture, case studies	Homework, Quizzes, Exams
13	2	Applications in Industrial Processes	Relate mathematical methods to practical refinery and chemical process problems.	Lecture, discussion	Homework
14	2	Review & Problem Solving	Comprehensive review with emphasis on problem-solving skills.	Discussion, Q&A	—
15	2	Final Exam	Assess all course learning outcomes.	Written exam	Final Exam

11. Course Evaluation

- Daily Preparation: 10 points
- Daily Oral Presentations: 10 points
- Monthly Written Exams: 30 points

- Reports/Assignments: 25 points
- Final Exam: 25 points

Total Score = (Daily Preparation Score x 10%) + (Daily Oral Presentations Score x 10%) + (Monthly
Written Exams Score x 30%) + (Reports/Assignments Score x 25%) + (Final Exam Score x 25%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	o Lecturers o Book "Coulson and Richardson,s Chemical Engineering volume 1, 6th Edition (International Edition), Butterworth-Heinemann, 1999." o Book "Coulson and Richardson,s Chemical Engineering volume 2, 5th Edition (International Edition), Butterworth-Heinemann, 2002." o Other support books :- R.E. Treybal, Mass transfer operations (3nd edit), McGraw Hill-2003
Main references (sources)	

Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Unit Operation I
2. Course Code:
OGRE3203
3. Semester / Year:
Year: 2nd Semester/ third year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Students' attendance is recorded in the classroom and on Excel Based on the number of lectures and according to the dates in the sched and is sent weekly via email to the Absences Committee.
6. Number of Credit Hours (Total) / Number of Units (Total)
3 theoretical hours/1 tutorial hours during one semester. 60 / 4
7. Course administrator's name (mention all, if more than one name)
Name: Walid Mohamed Saleh Qasim Email: @alfarabiuc.edu.iq

8. Course Objectives	
Course Objectives	The course aims to provide deeper knowledge, a wide scope and improved understanding of the mechanisms in mass transfer as well as a better insight into analytical and empirical methods applied in analysis and synthesis of mass transfer related problems. The students should gain knowledge to apply the theories to relevant engineering problems. Ability to lead a team, allocate tasks and assemble results.

9. Teaching and Learning Strategies	
Strategy	1- Understanding the basic information, concepts and terminology of the general principles of separation processes of gas-liquid separation (Tray absorption & Packed Bed absorption), Binary and Multicomponent Distillation. 2- Gain and/or improve their ability to synthesize, integrate and utilize process information in solving separations and analogy problems. 3- An ability to apply effective solutions, both independently and Cooperatively for problems in separation processes 4- Demonstrating a broad and integrated knowledge and a deep understanding

	of issues related to separation processes in a chemical process and important role it plays in the success of the process both economically and environmentally. 5- Apply course concepts in solving interdisciplinary problems, solve the problems through logic and improve their ability to work effectively in a group of peers. 6- Work analytically in the formulation and solution of problems. 7- Ability to design separation system for the effective solution of intended problem. 8- Use engineering and measuring equipment to provide data in support of theoretical understanding. 9- Work together in same-discipline teams to solve engineering problems.

10. Course Structure

Week	Hours	Unit Name	Required Learning Outcomes	Learning Method	Evaluation Method
1–2	4	Review of Ordinary Differential Equations	Solve first, second, and higher-order ODEs in chemical engineering contexts.	Lecture, Blackboard exercises	Homework, Quizzes, Exams
3–5	6	Partial Differential Equations	Apply direct integration, separation of variables, and variation of parameters to PDEs.	Lecture, worked examples	Homework, Quizzes, Exams
6	2	Laplace Transforms – Fundamentals	Understand definitions, basic rules, and the first shifting theorem.	Lecture, problem-solving	Homework, Quizzes
7–8	4	Laplace Transforms – Advanced	Apply inverse Laplace transforms, convolution, unit step, and impulse functions; solve ODEs with constant and variable coefficients.	Lecture, Blackboard	Homework, Quizzes, Exams
9–12	8	Formulation of Chemical Engineering Problems (Modeling)	Develop mathematical models for storage tanks, mixing tanks, reactors, heat/mass/momentum transfer, and process control systems.	Lecture, case studies	Homework, Quizzes, Exams
13	2	Applications in Industrial Processes	Relate mathematical methods to practical refinery and chemical process problems.	Lecture, discussion	Homework
14	2	Review & Problem Solving	Comprehensive review with emphasis on problem-solving skills.	Discussion, Q&A	—
15	2	Final Exam	Assess all course learning outcomes.	Written exam	Final Exam

11. Course Evaluation

- Daily Preparation: 10 points
- Daily Oral Presentations: 10 points
- Monthly Written Exams: 30 points
- Reports/Assignments: 25 points

- Final Exam: 25 points Total Score = (Daily Preparation Score x 10%) + (Daily Oral Presentations Score x 10%) + (Monthly Written Exams Score x 30%) + (Reports/Assignments Score x 25%) + (Final Exam Score x 25%)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	o Lecturers o Book "Coulson and Richardson,s Chemical Engineering volume 1, 6th Edition (International Edition), Butterworth-Heinemann, 1999." o Book "Coulson and Richardson,s Chemical Engineering volume 2, 5th Edition (International Edition), Butterworth-Heinemann, 2002." o Other support books :- R.E. Treybal, Mass transfer operations (3nd edit), McGraw Hill-2003
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:	
a. Heat Transfer II	
2. Course Code:	
a. OGRE3205	
3. Semester / Year:	
a. Two semester / year	
4. Description Preparation Date:	
a. 20/3/2024	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
a. Theoretical (3hr/week) / 2 Units Practical (3hr/week)	
7. Course administrator's name (mention all, if more than one name)	
a. Name: Ali Hassin Ali b. Email: ali.hassin2@alfarabiuc.edu.iq	
8. Course Objectives	
9. Course Objectives	Characterization of the design procedure for different heat transfer equipment as a heat exchanger. Provide practice at developing critical thinking skills, solving open-ended problems and to work in teams.
10. Teaching and Learning Strategies	
11. Strategy	12. Lectures, Tutorials, Example Classes, Informal and formal teamwork, Weekly homework problems, Analysis of cases 13. linked to the work environment, Practical Applications.

14. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Heat Exchangers, Various types and their general characteristic s, fouling factor.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
2	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Heat exchangers mean temperature difference.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
3	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Co-current and counter- current flow, solving problems.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homework's.

4	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Shell and Tube Exchangers, Types and various specification s.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks .
5	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Effectiveness (NTU) methods.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
6	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Design calculation for heat exchanger.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
7	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Heat Transfer, Condensatio n of single vapors, Design calculations for condenser.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.

8	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Pool and flow boiling.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
9	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Radiation, Radiation properties.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
10	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Shape factor, heat exchange for non-black bodies.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.

11	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	parallel planes, shields.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
12	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Gas tradition.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.
13	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Furnace design.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral uestions:- multiple choice, alternative response), Open questions that have a definite answer or do
14	3	Ability to characterization and specify the heat transfer issues related to the heat transfer modes.	Renewable Energy.	Lectures, Tutorials, Example Classes, Practical Applications.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.

15	3	Ability to characterizati on and specify the heat transfer issues related to the heat transfer modes.	Types o f renewable energy.	Lectures, Tutorials, Example Classes, Practical Applicatio ns.	Partial test (Oral questions:- multiple choice, alternative response), Open questions that have a definite answer or do not have a definite answer and homeworks.

