

**Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department**



Academic Program and Course Description Guide

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty

members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extracurricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: University of Basrah

Faculty/Institute: Collage of Engineering

Scientific Department: Chemical Engineering

Academic or Professional Program Name:

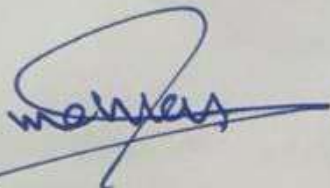
Final Certificate Name: BSC

Academic System: Bologna and courses

Description Preparation Date: 2026

File Completion Date: Sep/2026

Signature:

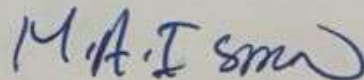


Head of Department Name:

Mohammed k kadhim

Date: 10/09/2025

Signature:



Scientific Associate Name:

Muner Ismail Abdel Jalil

Date: 21/9/2026

ce and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 21-9-2026

Dr. Ali K. marzok

Signature:



Approval of the Dean

Prof. Dr. Mohamed T. Rashid

1. Program Vision

To be a leading Chemical Engineering program that inspires innovation and supports sustainable development.

2. Program Mission

Deliver high-quality education combining theory and practice to prepare competent, ethical, and globally competitive graduates.

3. Program Objectives

Provide strong knowledge, practical skills, ethical values, and industry links to prepare graduates for professional and societal contributions.

4. Program Accreditation

Aligned with **ABET** and national quality standards, with continuous improvement and regular review.

5. Other external influences

Driven by higher education policies, industry demands, sustainability trends, technological advances, and societal needs.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	6	12	2.5%	
College Requirements	9	32	13%	
Department Requirements	34	144	60%	

Summer Training		required		
Other				

*This can include notes whether the course is basic or optional.

1.Program Description				
Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Year/Level	Course Code	Course Name		
Level one/semester one	UOB101	English Language I	X	
	CHE101	Mathematics I	X	
	CHE102	Analytical Chemistry	X	X
	CHE103	Engineering Drawing & Process flow sheeting)	X	X
	CHE104	Chemical Engineering Principles I	X	
	UOB102	Democracy and human rights	X	
	CHE105	Engineering Mechanics & Workshop Technology	X	X
Level one/semester two	CHE106	Mathematics II	X	
	CHE107	Physics	X	
	CHE108	Organic Chemistry	X	X
	UOB103	Computer I	X	X
	CHE109	Chemical Engineering Principles II	X	
	CHE110	Strength of Materials	X	
	UOB104	Arabic Language I	X	
Level two/semester one	CHE201	Applied Mathematics I	X	
	CHE202	Fluid Mechanics I	X	X
	CHE203	Electrical Technologies	X	
	CHE204	Material and energy Balances I	X	
	UOB203	Computer II	X	X

	UOB201	English Language II	X	
	UOB205	The crimes of the Baath regime in Iraq	X	
Level two/semester two	CHE205	Applied Mathematics II	X	
	CHE206	Fluid Mechanics II	X	
	CHE207	Physical Chemistry	X	X
	CHE208	Fuels and Sustainable Energy	X	
	CHE209	Materials and Energy Balance II	X	
	CHE210	Environmental Pollution & Water Technologies	X	
	UOB204	Arabic Language II	X	
Level three/semester one	CHE311	Chemical Eng. Analysis I	X	
	CHE312	Heat Transfer I	X	X
	CHE313	Mass Transfer I	X	
	CHE314	Chemical Eng. Thermodynamics I	X	
	CHE315	Engineering Materials Properties	X	X
	CHE316	Petrochemical Engineering	X	
Level three/semester two	CHE321	Chemical Eng. Analysis II	X	
	CHE322	Heat Transfer II	X	
	CHE323	Mass Transfer II	X	
	CHE324	Corrosion Engineering	X	
	CHE325	Chemical Eng. Thermodynamics 2	X	
	CHE326	Chemical Industries	X	
Level four/semester one	CHE412	Unit Operation	X	X
	CHE413	Process Dynamics	X	
	CHE414	Equipment Design I	X	
	CHE415	Reactor design I	X	
	CHE416	Petroleum Refinery I	X	
	CHE417	Numerical Methods	X	
	E422	Projects Management & Ethics		X
	E422	Projects		X

		Management & Ethics		
Level four/semester two	E421	Engineering Project II		x
	CHE423	Transport Phenomena	x	
	CHE424	Process Control & Instrumentation	x	
	CHE425	Equipment Design II	x	
	CHE426	Reactor Design II	x	
	CHE427	Petroleum Refinery II	x	x
	CHE428	Optimization and Simulation	x	

8. Expected learning outcomes of the program	
Knowledge	
	Demonstrate solid knowledge in mathematics, sciences, and core chemical engineering principles.
Skills	
	- Design and conduct experiments, analyze and interpret data using modern tools. - Design chemical engineering systems and processes that consider safety, sustainability, and economic
Ethics	
	- Commit to professional ethics and social responsibility in chemical engineering practice. - Communicate effectively, work in multidisciplinary teams, and engage in lifelong learning.

9. Teaching and Learning Strategies

- Interactive lectures and problem-based learning.
- Laboratory sessions and practical experiments.
- Case studies, projects, and design assignments.
- Group discussions, teamwork, and presentations.
- Use of modern digital tools, simulations, and e-learning resources.