15.Course Evaluation

This course is an introduction to the principal concepts and methods of heat transfer. The objectives of this integrated subject are to develop the fundamental principles and laws of heat transfer (conduction, convection and radiation), and to explore the implications of these principles for system behaviour; to formulate the models necessary to study, analyze and design heat transfer systems through the application of these principles; to develop the problem-solving skills essential to good engineering practice of heat transfer in real-world applications.

16. Learning and Teaching Resources

Required textbooks (curricular books, if a	
Main references (sources)	- J.P.Holman , "Heat Transfer", Ninth edition.
Recommended books and references (scientific journals, reports...)	- Frank P. Incropera & David P. Dewitt, "Fundamentals of Heat and Mass Transfer", Fifth Editio - Colulsson ,J.M and Richardson J. "Chemical Engineering , volume 1", Third edition ,Robert Maxwe M.C.
Electronic References, Websites	Google classroom

Course Description Form

1. Course Name:
Equipment Design Using CAD
2. Course Code:
OGRE3206
3. Semester / Year:
2nd Semester / year
4. Description Preparation Date:
05/03/2024
5. Available Attendance Forms:
Students' attendance is recorded in the classroom and on Excel lists based on the number of lectu and according to the dates in the schedule and is sent weekly via email to the Absences Committee
6. Number of Credit Hours (Total) / Number of Units (Total)
5 hours / 3 75 hours for semester
7. Course administrator's name (mention all, if more than one name)
Name: Wissam Abdulsattar AbdulhusseinEmail: wissam.abdulsattar@alfarabiuc.edu.iq

8. Course Objectives	
Course Objectives	• The ability to apply the design equation and equipments specifications as practical. • To prepare students to be able to read and understand chemical engineering plants drawing. • The student should have the necessary skills to design equipments such vessels, gas-liquid separator …etc. by Provide practice to design. • To be a part of working group, cooperate together to use the knowledge gained to get a proper design.
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this subject is to encouraging student participation in design exercises enhances engineering thinking skills through interactive classes and tutorials involving all students.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Explain design procedure for vessels design by example + the concepts of simulation	Pressure vessels design + computer aided design Laboratory (Introduction to simulation principle)	Lectures, Tutorials , Example Classes ,	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
2	5	prepare data sheets for vessels + tha ability to utilize computer software HYSYS	Pressure vessels design and pumps+ computer aided design Laboratory (getting start to computer software HYSYS)	Lectures, Tutorials , Example Classes , Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
3	5	Connection of piping and pumps to the vessels +	Pressure vessels design + computer aided	Lectures, Tutorials ,	Exams , Weekl homework, Te and homework
		the knowledge of HYSYS functions	design Laboratory	Example Classes ,	solve problems Open questions that have a definite answer or do not have definite answer

4	5	Ability to design gas-liquid seperator and prepare dara sheet + practice design for compressor and separator with HYSYS	gas-liquid separator, manually + computer aided design Laboratory (+ simulation of compressor and separator)	Lectures, Tutorials , Example Classes ,	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
5	5	Ability to design liquid -liquid seperator and prepare dara sheet + +practice design for compressor and separator with HYSYS	liquid-liquid separator + computer aided design Laboratory (simulation of compressor and separator)	Lectures, , Example Classes ,	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
6	5	Basic design procedure and theories related to design + practice desigm for reactor with HYSYS	Heat transfer practice + computer aided design Laboratory	Lectures, , Example Classes , Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
7	5	Ability to utilize books and referances to obtain the required physical properties of their approach system (heat capacity …etc + practice desigm for reactor with HYSYS	Heat transfer practice + computer aided design Laboratory	Lectures, , Example Classes , Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
8	5	Calculate Overall heat transfer	Heat transfer practice +	Lectures, , Example	Exams , Weekl homework, Te

		coefficient.and area required for heat exchanger design + practice desigm for reactor	computer aided design Laboratory	Classes , Practical Applications	and homework solve problems Open questions that have a definite answer or do not have definite answer
9	5	The ability to calculate individual heat transfer coefficients and pressure drop for heat exchangers	Heat transfer practice + computer aided design Laboratory	Lectures, , , Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
10	5	The student had been applied all steps required to design heat exchanger equipments	Heat transfer practice + computer aided design Laboratory	,Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
11	5	Understand the main concept of tower or column in chemical engineering equipment and the differences between tray and packed column	Mass transfer practice + computer aided design Laboratory	Lectures, , Example Classes , Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
12	5	Ability to utilize books and referances to obtain the required physical properties of their approach system X-Y diagram	Mass transfer practice + computer aided design Laboratory	Lectures, Tutorials , , Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
13	5	Practices the the necessary steps for towers internal design	Mas transfer practice + computer aided design Laboratory	Lectures, Tutorials , , Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer

					or do not have definite answer
14	5	Practices the the necessary steps for towers internal design	Mass transfer practice + computer aided design Laboratory	Lectures, Tutorials , Practical Applications	Exams , Weekly homework, he and homework solve problems Open questions that have a definite answer or do not have definite answer
15	5	The stud had b applied steps requi to des distillation column	Mass transfer practice + computer aided design Laboratory	, Example Classes , Practical Applications	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer

17. Course Evaluation

Midterm exams , Final exam , Quizzes, Weekly homework, Team and homew problems , partial test (Oral questions :,alternative response), Open questions that hav definite answer
Design projects and exams (30 %) Lab. (10 %)
Continuous evaluation degree (10 %) Final exam (50 %)

18. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Lectures Sinnott R. and Towler C; 2016 " chemical Engineering Design" 5th edition Butterworth-Heinemann -Coke, A.K ;2007"Ludwig s Applied Process Design of Chemical and petrochemical Plant" vol. 1 4th edition Gulf professional Publisher -Coulson ,J.M and Richardson J.F. “Chemical Engineering , volume 2”, Fifth edition 2002, Elsevier Science, Linacre House, Jordan Hill, Oxford -Green D ,Perry ,J.H, 2008” chemical engineering handbook ”,8th edition Mc-Graw –Hill Book com.. - Couper J. , Penny R. , Fair J and Wallas S " Chemical Process Equipment " 2nd edition 2010 Elesvier

Main references (sources)	Lectures, field trips, pilot plant laboratory ,Summer training
Recommended books and references (scientific journals, reports...)	- G.F. Froment and K.B. Bischoff, Chemical Reactor Analysis and Design (3nd edit), John Wiley & Sons 2011. 2-L D Schmidt, The Engineering of Chemical Reactions (2nd Edition), OUP, 2005. 3-O. Levenspiel, Chemical React Engineering (3rd edition), John Wiley & S 1999.
Electronic References, Websites	Websites , Laboratory

Course Description Form

1.	Course Name:	
	Petroleum and Gas Field Processing	
2.	Course Code:	
	CES.R.3313	
3.	Semester / Year:	
	2nd. Semester /2023-2024	
4.	Description Preparation Date:	
	Jan-2024	
5.	Available Attendance Forms:	
	Full time	
6.	Number of Credit Hours (Total) / Number of Units (Total):	
	2 hrs.-week/30 hrs.-Semester	
7.	Course administrator's name (mention all, if more than one name)	
	Name: Dhaha Sabbah Khudair AbbasEmail: dhaha.sabbah@alfarabiuc.edu.iq	
8.	Course Objectives	
Course Objectives	• To provide an understanding of the general principles and importance of petroleum and gas field processing in the petroleum industry. • A comprehensive understanding the fundamentals of the Petroleum and Gas Field Processing mechanisms at the basis of the processes. • Provide criteria affect the processing options and the processing equipment required in a petroleum and gas field processing at developing critical thinking skills, solving open-ended problems and to work in teams.	
9.	Teaching and Learning Strategies	
Strategy	Theoretical lectures, discussion and dialogue, brainstorming, and examples are used to achieve the goals.	
10. Course Structure		

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding the general information, concepts, and and importance of Petroleum and Gas Field Processing in the petroleum industry.	Formation and Accumulation of Oil and Gas. Types of Petroleum Reservoir,	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams
2	2	Understanding the general information, concepts, and and importance of Petroleum and Gas Field Processing in the petroleum industry.	Two-Phase Gas-Oil Separation : Introduction. The Separation Problem.	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams
3	2	Gain and/or improve their ability to synthesize, integrate and utilize process information in the phase's separation and treatment of gas and petroleum.	Theory of Gas-Oil Separation. Methods of Separation.	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams
4	2	Apply course concepts in solving interdisciplinary problems of phases separation and treatment of gas and petroleum.	Gas-Oil Separation Equipments	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams
5	2	An ability to apply effective solutions, both independently and cooperatively, for problems in phase's separation and treatment of gas and petroleum.	Three-Phase Oil-Water-Gas: Introduction, Separation Theory. Separator Types.	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams

6	2	Student teams are asked to help solve sample problems in class. Illustrate and analyze information and ideas in the phase's separation and treatment of gas and petroleum	Separator Sizing Equation and Rules.	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams
7	2	Understanding the general information, concepts, and and importance of Petroleum and Gas Field Processing in the petroleum industry. Apply course concepts in solving interdisciplinary problems, solve the problems through logic and improve their ability to work effectively in a group of peers	Treatment of Crude Oil : Emulsion Treatment and Dehydration of Crude Oil	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams
8	2	An ability to apply effective solutions, both independently and cooperatively, for problems in phase's separation and treatment of gas and petroleum.	Desalting of Crude Oil	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams
9	2	An ability to apply effective solutions, both independently and cooperatively, for problems in phase's separation and treatment of gas and petroleum.	Crude Oil Stabilization and Sweetening	Theoretical lectures, discussion and examples	Discussions during the lecture and daily exams

10	2	Understanding the general information, concepts, and and importance of Gas Field Processing in the petroleum industry.	Field Processing and Treatment of Natural Gas : Overview of Gas Field Processing	Theoretical lectures, discussion and examples	Disc duri lectı and
11	2	An ability to apply effective solutions, both independently and cooperatively, for problems in treatment of gas.	Sour Gas Treating	Theoretical lectures, discussion and examples	Disc duri lectı and
12	2	An ability to apply effective solutions, both independently and cooperatively, for problems in treatment of gas.	Gas Dehydration	Theoretical lectures, discussion and examples	Disc duri lectı and
13	2	An ability to apply effective solutions, both independently and cooperatively, for problems in treatment of gas.	Gas Dehydration and Recovery	Theoretical lectures, discussion and examples	Disc duri lectı and
14	2	An ability to apply effective solutions, both independently and cooperatively, for problems in treatment of gas.	Gas Separation Fractionation of Natural Gas Liquids	Theoretical lectures, discussion and examples	Disc duri lectı and
15	2	An ability to apply effective solutions, both independently and cooperatively, for problems in treatment of gas.	Fractionation of Natural Gas Liquids	Theoretical lectures, discussion and examples	Disc duri lectı dail exai

11. Course Evaluation
Oral questions and discussions during the lectures, daily exams, quarterly exams, documented examin ons, and, final exams.
12. Learning and Teaching Resources
Required textbooks (curricular books, if any)

	H. K. Abdel- Aal, Mohamed eggour, M. M Fahim "Petroleum and Gas Field Processing, (2016).
Main references (sources)	H. K. Abdel- Aal, Mohamed eggour, M. M Fahim "Petroleum and Gas Field Processing, (2003).
Recommended books and references (scientific journals, reports...)	Francis S. Manning-Oilfield Processing of Petroleum, Vol. 1_ Natural Gas, (1991). Francis S. Manning, Richard E. Thompson-Oilfield Processing, Vol. 2_ Crude Oil, (1995).
Electronic References, Websites	https://www.linkedin.com/pulse/top-oil-gas- websites-jaya-priya

Course Description Form

1. Course Name:	
Unit Operation II	
2. Course Code:	
OGRE4101	
3. Semester / Year:	
First Semester / Fourth Year	
4. Description Preparation Date:	
3/8/2025	
5. Available Attendance Forms:	
Central / Full	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hr / 3 Unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Lamees Raad Jabbar Email: lamees.raad@alfarabiuc.edu.iq	
8. Course Objectives	
Course Objectives	• To provide an understanding of the general principles of separation processes to allow students to make sensible options given a separation (Humidification, Dehumidification and

	Cooling tower, Evaporation, crystallization, and Wet Solid Drying). • A comprehensive understanding of the transport processes related to chemical engineering operations, with focus on both theory and applications. • Ability to select of appropriate equipment for the separation of materials in process plant. • Provide practice at developing critical thinking skills, solving o ended problems and to work in teams.

9. Teaching and Learning Strategies

Strategy	• **Written method implies** the following forms of activity: copying, taking notes, composing theses, writing essays, etc. • **Laboratory method** implies the following forms of activity: conducting experiments, showing video materials, etc. • **Practical methods** unite all the teaching forms that stimulate developing practical skills in students • **Explanatory method** is based on discussing a given issue. Designing and presenting a project • **Discussion/debates**. This is the most widely spread method of interactive teaching. • **Case study** – the teacher discusses concrete cases together with the students and they study the issue thoroughly.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Provide an understanding of the general principles of Drying wet solid	Drying wet solid: – introduction and gener principle in drying, rate drying, the mechanism moisture movement.	Lectures, Practica Applications	partial test (Oral questions: multiple choice ,alternative response), Open questions that have a definite

					answer, or do not have a definite answer
2		Basic principles of drying de on rate regime (constant a falling regime)	Calculation of rate of drying, moisture transport in solids a constant in continuous dryers	Lectures, Example Classes, Practical Applications	Exams, Weekly homework, Team and homework problems, Open questions that have a definite answer, or do not have a definite answer, partial test (Oral questions)
3		Demonstrating a bro and integrated knowledge and a dee understanding of issue related to Drying wet solid	Types of dryers and falling rate period , capillary movement , material and energy balances	Demonstrating a broad deep understanding of	Weekly homew Team and homew solve problems, O questions that hav definite answer, or not have a defi answer, partial test (questions)
4		Apply course concep in solving interdisciplii problems of cooling to	Mechanism of cooling tower , minimum gas flow rate	Lectures, Tutorials, Example Classes, Informal and formal teamwork, Weekly homework problems	Exams , Weekly homework, Team and homework solve problems , Open questions that have a definite answer, or do not have a definite answer
5		provide an understanding of the general	Humidification, temperature humidification chart, enthalpy – humidification	Lectures, Tutorials, Example	Exams, Wee homework, Team homework so problems, O questions that hav