10. Evaluation methods

- Written exams (midterm and final).
- Quizzes and short assignments.
- Laboratory reports and practical performance.
- Project work and oral presentations.
- Continuous assessment, peer evaluation, and final comprehensive exam.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)	Number of the teaching staff	
	General	Special		Staff	Lecturer
Assistant professor Dr. Abdul Wahid Al-Hajjaj		x		x	
professor Dr. Alaa Abdul Razzaq Jassim		x		x	
professor Mohammed Nasser Fares		x		x	
Lecturer Dr.Haifa Latif		x		x	

professor Rasul Mohammed Nasir		x		x	
Professor Haidar Hadi	x			x	
Lecturer Dr Raed Abdul Hussein Diab		x		x	
Lecturer Hassan Wathiq Ayoub		x		x	
Lecturer Dr Shaima Mahdi Shuaib		x		x	
Assistant lecturer Ahmed Shawqi Sadiq		x		x	
Lecturer Dr Anwar Abdul Hassan		x		x	
Assistant lecturer Wad Khaled Ghanem		x		x	
Assistant lecturer Shorouk Shabar Ghalib		x		x	
Assistant lecturer Nour Talib Jassim		x		x	
Assistant lecturer Ahlam Abdul Redha Hussein		x		x	
Assistant lecturer Ruwaida Mohammed Ali		x		x	
Assistant lecturer Nebras Raad Fajr		x		x	
Assistant lecturer Ghadeer Jassim Mohammed		x		x	
Assistant lecturer Taqi Aboud Mohsen Ali	x			x	
Assistant lecturer Maher Ismail Badran Saleh	x			x	
Assistant lecturer Haider Hamid	x			x	

Professional Development

Mentoring new faculty members

- Orientation sessions on program vision, mission, and academic policies.
- Assigning senior faculty as mentors for guidance in teaching, research, and student advising.
- Providing training workshops on curriculum design, assessment methods, and use of digital tools.

Professional development of faculty members

- Continuous training through workshops, seminars, and conferences.
- Encouraging participation in research projects, publications, and industry collaboration.
- Regular evaluation and feedback sessions to enhance teaching effectiveness.
- Support for pursuing higher academic qualifications and international collaborations.

12. Acceptance Criterion

Acceptance Criterion

- Applicants must hold a secondary school certificate (scientific branch or equivalent).
- Meet the minimum GPA/score set annually by the Ministry of Higher Education.
- Fulfill any additional requirements (e.g., interview or placement test if applicable).

13. The most important sources of information about the program

- University and college official websites.
- Student guidebook and annual catalog.
- Academic advising and orientation sessions.
- Official announcements and notices issued by the department.

14. Program Development Plan

- Periodic curriculum review every 3–5 years to align with scientific and industrial advances.
- Continuous update of laboratories, equipment, and digital resources.
- Faculty development through training, workshops, and research collaboration.
- Strengthening partnerships with industry for training and employment opportunities.
- Integration of sustainability, innovation, and modern technologies in teaching and

research.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Level one/semester one	UOB101	English Language I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE101	Mathematics I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE102	Analytical Chemistry	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE103	Engineering Drawing & Process flow sheeting)	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE104	Chemical Engineering Principles I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	UOB102	Democracy and human rights	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE105	Engineering Mechanics & Workshop Technology	Basic	X	X	X	X	X	X	X	X	X	X	X	X
Level one/semester two	CHE106	Mathematics II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE107	Physics	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE108	Organic Chemistry	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	UOB103	Computer I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE109	Chemical Engineering Principles II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE110	Strength of Materials	Basic	X	X	X	X	X	X	X	X	X	X	X	X

	UOB104	Arabic Language I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
Level two/semester one	CHE201	Applied Mathematics I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE202	Fluid Mechanics I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE203	Electrical Technologies	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE204	Material and energy Balances I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	UOB203	Computer II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	UOB201	English Language II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	UOB205	The crimes of the Baath regime in Iraq	Basic	X	X	X	X	X	X	X	X	X	X	X	X
Level two/semester two	CHE205	Applied Mathematics II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE206	Fluid Mechanics II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE207	Physical Chemistry	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE208	Fuels and Sustainable Energy	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE209	Materials and Energy Balance II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE210	Environmental Pollution & Water Technologies	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	UOB204	Arabic Language II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
Level three/semester one	CHE311	Chemical Eng. Analysis I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE312	Heat Transfer I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE313	Mass Transfer I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE314	Chemical Eng. Thermodynamics I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE315	Engineering Materials Properties	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE316	Petrochemical Engineering	Basic	X	X	X	X	X	X	X	X	X	X	X	X