		principles of Humidification, saturation, dew point , wet and adiabatic saturation temperature ,humid heat and volume	temperature chart.	Classes, Informal and formal teamwork, Weekly homework problems Analysis of cases linked to the work environr	definite answer, or not have a defi answer, partial test (questions)
6		evaluate information ideas in the handling transport phenom issues	Addition of steam to stream, Addition of ga gas stream	Lectures, Tutorials, Exampl Classes , Informal and formal teamwork , Weekly homework problems	Team and homework solve problems , Open questions that have a definite answer , or do not have a definite answer, partial test (Oral questions)
7		Apple to use concept solving interdisciplir problems dehumidification tow	Mechanism dehumidification to minimum gas flow rate	Lectures, Tutorials, Example Classes , Informal and formal teamwork, Weekly homework	Exams, Weekly homework, Team and homework solve problems, Open questions that have a definite answer, or do not have a definite answer

				problems	
8		understanding of transport proces related to Evaporation	Evaporation: introduct types of evapora forward, backward parallel evaporators, h transfer in evapora process boiling point	Lectures, Tutoria Example Class Informal and for teamwork, We homework problen	Exams, Weekly homework, Team and homework solve problems, partial test (Oral questions), Open questions that have a definite answer, or do not have a definite answer
9		Design of single evaporators	Arrangement of evaporators: – single evaporators	Lectures, Tutorials Example Classe Informal and forma teamwork, Weekl homework	Exams, Weekly homework, Team a homework solve problems, Open questions that have a definite answer, or d not have a definite answer
10		Design of double evaporators	Arrangement of evaporators: – Design double evaporators, comparison of forwar and backward evaporators	Lectures, Tutorial Example Classe Informal and form teamwork, Week homework problen	Exams, Weekly homework, Team and homework solve problems, partial test (Oral questions),Open questions that have a definite answer , or do not have a

					definite answer
11		Factors influence on the arrangement of evaporators and desig	Arrangement of evaporators: – Desigr triple evaporators, comparison of forwar and backward evaporators	Lectures, Tutorial Example Classe Informal and form teamwork, Week homework proble	Exams, Weekly homework, partial te (Oral questions), Team and homewo solve problems, Op questions that have definite answer, or not have a definite answer
12		Understand the Crystallization fundamentals	Batch and continuous crystallization Crystallize selection	Lectures, Tutorials, Example Classes, Informal and formal teamwork, Weekly homework problems	Exams, Weekly homework, Team and homework solve problems, Open questions that have a definite answer, or do not have a definite answer

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Perry,J.H," chemical engineering handbook ",Mc–Graw –Hill Book com.1975.
Main references (sources)	1. Colulsson, J.M and Richardson J.F. "Chemical Engineering, volume 1", 3ed edition, Robert Maxwell.M.C. 2. Colulsson, J.M and Richardson J.F. "Chemical Engineering, volume 2", 3ed edition, Robert Maxwell.M.C.

	3. Colulsson, J.M and Richardson J.F. "Chemical Engineeri volume 6", 3ed edition, Robert Maxwell.M.C
Recommended books and references (scientific journals, reports.)	1. Binay.K.Dutta "'mass transfer and separation process "2007. 2. Trebal Robert E.,"mass transfer operation"2ed edition, Mc– Graw –Hill Book com.1975.
Electronic References, Websites	

Course Description Form

1. Course Name:
Process Dynamics
2. Course Code:
OGRE4102
3. Semester / Year:
First Semester / Fourth Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Students' attendance is recorded in the classroom and on Excel lists based the number of lectures and according to the dates in the schedule and is se weekly via email to the Absences Committee.
6. Number of Credit Hours (Total) / Number of Units (Total)
25 hr / 2 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Abdulfatah Mohamed Ali Email: abdulfatah.mohamed@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	• To provide an understanding of the dynamic analysis of chemical processes to allow students to identify the system under different operating conditions. • Ability to formulate transfer function of

	the system. • Selecting of critical process variables. • Provide practice at developing critical thinking skills, solving open ended problems and to work in teams.

9. Teaching and Learning Strategies

Strategy	Lectures / seminars / Pictures and video clips

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introduction to Proc Dynamics	Introduction to Proc Dynamics	Lectures and sol examples.	Oral questions.
2		Laplace transform of the derivatives, Laplace transform of Integral, Laplace Transform of t.f (t) (multiplication by t), and Properties of Laplace transform.	Laplace transforms	Lectures and sol examples.	Oral questions.
3		Properties of Lapalce transform (Initial value theorem, final value theorem, real time translation). Laplace transform of special functions (step, pulse, Impulse, ramp and periodic functions), Convolution theorem.	Laplace transforms	Lectures and sol examples.	Quiz.
4		First shifting properties, second shifting properties, Inverse of Laplace transform, Inverse Laplace transform of derivatives, Inverse Laplace Transform of	Inverse of Lap transforms	Lectures and sol examples.	Oral questions.

		Integrals Partial fraction expansion			
5		Solution of differential equations, Solution of simultaneous ordinary differential equations.	Laplace transforms	Lectures and solving examples.	Quiz.
6		Mathematical description of Continuous Stirred Tank Heater, Liquid holding system, CSTR, Bioreactor First order systems.	First order systems	Lectures and solving examples.	Oral questions.
7		Derivation of the transfer function for a standard fir order system.	First order systems		Quiz.
8		Response of a first order system to pulse, step and sinusoidal inputs.	Dynamic response of first order systems	Lectures and solving examples.	Oral questions.
9		Dynamic response of first order systems. 1. Dynamics of a liquid level tank 2. Dynamics of a temperature measuring system. 3. Dynamics of a mixing process. Dynamics of an under damped second order system.	Dynamic response of first order systems	Lectures and solving examples.	Quiz.
10		Graphical fitting of first-order plus time-delay models using step tests. Approximation of higher-order systems (model reduction)	Graphical fitting	Lectures and sol examples.	Oral questions.
11		First order systems in series. Non-	First order systems in series	Lectures and sol examples.	Quiz.

		interacting and interacting systems. Dynamics of interacting first order systems in series. Dynamics of non-interact first order systems in seri			
12		Linearization technique f non- linear syst transportation lag. Trans delay, dynamic response time delay systems	Linearization	Lectures solving examples.	Oral questic
13		General form of the transfer function of a second order system Underdamp Critically damping Over da	Second order systems	Lectures and sol examples.	Quiz.
14		Response of a sec order underdamped sys step inputs.	Second order systems	Lectures and solving examples.	Oral questions.
15		Response of a second o underdamped system pulse and sinusoidal inpu	Second order systems	Lectures and solving examples.	Quiz.