Level three/semester two	CHE321	Chemical Eng. Analysis II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE322	Heat Transfer II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE323	Mass Transfer II	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE324	Corrosion Engineering	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE325	Chemical Eng. Thermodynamics 2	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE326	Chemical Industries	Basic	X	X	X	X	X	X	X	X	X	X	X	X
Level four/semester one	Engineering Project I	Engineering Project I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	Unit Operation	Unit Operation	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	Process Dynamics	Process Dynamics	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	Equipment Design I	Equipment Design I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	Reactor design I	Reactor design I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	Petroleum Refinery I	Petroleum Refinery I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	Numerical Methods	Numerical Methods	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	Projects Management & Ethics	Projects Management & Ethics													
Level four/semester two	E411	Engineering Project I	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE412	Unit Operation	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE413	Process Dynamics	Basic	X	X	X	X	X	X	X	X	X	X	X	X
	CHE414	Equipment Design I	Basic	X	X	X	X	X	X	X	X	X	X	X	X

	CHE415	Reactor design I	Basic	x	x	x	x	x	x	x	x	x	x	x	x
	CHE416	Petroleum Refinery I													
	CHE417	Numerical Methods	Basic	x	x	x	x	x	x	x	x	x	x	x	x

- Please tick the boxes corresponding to the individual program learning outcomes under evaluatio

Course Description Form

1. Course Name:	
Chemical Engineering Principles I	
2. Course Code:	
CHE117	
3. Semester / Year:	
1 st Semester / 1 st Year	
4. Description Preparation Date:	
10-09-2025	
5. Available Attendance Forms:	
Attendance in the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Hassan Wathiq Ayoob Email: hassan.wathiq@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	1. Establish a solid scientific foundation by linking the fundamentals of mathematics, chemistry, and physics with applied engineering concepts. This also provides students with the ability to deal with dimensional equations and different units. • 2. Understand and solve material balances by training students to formulate and solve material balances for chemical and physical

	systems and to identify simplification methods and assumptions used in solving engineering problems. • 3. Demonstrate the ability to represent industrial processes by introducing students to how to represent processes using flow diagrams, highlighting the relationship between incoming and outgoing components and their impact on the performance of the industrial unit. • 4. Prepare students for advanced specialized courses by paving the way for an understanding of material transfer, heat transfer, and thermodynamics, providing a solid foundation for future study of equipment and production unit design. • 5. Develop analytical and engineering skills by teaching students to think systematically in solving industrial problems. • 6. Link academic aspects with industrial applications by enabling students to understand how theoretical principles are translated into practical industrial processes, preparing them for work in factories and research and development fields.
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9. Teaching and Learning Strategies

Strategy	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Scientific visits. 5- Seminars held in the department.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4+2	Introduction to engineering calculations, dimensions, units and conversions.	The Units	Theoretical +Tutorial	Questions + Discussion
Week 2	4+2	Moles, density and concentration	Types of concentrations	Theoretical +Tutorial	Questions + Discussion

Week 3	4+2	Basis choosing for solids, liquids and gases.	The Basis	Theoretical +Tutorial	Questions + Discussion
Week 4	4+2	Temperature, types, units, conversions, and temperature difference calculations.	Temperature	Theoretical +Tutorial	Questions + Discussion
Week 5	4+2	Pressure and its units, measurements and differential pressure calculations.	The Pressure	Theoretical +Tutorial	Questions + Discussion + Quiz
Week 6	4+2	Composition of mixtures, Principles of stoichiometric combination.	The Mixtures	Theoretical +Tutorial	Questions + Discussion
Week 7	4+2	Introduction to material balances, nature of balances, concepts and Input-output relationships.	Material Balance	Theoretical +Tutorial	Mid Term Exam
Week 8	4+2	Steady-state and unsteady considerations.	Material Balance	Theoretical +Tutorial	Questions + Discussion
Week 9	4+2	A general strategy for solving material balance problems.	Material Balance	Theoretical +Tutorial	Questions + Discussion

Week 10	4+2	Balances for batch and continuous plant.	Material Balance	Theoretical +Tutorial	Questions + Discussion + Quiz
Week 11	4+2	Material balance Involving Multiple Units.	Material Balance	Theoretical +Tutorial	Questions + Discussion
Week 12	4+2	Recycle and its industrial application.	Material Balance	Theoretical +Tutorial	Questions + Discussion
Week 13	4+2	Bypass and its industrial application.	Material Balance	Theoretical +Tutorial	Questions + Discussion
Week 14	4+2	Purge and its industrial application.	Material Balance	Theoretical +Tutorial	Questions + Discussion
Week 15	4+2	Review the article	Review	Theoretical +Tutorial	Questions + Discussion
11. Course Evaluation					
1. Quizzes (10%). 2. Home Works (10%). 3. Class works (10%). 4. Seminars (10%). 5. Midterm Exam (10%). 6. Final Exam (50%).					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			1. Elementary principle of chemical Processes. by, Richard M. Felder.		

	2. Basic principles and calculation in chemical engineering. David. m.Himmelblau.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Libraries sites in some scientific universities.

Course Description Form

1. Course Name:					
English I					
2. Course Code:					
U111					
3. Semester / Year:					
1 st Semester / 1 st year					
4. Description Preparation Date:					
9/9/2025					
5. Available Attendance Forms:					
In-person or online attendance					
6. Number of Credit Hours (Total) / Number of Units (Total)					
30 hours of theory /					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Meyyada Yahya Alabdulhady Email: meyyada.yahya@uobasrah.edu.iq					
8. Course Objectives					
Coarse Objectives		The course aims to improve students' reading, speaking, and writing skills and enrich their vocabulary with new terms related to chemical engineering.			
9. Teaching and Learning Strategies					
Strategy		- Explanation and clarification through lectures. - Presentation of scientific materials using projectors: data shows, smart boards, and plasma screens. - Self-learning through homework and mini-projects within lectures. - Seminars held in the department.			
10. Course Structure					
Week	Hou	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
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, if any)	New Headway_ Beginner A1_ Workbook
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Reliable websites. Library websites at some international universities.

Week	Hours	Required learning outcomes	Unit/Object	Method of Learning	Metod of Evaluation
1	2	Use tenses effectively to express ideas and information accurately and clearly in a variety of communication contexts.	Present tense+vocabulary	theoretical lecture	Discussion and quiz
2	2		Present tense+vocabulary	theoretical lecture	Discussion and quiz
3	2		Past tense+vocabulary	theoretical lecture	Discussion and quiz
4	2		Future tense+vocabulary	theoretical lecture	Discussion and quiz
5	2	Learning to compare and contrast provides students with the tools to think critically and understand relationships between things.	Comparisons+vocabulary	theoretical lecture	Discussion and quiz
6	2		Mid-term preperation	theoretical lecture	Discussion and quiz
7	2	Enabling the student to understand and apply the rules of nouns and pronouns efficiently, which enhances his ability to read, write, and speak in a correct and accurate language.	Nouns +vocabulary	theoretical lecture	Discussion and quiz
8	2		Pronouns +vocabulary	theoretical lecture	Discussion and quiz
9	2	Learning punctuation provides the learner with essential skills for clear, organized, and accurate writing, enhancing their ability to communicate effectively through writing.	Punctuation+vocabulary	theoretical lecture	Discussion and quiz
10	2		Capitalization+vocabulary	theoretical lecture	Discussion and quiz
11	2	The presentation aims to enable students to communicate effectively, think deeply, use technology intelligently, and present themselves confidently.	Presentation	theoretical lecture	Discussion and quiz
12	2		Presentation	theoretical lecture	Discussion and quiz
13	2		Presentation	theoretical lecture	Discussion and quiz
14	2		Presentation	theoretical lecture	Discussion and quiz
15	2		Final exam preperation	theoretical lecture	Discussion and quiz

Course Description Form

1. Course Name:					
Computer I					
2. Course Code:					
CHE107					
3. Semester / Year:					
1 st Semester/first. Year					
4. Description Preparation Date:					
11/9/2025					
5. Available Attendance Forms:					
Attendance in the classroom					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3units					
7. Course administrator's name (mention all, if more than one name)					
Name: Nawras talib Jassim Email: nawras.algreeb@uobasrah.edu.iq					
8. Email: Course Objectives					
Course Objectives		What is relevant to the topic. • The course also aims to provide students with knowledge of Microsoft Office applications and how to use them effectively. • Apply them practically in computer labs, along with a theoretical explanation. • Encourage students to learn how to use the internet and its websites correctly and in a way that benefits them academically. • Introduce students to the most important and latest developments in technology.			
9. Teaching and learning strategies					
Strategy					
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	1	Introduction of computer	Concepts of hardware and software Concept of computing ,data and communication	lecture	
2	4	Computer components	Computer portion hardware parts...	lecture	
3	4	Operating system and graphical user interface	Basics of common operating system	lecture	
4	4	Word processing	Word processing basic	lecture	
5	4	Spread sheet	Basics of spreadsheet	lecture	
6	4	Presentation software	Basics of Presentation software	lecture	
7	2	Introduction to internet and web browsers	Computer network basics	lecture	
8	2	Communications and Email	Basics of electronic mail	lecture	
9	1	Quiz			Quiz
10	2	Computer Troubleshooting	Identifying and solving	lecture	
11			Exam		
12	2	Introduction to Microsoft Excel Basics of the Electronic Accounting Program (How to		lecture	

		Create Database s and Worksheets in Excel			
13	2	Learn the commands to insert, delete, rename, and hide all (cells + columns + rows + worksheets) in Excel.		lecture	
14	2		Exam		
15	2	Mathematical formulas and arithmetic operators		lecture	

11. Course Evaluation

20%) Monthly exam, (20%) (distributed between daily exams, reports, daily preparation and commitment to lectures) + (60%) Final exam.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	NO
Main references (sources)	NO
Recommended books and references (scientific journals, reports...)	The book (Computer Basics) / Author: Dr. Qais Al-Hadi Babiker Al-Hadi, Assistant Professor, University of Gezira - Department of Computer Science (Sudan)
Electronic References, Websites	https://uomustansiriyah.edu.iq/media/lectures/12/12_2023_01_09!10_21_50_PM.pptx

Course Description Form

1. Course Name:					
Computer I					
2. Course Code:					
CHE107					
3. Semester / Year:					
1 st Semester/first. Year					
4. Description Preparation Date:					
11/9/2025					
5. Available Attendance Forms:					
Attendance in the classroom					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Nawras talib Jassim Email: nawras.algreeb@uobasrah.edu.iq					
8. Email: Course Objectives					
Course Objectives			What is relevant to the topic. - The course also aims to provide students with knowledge of Microsoft Office applications and how to use them effectively. - Apply them practically in computer labs, along with a theoretical explanation. - Encourage students to learn how to use the internet and its websites correctly and in a way that benefits them academically. - Introduce students to the most important and latest developments in technology.		
9. Teaching and learning strategies					
Strategy					
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	Introduction of computer	Concepts of hardware and software Concept of computing	lecture	