11. Course Evaluation

Attendance: 5%
Homework, assignments 5% Mid term Exam 10%
In-class quizzes: 10 % Final: 70 %

Total: 100 %

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. D.R. Coughanowr and S. LeBlanc, Process Systems Analysis and Control, McGraw-Hill, 3P nd P edition, 2008. 2. Stephanopoulos G., "Chemical Process Control-An Introduction to Theory and Practice, "Prentice -Hall, New Jersey, 1984.
Main references (sources)	1. Luyben W. L., "Process Modeling, Simulation and Control for Chemical Engineers," McGraw-Hill, New York, 2nd Ed., 1990 . 2. *Process Dynamics: Modeling, Analysis and*

	Simulation, by Wayne Bequette.
Recommended books and references (scientific journals, reports…)	Dale E. Seborg, Thomas F. Edgar, and Duncan A. Mellichamp. Process dynamics & control. Wiley. com, 2006.
Electronic References, Websites	

Course Description Form

1. Course Name:
Petroleum Refinery Eng. II
2. Course Code:
OGRE4103
3. Semester / Year:
First Semester / Fourth Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Full time
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hrs.-week/45 hrs.-Semester
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Salim Mohamed Email: salim.mohamed@alfarabiuc.edu.iq
8. Course Objectives

• **Course Objectives**	• To provide an understanding of the general principles and importance of conversion processes in the refining industry, • A comprehensive understanding the fundamentals of the chemical mechanisms at the basis of the processes. These disciplines are thermodynamics, chemical kinetics, reactor calculation and industrial catalysts.

	• Provide criteria affect the processing options and the processing equipment required in a modern refinery.

9. Teaching and Learning Strategies

Strategy	Theoretical lectures, discussion and dialogue, brainstorming, and examples are used to achieve the goals.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understanding the general information, concepts, and importance of Petroleum Refinery Processing in the petroleum industry.	Fundamentals of Petroleum Refining	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
2		Understanding the general information, concepts, and importance of Petroleum Refinery Processing in the petroleum industry	Physical Separation Processes	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
3		A comprehensive understanding the fundamentals of the chemical conversion process.	Chemical Catalytic Conversion Processes	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
4		Apply course concepts in	Thermal Chemical Conversion	Theoretical lectures,	Discussions during the

		solving interdisciplinary problems of Thermal Conversion Processes.	Processes	discussion and examples	lectures and daily exams
5		An ability to apply effective solutions, both independently and cooperatively, for problems in petroleum refinery processes	Refining Processes	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
6		Student teams are asked to help solve sample problems in Catalytic Reforming Unit.	Catalytic Reforming	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
7		Understanding the general information, concepts, and importance of Petroleum Refinery Processing industry.	Isomerization Process in petroleum refinery	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
8		Apply course concept solving interdisciplir problems, solve problems through l and improve their ab to work effectively i	Thermal Cracking Coking	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams

		group of peers			
9		An ability to apply effective solutions, both independently and cooperatively, for problems in phase's separation and treatment of gas and petroleum.	Vis breaking	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
10		An ability to apply effective solutions, both independently and cooperatively, for problems in phase's separation and treatment of gas and petroleum.	Delayed Coking	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
11		Understanding the general information, concepts, and importance of Fluid Coking Processing in the petroleum industry.	Fluid Coking	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
12		An ability to apply effective	Flexi coking	Theoretical lectures,	Discussions during the

		solutions, both independently and cooperatively, for problems in Flexi coking.		discussion and examples	lectures and daily exams
13		An ability to apply effective solutions, both independently and cooperatively, for problems in Alkylation process.	Alkylation	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
14		An ability to apply effective solutions, both independently and cooperatively, for problems in Solid Catalyst Alkylation.	Solid Catalyst Alkylation	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams
15		An ability to apply effective solutions, both independently and cooperatively, for problems in hydroconversion process	Hydro conversion	Theoretical lectures, discussion and examples	Discussions during the lectures and daily exams

11. Course Evaluation

Oral questions and discussions during the lectures, daily exams, quarterly exams,

documented examinations, and, final exams.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	W.L..Nelson " Petroleum Refining Engineering " Edition. McGraw Hill, New
Main references (sources)	York, 1985Mohamed A. Fahim, Taher A. Al-Sah Amal Elkilani-Fundamentals of Petroleum Refini Elsevier Science (2009)
Recommended books and references (scientific journals, reports…)	Pierre Leprince-PETROLEUM REFINING V.3_ Conversion Processes (Publication IFP)-Editions Technip (2000)
Electronic References, Websites	http://eprints.abuad.edu.ng/555/1/Handbook_of_ Petroleum_Refining-1.pdf

Course Description Form

1. Course Name:
Heterogeneous Reactor and Catalyst
2. Course Code:
OGRE4105
3. Semester / Year:
First Semester / Fourth Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Full Time
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hrs.-week / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Lamees Raad Email: lamees.raad@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	• To introduce and define a special knowledge in the catalyst and catalysis science for 4th year B.Sc. students in the Chemical

	Engineering Department. • Provide the basic principles of catalyst and catalysis science using general laws mathematical equations and then applied them to study the behavior of catalysts dur chemical reactions. • Helping to understand the fundamental principles of catalyst and catalysis science it's applications in the kinetics of chemical reactions in terms of the transmission of m heat and momentum within the catalyst in the reactors. • Taking advantage of the necessary means and available capabilities to analyze physical properties of catalysts and understand the mechanism of their effect on progress of chemical reactions.

9. Teaching and Learning Strategies

Strategy	The development of the student's ability to apply the knowledge and the order to be able to corr analysis of the problems and issues, which are related to the catalyst and catalysis science and to put the appropriate assumptions and interpretation to reach a solution through lecturing participation by the training and conduct various tests in this topic. It can be summarized by following assessment methods: - The classroom discussions and identify the possibilities of a student on the analysis of the issues and his / her response. -Homework. - Sudden exams (Quizzes). - Midterm and final exams. -Open questions and reports.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1		Definition of cataly	Introduction of catalys	Encourage students through lectures on the	Classroom Discussions

	3			development of their capabilities in data analysis in order to establish the problem and describe the solution.	
2		Properties (activity, acidity, selectivity, and porosity) of catalysts.	Characteristics catalysts.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions Homework
3		Description the relationships between catalysts and activation energy.	Rate equations of fluid solid catalytic reactions.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions Quizzes
4		Description the relationships between catalysts and both rate / time of reaction, and pressure in the	Rate equations of fluid solid catalytic reactions.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and	Classroom Discussions

		catalytic reactors.		describe the solution.	
5		Description theories and major design equations, which are found to be associated with the catalytic reactions.	Reactions on solid catalyst.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions Homework
6		External diffusion of reactant molecules on the catalyst surface in the four basic types of chemical reactors.	External diffusion and reactions in (fixed–, fluidized–, slurry–, and trickle–bed).	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions
7		External diffusion of reactant molecules on the catalyst surface in the four basic types of chemical reactors.	External diffusion and reactions in (fixed–, fluidized–, slurry–, and trickle–bed).	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions Quizzes
8		External diffusion of reactant molecules on	External diffusion and reactions in (fixed–, fluidized–, slurry–, and trickle–	Encourage students through lectures on the	Classroom Discussions Midterm exams

		the catalyst surface in the four basic types of chemical reactors.	bed).	development of their capabilities in data analysis in order to establish the problem and describe the solution.	
9		Practical examples and applications to analyze the reaction rate within the catalytic reactions.	Practical example for catalytic reactions.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions
10		Internal diffusion of reactant molecules inside the framework structure of catalyst and its applications.	Internal diffusion and practical example in the heterogeneous reactions.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution	Classroom Discussions Homework
11		Internal diffusion of reactant molecules inside the framework structure of catalyst and its applications.	Internal diffusion and practical example in the heterogeneous reactions.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the	Classroom Discussions

				solution.	
12		Mathematical models for the design of catalyst in the catalytic reactors (parallel-pore model).	Mathematical models for the catalyst.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions Quizzes
13		Mathematical models for the design of catalyst in the catalytic reactors (random-pore model).	Mathematical models for the catalyst.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions Homework
14		The development of the catalyst industry.	Developing industrial catalysts & characterization techniques.	Encourage students through lectures on the development of their capabilities in data analysis in order to establish the problem and describe the solution.	Classroom Discussions Scientific reports
15		The development of the modern instruments and	Developing industrial catalysts & characterization techniques.	Encourage students through lectures on the development of their capabilities in data analysis	Classroom Discussions Final exams

		equipment used to determine the characteristics and Specifications of the catalyst.		in order to establish the problem and describe the solution.	

11. Course Evaluation	
70% Final semester central exam, 15% Monthly exams, 5% daily preparation, 5% daily oral exams, and 5% reports	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	J.F. Lepage, J. Cosyns & P.Couty Applied heterogene catalysis.
Main references (sources)	J. M. Smith (1981), Chemical Engineering Kinetics, 3rd edition, Mc Grow – Hill, Singapore.
Recommended books and references (scientific journals, reports…)	- A. Dyer (1988), An introduction to zeolite molecular sieves, by John Wiley & sons Ltd. Daniel Decroocq (1984), catalytic cracking of heavy petroleum fractions, by imprimerie– Jean, France.
Electronic References, Websites	http://www.uotechnology.edu.iq/dep-chem-eng/LECTURE/4Y/O/Catalyst%20and%20catalysis.pdf

Course Description Form

1. Course Name:
Environmental Pollution. & Safety in Petroleum Refineries
2. Course Code:
OGRE4106
3. Semester / Year:
First Semester / Fourth Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Students' attendance is recorded in the classroom and on Excel lists based on the number of lectu and according to the dates in the schedule and is sent weekly via

email to the Absences Committee
6. Number of Credit Hours (Total) / Number of Units (Total)
3 hr / 2 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Walid Mohamed Email: walid.mohamed@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	• Understand the concept of the environment and environmental pollution and global problems resulting from environmental pollution. • Provide solutions to environmental problems. • Concerned with local and worldwide environmental issues. • Design devices that are used in the control of air pollution. • Environmental engineers conduct hazardous-waste management studies in which they evaluate the significance of the hazard, offer analysis on treatment and containment.

9. Teaching and Learning Strategies

Strategy	• The student shall have the general information about the air pollution such as the concept of air pollution, the type of air pollutants, the sources and effect of air pollutants, and select the most appropriate technique to purify and/or control the emission of pollutants. • The students shall have a comprehensive knowledge about the Earth's atmosphere and its composition, the effect of air pollutants on the environment and the global environmental issue resulting from air pollution. • Be able to understand of the transportation and dispersion of air pollutants. • Be able to classify the air pollutants and select the most appropriate technique to purify and/or control the emission of pollutants. • Be able to design the equipment used to control the particulate air pollutants.

	• Be able to design processes and equipment to control the gaseous pollutants.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introduction, definition: Environment, environmental Engineering, Environmental pollution, Pollutants, Kind of Pollutants, Source of pollutants Air pollution: definition, classification of air pollutants, source of air pollution, Pollutants and their effects, Particulate matter, Air born particulate.	Introduction	Lectures, Tutorial Example Classes	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have defin answer
2		The atmosphere and its structure, layers, and composition. Greenhouse gases and greenhouse effect.	The Impact of Production Operations	Lectures, Tutorial Example Classes	Exams, Weekly homework, The and homework solve problems Open questions that have a definite answer or do not have definite answer
3		Regional and Global Issue: Global warming; Ozone layer depletion, Acid rain; The world action for the problem. International environmental	Global warming management	Lectures, Tutorial Example Classes	Exams, Weekly homework, Te and homework solve problems Open questions that have a definite answer or do not have

		agreements and Protocols			definite answer
4		Meteorological aspect of air pollutants dispersion: Lapse rate, Type of Lapse Rate, Dive the dry Adiabatic Lapse Rate equation., Atmospheric stability, Inversion, Atmospheric turbulence, Plume behavior, type of Plumes	Treatment of Air Emissions	Lectures, Tutorials, Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
5		The Gaussian plume model, Estimation of plume rise, Stack height	The Gaussian plume idea	Lectures, , Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
6		Examples solution from Tutorial sheet about Gaussian model		Lectures, , Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
7		Air pollution, type of air pollution, air control equipment, the parameter determined before choice the proper equipment	Treatment of Air Emissions	Lectures, , Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have

					definite answer
8		Type of particulate air control equipment, operation of each equipment, advantages and disadvantages of equipment with sketch of equipment	Treatment of Solids	Lectures, Example Classes	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
9		Design of Settling Chamber		Lectures, Tutorials , Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
10		Examples solution from Tutorial sheet about settling chamber		Lectures, Tutorials, Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
11		Cyclone separator design		Lectures, Tutorials , Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
12		Solution of examples from		Lectures,	Exams , Weekl

		Tutorial sheet		Tutorials, Example Classes	homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
13		Techniques to remove gaseous contamination from gas stream: Absorption by liquids, adsorption by solids, combustion		Lectures, Tutorials , Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
14		Control of specific gaseous pollutants: Control of sulfur dioxide. Control of nitrogen oxide, Control of carbon monoxide, Mobile source		Lectures, Tutorials , Example Classes	Exams, Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer
15		Safety in Petroleum Refinery: Fire Prevention and Control. Materials handling and storage, Noise Hazardous, Radiation Hazardous, Common Hazardous Materials in Refinery	Safety manageme	Lectures, Tutorials , Example Classes	Exams , Weekl homework, Te and homework solve problems Open questions that have a definite answer or do not have definite answer

11. Course Evaluation

Midterm exams , Final exam, Quizzes, Weekly homework, Team and homew problems , partial test (Oral

questions:, alternative response), Open questions that have definite answer Quiz (20%) Homework and continuous evolution (10%) Final exam (70%)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Lectures 1- C.S.Rao, "Environmental Pollution Con Engineering", 2nd Edition, New Age International Limited, Published, 2006, Reprint 2007. 2- R. K. Sinnott, Chemical Engineering Design, Vol. 6 edition, Chemical Engineering Design, 2005, pp. 450- 3- Noel de Never, "Air Pollution Control Engineeri McGrow-Hill, Inc 1987.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	1- R. Weiner & R. Matthews, "Environmental Engineering" ButterwothHeinemann, 2003. 2- N.W. Jern, "Industrial Wastewater Treatment" Imperial College Press, 2006. 3- S.D. Lin & C.C. Lee, "Water and wastewater Calculation Manual" Mc-GrawHill, 2001. 4- M.J. Hammer,"Water & Wastewater Technology" John wiley & Sons, End Edition. 5- P.A. Vesilind & J. Jeffrey, "Environmental Engineering" Ann Afbar Sc., 2003. Ray Asfahl, "Industrial Safety and He Management" Prentice Hall.
Electronic References, Websites	Websites , Laboratory

Course Description Form

1. Course Name:
Industrial Management
2. Course Code:
OGRE4104
3. Semester / Year:
First Semester / Fourth Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Real Present Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hr / 2 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Saad Ahmed Email: saad.ahmed@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	• To helps and learn in the optimum use of plant equipment, efforts toward productivity improvement. • TO establishing the most efficient and effective utilization of human if and synchronizing various resources like men, machine and material as w as Engineering Ethics.