			,data and communication		
2	4	Computer components	Computer portion hardware parts...	lecture	
3	4	Operating system and graphical user interface	Basics of common operating system	lecture	
4	4	Word processing	Word processing basic	lecture	
5	4	Spread sheet	Basics of spreadsheet	lecture	
6	4	Presentation software	Basics of Presentation software	lecture	
7	2	Introduction to internet and web browsers	Computer network basics	lecture	
8	2	Communications and Email	Basics of electronic mail	lecture	
9	1	Quiz			Quiz
10	2	Computer Troubleshooting	Identifying and solving	lecture	
11			Exam		
12	2	Introduction to Microsoft Excel Basics of the Electronic Accounting Program (How to Create Databases and Worksheets)		lecture	

		ts in Excel			
13	2	Learn the commands to insert, delete, rename, and hide all (cells + columns + rows + worksheets) in Excel.		lecture	
14	2		Exam		
15	2	Mathematical formulas and arithmetic operators		lecture	
11. Course Evaluation					
20%) Monthly exam, (20%) (distributed between daily exams, reports, daily preparation and commitment to lectures) + (60%) Final exam.					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			NO		
Main references (sources)			NO		
Recommended books and references (scientific journals, reports...)			The book (Computer Basics) / Author: Dr. Qais Al-Hadi Babiker Al-Hadi, Assistant Professor, University of Gezira - Department of Computer Science (Sudan)		
Electronic References, Websites			https://uomustansiriyah.edu.iq/media/lectures/12/12_2023_01_09!10_21_50_PM.pptx		

Course Description Form

1. Course Name:	
Chemical Engineering Principles II	
2. Course Code:	
CHE126	
3. Semester / Year:	
2 st Semester / 1 st Year	
4. Description Preparation Date:	
10-09-2025	
5. Available Attendance Forms:	
Attendance in the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Hassan Wathiq Ayoob	
Email: hassan.wathiq@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	The objectives of this course are to: 1. Develop advanced knowledge of material balances involving chemical reactions, including conversion, yield, selectivity, and stoichiometric relationships. 2. Introduce combustion analysis, focusing on material balances of combustion processes, excess air calculations, and flue gas composition.

	3. Study the behavior of gases, including ideal and real gas laws, and their applications in process calculations. 4. Understand phase behavior of mixtures, covering gas–liquid systems, vapor–liquid equilibrium (VLE), and their relevance to separation processes. 5. Apply material balance concepts under different operating conditions, such as batch, continuous, steady, and unsteady-state processes. 6. Enhance problem-solving skills through practical case studies and industrially relevant examples. 7. Prepare students for subsequent courses in thermodynamics, reaction engineering, and process control by building a strong background in chemical process analysis. 8. Enhance teamwork, reporting, and presentation skills through assignments and mini-projects also,Strengthen critical thinking and decision-making abilities in engineering contexts.				
9. Teaching and Learning Strategies					
Strategy	1- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- Scientific visits. 5- Seminars held in the department.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4+2	Mass balances for reactive processes, conversion, yield , percent of completion in chemical reactions.	Material balance involving chemical reactions	Theoretical +Tutorial	Questions + Discussion
Week 2	4+2	Overall and component balances, limiting and excess reactants.	Material balance involving chemical reactions	Theoretical +Tutorial	Questions + Discussion

Week 3	4+2	Material balance involving combustion, the required and excess of air.	Material balance involving combustion	Theoretical +Tutorial	Questions + Discussion
Week 4	4+2	Ideal gas, state equation if ideal gas, mixture of ideal gases.	Ideal gas theory	Theoretical +Tutorial	Questions + Discussion
Week 5	4+2	Real gases: focus on z factors, critical and produced pressure, critical and produced temperature, critical and produced volume.	Real gas theory	Theoretical +Tutorial	Questions + Discussion + Quiz
Week 6	4+2	Kays method for real gases mixture.	Real gas mixtures	Theoretical +Tutorial	Questions + Discussion
Week 7	4+2	Vapor pressure: Antoine equation, Clausius-Clapeyron equation, and steam tables.	Vapor pressure	Theoretical +Tutorial	Mid Term Exam
Week 8	4+2	Mixture of gas and saturated vapor .	Gas–Vapor Mixtures	Theoretical +Tutorial	Questions + Discussion
Week 9	4+2	Gas–Vapor Mixtures: relative saturation, relative humidity, dew point temperature, dew point pressure,	Gas–Vapor Mixtures	Theoretical +Tutorial	Questions + Discussion

		condensation, saturation and drying problems.			
Week 10	4+2	Vapor–Liquid Equilibrium: Raoult's Law.	Vapor–Liquid mixture	Theoretical +Tutorial	Questions + Discussion + Quiz
Week 11	4+2	Material balance involving operating conditions, ideal and real gas applications.	Material balance involving operating conditions	Theoretical +Tutorial	Questions + Discussion
Week 12	4+2	Material balance involving operating conditions, ideal and real gas applications.	Material balance involving operating conditions	Theoretical +Tutorial	Questions + Discussion
Week 13	4+2	Displaying student projects	Mini projects seminars	Tutorial	Questions + Discussion
Week 14	4+2	Displaying student projects	Mini projects seminars	Tutorial	Questions + Discussion
Week 15	4+2	Review the article	Review	Theoretical +Tutorial	Questions + Discussion
11. Course Evaluation					
1. Quizzes (10%). 2. Home Works (10%). 3. Class works (10%). 4. Seminars (10%).					

5. Midterm Exam (10%).

6. Final Exam (50%).

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Elementary principle of chemical Processes. by, Richard M. Felder. 2. Basic principles and calculation in chemical engineering. David. m. Himmelblau.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Libraries sites in some scientific universities.

Course Description Form

1. Course Name:	
Physics	
2. Course Code:	
E122	
3. Semester / Year:	
Second/first	
4. Description Preparation Date:	
2025/9/9	
5. Available Attendance Forms:	
Classroom and Online	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75/3	
7. Course administrator's name (mention all, if more than one name)	
Name: RAED ABDULHUSSEIN DHEYAB Email: raed.dheyab@uobasrah.edu.iq	
8. Course Objectives	
Course Objective	Providing students with a basic understanding of fundamental physics concepts, enabling them to apply these principles to solve problems, analyze physical phenomena, and understand the scientific laws governing the universe. Students are expected to develop problem-solving skills, learn to conduct and interpret experiments, and improve scientific communication to use this knowledge in the design and development of new technologies.
9. Teaching and Learning Strategies	
Strategy	Active Learning: The main teaching strategy for this unit is to engage students in exercises, honing and expanding their critical thinking skills. This is achieved through classroom instruction, interactive lessons, and simple experiments that include simulation activities that interest students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The ability to define basic and derived physical quantities.	Physics Units & Numbers	Classroom and Online	Formative and Summative Assessment
2	2	Understand and apply concepts such as displacement, velocity, acceleration, and free fall.	One-Dimensional Kinematics, Free Fall	Classroom and Online	Formative and Summative Assessment
3	2	The ability to analyze motion into independent horizontal and vertical components and apply the laws of motion.	2D Motion, Projectiles	Classroom and Online	Formative and Summative Assessment
4	2	Explain Newton's three laws of motion accurately, identify forces acting on objects, and apply the laws mathematically.	Newton's Laws of Motion	Classroom and Online	Formative and Summative Assessment
5	2	Define and describe frictional force, including its types.	Friction	Classroom and Online	Formative and Summative Assessment
6	2	The student's ability to define these physical concepts, distinguish their different types, and understand the relationship between them through the law of conservation of energy.	Work, Kinetic and Potential Energy	Classroom and Online	Formative and Summative Assessment
7	2	The ability to define mechanical energy, understand the principle of its conservation, and apply it to solve physical problems.	Mid-term Exam + Conservation of Mechanical Energy	Classroom and Online	Formative and Summative Assessment
8	2	The ability to understand the basic principles of fluid pressure and how it affects surfaces, and to distinguish between	Static Fluids	Classroom and Online	Formative and Summative Assessment

		static and moving flow.			
9	2	The ability to describe Archimedes' principle and determine buoyancy. The ability to understand Bernoulli's principle and how it links pressure, velocity, and energy, and to apply these principles.	Buoyant Forces, Bernoulli	Classroom and Online	Formative and Summative Assessment
10	2	The ability to understand that ideal gases consist of point particles in constant random motion and to apply the gas laws.	Ideal Gases and Kinetic Theory	Classroom and Online	Formative and Summative Assessment
11	2	Explain the relationship between temperature and particle motion, describe the mechanism of heat transfer, and apply these concepts to solve practical problems, such as designing cooling systems.	Heat: Temperature Changes	Classroom and Online	Formative and Summative Assessment
12	2	Be able to define and explain basic concepts such as energy, enthalpy, entropy, and the laws of thermodynamics.	Thermodynamics	Classroom and Online	Formative and Summative Assessment
13	2	Be able to define simple harmonic motion, specify its conditions, and apply mathematical equations to describe this motion.	Vibrations; Simple Harmonic Motion	Classroom and Online	Formative and Summative Assessment
14	2	The learner will be able to define sound intensity and sound level, explain their relationship, and apply the intensity level formula.	Sound, Intensity and Level	Classroom and Online	Formative and Summative Assessment

15	2	The learner will be able to describe the wave properties of light, such as wavelength and frequency, and predict the behavior of light when it interacts with materials in phenomena such as reflection, refraction, diffraction, and interference.	Wave properties of light	Classroom and Online	Formative and Summative Assessment
16			Preparatory week before the final Exam		

11 .Course Evaluation

The grade is distributed out of 100 based on the tasks assigned to the student, including formative assessment out of 40 (assignments, reports, presentations, projects, etc.) and summative assessment out of 60 (midterm and final exams).