9. Teaching and Learning Strategies

Strategy	Theoretical

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	To helps and learn in the optimum use	Principle of management types	Lecture, Data sh	daily preparation

		of plant, equipment, efforts towards productivity improvement, establishing g the most efficient and effective utilization of human effort and synchronizing various resources like men, machine and material as well as Engineering g Ethics.	and classification management responsibility organization responsibility		
2			Site, Feasibilityst Development of effic work method (plant lay flow of material, mat handling), Workstati Inputs and Outp Production planning (t of Productions).		Reports
3			**Maintenance** Classification,Machine replacements, studies and examples.		Questions answers
4			**Network Analysis** Principles and applicati Critical path method (C Gant Chart, Pert techni (examples and case studi		daily preparatio Quiz
5			**Work Measurement Techniques** Time and Motion study.		daily preparatio daily oral
6			**Engineering Ethics**: Engineering has a direct and vital impact on the quality of life for all people. Engineering is an important and learned job. Engineers are expected to exhibit the		daily preparation

			highest standards of honesty and integrity. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.		
7			**Quality Control:** Standardization, Specification, Sampling techniques, Inspection- analysis of results. Quality costs (preventive cost, appraisal cost and failure cost). Application of quality control chart- examples, Reliability.		daily oral
8			**ISO:** Requirements, applications, ISO series, Quality management system (QMS), Total Quality		Questions answers

			management (TQM), Requirements and applications.		
9			**Safety Requirements:** Hazards (type's e.g. industrial hazards, pollution (air pollution, water pollution, industrial pollution). Industrial by products and industrial waste, Safety requirements of industrial sites, Requirements of suitable work environment (examples with particular emphasis in chemical industry).		daily preparatio Quiz
10					Exam
11					daily preparation
12					daily oral

11. Course Evaluation

daily preparation: 10
daily oral:10
Reports:10
Quiz:20
Monthly Exam: 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	T.R. Banga and S.C. Sharma "Industrial Engineering Management" including Production Management, Eleventh Edition:2008.
Recommended books and references (scientific journals, reports…)	M.S. Peters, K.D. Timmerhaus and R.E. West "Plant Design and Econom for Chemical Engineers" Fifth Edition: 2003.
Electronic References, Websites	

Course Description Form

1. Course Name:
Unit Operation III
2. Course Code:
OGRE4201
3. Semester / Year:
Second Semester / Fourth Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
Central / Full
6. Number of Credit Hours (Total) / Number of Units (Total)
5 hr / 5 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Lamees Raad Email: lamees.raad@alfarabiuc.edu.iq
8. Course Objectives

Course Objectives	• To provide an understanding of the general principles of separation processes to allow students to make sensible options given a separation (Humidification, Dehumidification and Cooling tower, Evaporation, crystallization, and Wet Solid Drying). • A comprehensive understanding of the transport processes related to chemical engineering operations, with focus on both theory and applications. • Ability to select of appropriate equipment for the separation of materials in process plant. • Provide practice at developing critical thinking skills, solving open ended problems and to work in teams.

9. Teaching and Learning Strategies

Strategy	**Written method implies** the following forms of activity: copying, taking notes, composing theses, writing essays, etc. **Laboratory method** implies the following forms of activity: conducting experiments, showing video materials, etc. **Practical methods** unite all the teaching forms that stimulate developing practical skills in students **Explanatory method** is based on discussing a given issue. Designing and presenting a project **Discussion/debates**. This is the most widely spread method of interactive teaching. **Case study** – the teacher discusses concrete cases together with the students and they study the issue thoroughly.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand the selection proper equipment for extraction process and operation process	Extraction (liquid–liquid):–definition ,extraction process, equilateral triangle coordinates system of liquid – one pair partially soluble, choice solvent	Lectures, Practica Applications	partial test (Oral questions :– multiple choice, alternative response), Open questions that have a definite answer , or do not have a definite answer
2		Understand the partial soluble system	Equipment of extract partial soluble systen cross–current extract single and multistage	Lectures, Exampl Classes, Practic Applications	Exams, Weekly homework, Team an homework problems Open questions that have a definite answ or do not have a definite answer, partia test (Oral questions)

3		Understand the insolub solvent system	Equipment of extrac insoluble solvent in cross-current extracti single and multistag	Lectures, Tutoria Example Classe Practical Applications	Weekly homework, Team and homewor solve problems , Ope questions that have definite answer , or c not have a definite answer, partial test (O questions)
4		Design continuous coun current extraction single and multistage	Equipment of extrac partial soluble syste in continuous counte current extraction sing and multistage	Lectures, Tutorials , Example Classes , Informal and formal teamwork, Weekly homework problems	Exams , Weekly homework, Team and homework solve problems , Open questions that have a definite answer , or do not have a definite answer, partial test (Oral questions)
5		Design continuous coun current extraction single and multistage	Equipment of extracto insoluble solvent in continuous counter-current extraction single and multistag	Lectures, Tutorials , Example Classes, Informal and formal teamwork, Weekly homework problems	Team and homework solve problems , Open questions that have a definite answer, or do not have a definite answer, partial test (Oral questions)
6		Minimum solvent require	Minimum solvent required	Lectures, Tutorial Example Classe	Exams, Weekly homework, Team an

				Informal and form teamwork, Week homework proble	homework solve problems, Open questions that have a definite answer , or d not have a definite answer
7		Understand the operatio plate and frame filter	Plate and frame filter (filtration at constant pressure drop and a constant filtrate) , washing time	Lectures, Tutorial Example Classe Informal and form teamwork, Week homework proble	Exams, Weekly homework, Team an homework solve problems, Open questions that have a definite answer , or d not have a definite answer
8		Understand the operatio leaf filter	Leaf filter(filtration at constant pressure dro and at constant filtrat washing time	Lectures, Tutorials, Example Classes, Informal and formal teamwork, Weekly homework problems	Exams , Weekly homework, Team and homework solve problems, Open questions that have a definite answer , or do not have a definite answer
9		Determine the optimum cake thickness and max throughput	Maximum rate of filtra for Plate and frame fi	Lectures, Tutorials, Example Classes, Informal and formal teamwork ,	Exams , Weekly homework, Team and homework solve problems, Open questions that have a definite answer , or do not

				Weekly homework problems	have a definite answer
10		Understand the settling a sedimentation theory.	Basic assumption (Kynch theory)	Lectures, Tutorials , Example Classes , Informal and formal teamwork , Weekly homework problems	Exams , Weekly homework, Team and homework solve problems , Open questions that have a definite answer , or do not have a definite answer

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Perry,J.H," chemical engineering handbook ",Mc-Graw –Hill Book com.1975.
Main references (sources)	1- Colulsson ,J.M and Richardson J.F. "Chemical Engineering, volume 1", 3ed edition, Robert Maxwell.M.C. 2- Colulsson ,J.M and Richardson J.F. "Chemical Engineering, volume 2", 3ed edition, Robert Maxwell.M.C. 3- Colulsson, J.M and Richardson J.F. "Chem Engineeri volume 6", 3ed edition, Ro Maxwell.M.C
Recommended books and references (scientific journals, reports…)	1- Binay.K.Dutta "'mass transfer and separa process "2007. 2- Trebal Robert E.,"mass transfer operation" edition, Mc- Graw –Hill Book com.1975.
Electronic References, Websites	

Course Description Form

1. Course Name:

Process Control and Instruments for Petroleum Refinery

2. Course Code:

OGRE4202

3. Semester / Year:

Second Semester / Fourth Year

4. Description Preparation Date:

3/8/2025

5. Available Attendance Forms:

Students' attendance is recorded in the classroom and on Excel lists based the number of lectures and according to the dates in the schedule and is se weekly mail to the Absences Committee.