12 .Learning and Teaching Resources

Required textbooks (curricular books, if any)	اساسيات الفيزياء العامة/محمد ابو دعابس اساسيات في الفيزياء العامة خواص المادة، الحرارة، الحركة الموجية والصوت / عويش بن حربي الغامدي
Main references (sources)	-Raymond A. Serway, John W. Jewett, Jr. , PHYSICS for Scientists and Engineers with Modern Physics,7 th edition. -Halliday & Resnick & Walker, Fundamental of Physics,10th edition.
Recommended books and references (scientific journals, reports...)	Reliable websites. Library websites at some international universities.
Electronic References, Websites	https://www.physicsclassroom.com https://www.aip.org/aip/about-aip https://aps.org https://phet.colorado.edu/ar_SA Cambridge Books - Cambridge University Oxford Scholarship Online - Oxford University Springer Nature eBook Collections Wiley Online library

Course Description Form

1. Course Name:	
Mohammed Adnan Mustafa	
2. Course Code:	
3. Semester / Year:	
1 st year/ 2nd semester	
4. Description Preparation Date:	
11/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
7. Course administrator's name (mention all, if more than one name)	
Name: Mohammed Adnan Mustafa	
Email: mohammedaltimimi595@gmail.com	
8. Email: Course Objectives	
Course Objectives	- Introduce students to the fundamental concepts of stress and strain in engineering materials. - Enable students to analyze the effects of forces and moments on various structural elements. - Develop students' skills in calculating stresses resulting from different types of loads (tension, compression, shear, torsion, bending). - Train students to use mathematical and engineering relationships to compute deformations and strains in solid objects. - Enhance students' ability to interpret laboratory test results and correlate them with theoretical principles. - Prepare students to apply the acquired concepts in advanced courses such as Structural Analysis, Machine Design, and Materials Engineering.
9. Teaching and Learning Strategies	

Strategy	• Theoretical lectures using presentations and board-based explanations to clarify key concepts. • Solving individual and group problems in class to foster analytical and critical thinking. • Hands-on laboratory experiments to conduct real-life testing of materials (e.g., tension, hardness, bending, torsion tests). • Mini projects that simulate practical engineering applications. • Supporting e-learning resources, including recorded lectures and online interactive materials. • Encouraging classroom discussions and active student-instructor engagement to enhance applied understanding.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1		Understand truss analysis methods	Structural analysis: method joints	Lecture +problems	discussion
Week 2		Apply method of sections in structural analysis	Structural analysis: section joints	Lecture +problems	Homework assignment
Week 3		Calculate moment of inertia for areas	Moment of inertia for definition ,parallel –axis	Lecture +problems	Discussion
Week 4		Extend to composite areas	Moment of inertia for composite areas	Lecture +problems	Quiz
Week 5		Identify load types	Simple stress: types of load	Lecture +problems	Homework assignment
Week 6		Perform tensile test compare ductility and brittle materials	Simple strain :tensile test ,hooks law ,passion ratio	Lecture +problems	Discussion
Week 7		Analyze Shear stress	Shear stress	Lecture +problems	Discussion
Week 8		Analyze thermal stress	thermal stress	Lecture +problems	Homework assignment

Week 9		Analyze Stresses in composite members under axial loading	Stresses in composite members	Lecture +problems	Quiz
Week 10		Draw shear force and bending moment	shear force and bending moment diagram	Lecture +problems	Discussion
Week 11		Apply bending theory equation	Bending theory :equations of stress and momentum in beams	Lecture +problems	Discussion
Week 12		Calculate slope and deflection	Slope and deflection of beams	Lecture +problems	Quiz
Week 13		Apply stress theory to cylinders	Stress in cylinders	Lecture +problems	Homework assignment
Week 14		Apply torsion theory concepts	Torsion theory	Lecture +problems	Discussion
Week 15		Review and prepare for exam	Preparatory week (final exam review	Lecture +discussion	Discussion

11. Course Evaluation

- Midterm Exams (Midterm): 10%
- Classroom Assignments: 10%
- Practical Lab Reports and Practical Assessment: 10%
- Class Participation and Attendance: 10%
- Quizzes: 10%
- Final Exam: 50%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Beer, F. P. & Johnston, E. R. Mechanics of Materials, McGraw-Hill. Singer, Ferdinand L. Strength of Materials.
Main references (sources)	Timoshenko, S. P. Strength of Materials. Hibbeler, R. C. Mechanics of Materials, Pearson. Mechanics of Materials I - E. J. Hearn
Recommended books and references (scientific journals, reports...)	International Journal of Mechanical Sciences. Journal of Materials Engineering and

	Performance.
	Engineering Failure Analysis (journal).
Electronic References, Websites	Engineering Toolbox https://www.engineeringtoolbox.com) Khan Academy – Mechanics of Materials https://www.khanacademy.org) Coursera / edX Mechanical Engineering modules.

Course Description Form

1. Course Name:	
Electrical Technologies	
2. Course Code:	
CHE215	
3. Semester / Year:	
First Course	
4. Description Preparation Date:	
10-9-2025	
5. Available Attendance Forms:	
Class attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 hour in week/ 5 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Anwer Mossa Jassim Email: anwer.al-aaragee@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	1. Understanding Electrical Engineering Principles : Teaching students how to identify and analyze electric circuits and its application. 2. DC circuit Analysis: Learning how to analyze circuits Kirchhoff's laws 3. Design of Engineering Components: Developing the ability to design Electrical Instrument and measurements 4 - This is the basic subject for all electrical and electronic circuits.
9. Teaching and Learning Strategies	
Strategy	1. Understanding the Principles of Electrical Engineering: Students learn how to identify and analyze electrical circuits and their applications. 2. Analyzing DC Circuits: Learn how to analyze circuits using Kirchhoff's laws. 3. Designing Equipment and Instruments: Developing the ability to design electrical devices and measurements.