6. Number of Credit Hours (Total) / Number of Units (Total)

45 hr/ 3 Unit

7. Course administrator's name (mention all, if more than one name)

Name: Abdulfatah Mohamed Ali
Email: Abdulfatah.mohamed@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	Process control is concerned with the "control" or "manipulation" of process behavior so that the process operates close to the desired operating point even in the presence of inevitable upsets and disturbances. Process control plays a central role in the efficient and trouble-free operation of modern processing plants. This course will introduce the concepts of systems modeling, transient response analysis and feedback control. At the end of this course, students will be able to: • Model and simulate the behavior of 1st, 2nd and higher order dynamical systems. • Analysis of closed-loop system and response of controlled system under different operating conditions.

	• Design and tune feedback controllers and obtain a hands-on experience in doing this via simulation and experimentally on pilot- scale processes. • Configure and analyze control loops for stability and performance.

9. Teaching and Learning Strategies

Strategy	Lectures / seminars / Pictures and video clips

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Classify process variables Control & instrumentation Diagram Control configurations Control block Diagram	Introduction to process control	Lectures solving examples.	Oral questions
2		Concept of feedback control Analysis of feedback- controlled processes Basic feedback controller design	Feedback Cor Systems	Lectures solving examples.	Oral questions
3		Servo Vs regulator problem Closed loop control systems Development of block diagram for feed-back control systems- servo	Design of Feedb Controllers	Lectures and solv examples.	Quiz.

		problems			
4		Dynamic behavior of closed-loop systems Development of empirical models from process data Development of transfer function for ON-OFF, P, PD, PI, PID controllers.	Feedback contro and PID controller	Lectures and solving examples.	Oral questions
5		Transient response of a fi order system under feedback control Transient response of a fi order system under feedback control	Dynamic behavior closed-loop cor systems.	Lectures and solv examples.	Quiz.
6		Transient response of a fi order system under feedback control Transient response of a fi order system under feedback control	Dynamic behavior closed-loop cor systems.	Lectures and solv examples.	Quiz.
7		Development of block diagram for feed-back control systems – regulator problems Overall transfer function of a closed-loop control system	Block diagram reduction	Lectures and solv examples. .	Oral questions
8		Mid Course examinati			
9		Stability of feedback cor system, Closed loop stab Routh's test	Stability analysis control systems	Lectures and solv examples.	Oral questions
10		Transient respons closed-loop cor systems and t stability.	Stability anal of cor systems	Lectures and solv examples.	Quiz.

11		Performance criteria controllers design & tuning Quarter Decay Ratio IAE, ISE and ITAE	Controller tuning	Lectures and solv examples.	Oral questions
12		Types of controller tuning Process reaction curve method Direct synthesis method Integral error criteria based tuning method Open loop tuning (Cohen-Coon),	Controller tuning	Lectures and solv examples.	Quiz.
13		Closed loop tuning (Ziegler-Nichols, continuous cycling, relay auto) Tuning of P, PI and PID controllers for chemical engineering process systems.	Controller tuning	Lectures and solv examples.	Oral questions
14		Characteristics Of Measurement System- Pressure Measurement-Temperatur Measurement-Flow Measurement-	Control sys instrumentation	Lectures and solv examples.	Quiz.
15		Characteristics Of Measurement System- Level Measurement- Selection of sensors, transmitters, transducers Types of	Control sys instrumentation	Lectures and solv examples.	Quiz.

		control valves			

11. Course Evaluation

Attendance: 5%
Homework's: 5 %
In-class quizzes: 10 % Midterm: 10 %
Laboratory: 10%
Final: 60 %

Total: 100 %

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. D.R. Coughanowr and S. LeBlanc, Process Systems Analysis and Control, McGraw–Hill, 3*P* rd *P* edition, 2008. 2. Stephanopoulos G., "Chemical Process Control–An Introduction to Theory and Practice, "Prentice –Hall, New Jersey, 1984.
Main references (sources)	1. Luyben W. L., "Process Modeling, Simulation and Control for Chemical Engineers," McGraw–Hill, New York, 2nd Ed., 1990. 2. Process Dynamics: Modeling, Analysis and Simulation, by Wayne Bequette.
Recommended books and references (scientific journals, reports…)	Dale E. Seborg, Thomas F. Edgar, and Dun Mellichamp. Process dynamics & control. Wiley. com,
Electronic References, Websites	

Course Description Form

1. Course Name:
Corrosion Eng. In Petroleum Refinery
2. Course Code:
OGRE4205
3. Semester / Year:
Second Semester / Fourth Year
4. Description Preparation Date:
3/8/2025
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hr/ 2 unit

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Saad Ahmed
Email: saad.ahmed@alfarabiuc.edu.iq

8. Course Objectives

Course Objectives	• Understanding the concept of corrosion. The form of corrosion, How material destroyed by corrosion. • Determine the corrosion rates and electrochemical behavior of the metals and the thermodynamics of corrosion reactions. • Applying the corrosion prevention technology. • Selection of materials involved in applying the corrosion prevention technology in petroleum refineries.

9. Teaching and Learning Strategies

Strategy	Theoretical /2

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding the con of corrosion. The form corrosion, How the mat destroyed by corrosion	Introduction Corrosion Eng.	Lecture, Data show	daily preparation
2-3	4	Understanding the typ of corrosion	Classification corrosion	Lecture, Data show	Reports
4-5	4		Kinetics aqueous corrosion:	Lecture, Data show	Questions and answers
6-7	4	Study thermodynamics corrosion	Thermodyna and application corrosion	Lecture, Data show	daily preparation , Quiz

8-9	4	Determine the corrosion rates and electrochemical behavior of the metals	Determining corrosion rate	Lecture, Data show	daily preparation , daily oral
10	2	Study the passivity metals	Passivity	Lecture, Data sho	daily preparation
11	2	Study the types reference electrodes	Reference electrodes	Lecture, Data sho	daily oral
12	2	The effects of petrol and products on corrosion of equipment	Corrosion prevention in Industry	Lecture, Data sho	Questions and answe
13	2	Study the effect of pH potential on m corrosion	Pourbaix diagram:	Lecture, Data sho	daily preparation , Qui
14-15	4	Study the types cathodic protection	Cathodic Protection:	Lecture, Data sho	Exam

11. Course Evaluation

daily preparation: 10 daily oral:10 Reports:10
Quiz:20
Monthly Exam: 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Zaki Ahmed, "Principle of Corrosion Engineering and Corrosion Control",1ST Edition, ,IChemE ,ELSEVIER, 2006.
Recommended books and references (scientific journals, reports…)	Denny A. Jones, "Principle and Prevention of Corrosion nd Edition, Prentice Hall, 1996.
Electronic References, Websites	