	4. Analyzing AC Circuits: Students learn how to connect and analyze the performance of components in alternating current electrical and electronic circuits.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Electrical Potential, Potential Difference and voltage, Resistance, Resistance in series and parallel, Open and Short Circuits	Chapter 1	In class	Quiz
2	2	Kirchhoff's laws, Exampels	Chapter 1	In class	Quiz
3	2	revision +Quiz		In class	
4	2	Work, Power, Main effects of electric current, Electric Cell	Chapter 2	In class	homwork
5	2	AC Fundamentals: A.C. Terminology, Effective value(<i>root mean square</i>) of AC quantity, Simple signal element circuit	Chapter 3	In class	Quiz
6	2	Series AC circuits , more Examples	Chapter 3	In class	Class work
7	2	Moving Coil Instruments, Galvanometer, Ammeter	Chapter 4	In class	Quiz
11. Course Evaluation					
The grade Distributed according to the tasks assigned to the student, such as homework, college assignments, Quizes, reports, and midterm and final exams.					
12. Learning and Teaching Resources					
Main references (sources)			- A TEXTBOOK OF ELECTRICAL TECHNOLOGY: VOLUME I, by B.L. THERAJA.		
Recommended books and references (scientific journals, reports...)			- Fundamentals of Electric Circuits /4 th ed by Charles K. Alexander		

Course Description Form

1. Course Name:	
Fluid Mechanics 1	
2. Course Code:	
CHE202	
3. Semester / Year:	
1 st semester /second year	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
Attendance in the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Nibras raad fajri Email:: nebras.raad@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	Covering the basic principles of fluid flow material, and preparing real problems of engineering reality to enable the student to feel the importance of the material in applied engineering. Understanding matter fundamentally by clarifying special physical problems and familiarity with the equations for the movement and flow of fluids. A study of static fluids or fluids with relative stability in order to calculate the pressures and forces resulting from them..
9. Teaching and Learning Strategies	
Strategy	Lectures (Theoretical Presentation of the Subject and According to the Teaching Curriculum of the Subject) Presenting Power Point Slides and Theoretical Presentation Using a Data Show Discussions Data collection and reporting Laboratory presentation method using instruments for measuring the

		different properties of the material under experiment			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	The properties of fluids	Introduction Definition of a fluid, density , specific weight and specific gravity	Lecture + tutorial	Homework or Quiz or report writing
2	4		Viscosity, pressure and perfect gas, vapor pressure, and surface tension	Lecture + tutorial	Homework or Quiz or report writing
3	4	Dimensional analysis	Newtonian and non-Newtonian fluids	Lecture + tutorial	Homework or Quiz or report writing
4	4		Introduction Fundamentals Dimensions Dimensional Homogeneity	Lecture + tutorial	Homework or Quiz or report writing
5	4		Methods of Dimensional Analysis Rayleigh’s method (or Power series)	Lecture + tutorial	Homework or Quiz or report writing
6	4		Buckingham’s method (or Π -Theorem) Selection of repeating variables Dimensions of some important variables	Lecture + tutorial	Homework or Quiz or report writing
7	4		Forces, stresses and pressure at a point	Lecture + tutorial	Homework or Quiz or report writing

8	4	Fluid statics	Basic equation of fluid statics	Lecture + tutorial	Homework or Quiz or report writing
9	4		Absolute and Relative Pressure Head of Fluid	Lecture + tutorial	Homework or Quiz or report writing
10	4		Units and scale of pressure measurements, manometers	Lecture + tutorial	Homework or Quiz or report writing
11	4	Fluid Dynamics	Types of fluid, Types of flow	Lecture + tutorial	Homework or Quiz or report writing
12	4		Continuity equation	Lecture + tutorial	Homework or Quiz or report writing
13	4	Equation of fluid motion	Energy conservation and Bernoulli's equation	Lecture + tutorial	Homework or Quiz or report writing
14	4		Modification of Bernoulli's Equation	Lecture + tutorial	Homework or Quiz or report writing
15	4		Friction in Pipes	Lecture + tutorial	Homework or Quiz or report writing

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Fluid Mechanics for Engineer by Albertson, Barton & Simons Coulson, J.M. and J.F. Richardson, "Chemical Engineering", Vol.I "Fluid Flow, Heat Transfer, and Mass Transfer" 5th edition Holland, F.A. "Fluid Flow for Chemical Engineers" Arnold - McCabe, W.L., Smith, J.C., and Harriott, P. "Unit Operations of Chemical Engineering" 6th edition
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Sober websites. Library Locations in Some International Universities.

Course Description Form

1. Course Name:	
Chemical Eng. Energy Balance	
2. Course Code:	
CHE216	
3. Semester / Year:	
Semester	
4. Description Preparation Date:	
10-9-2025	
5. Available Attendance Forms:	
10-9-2025	
6. Number of Credit Hours (Total) / Number of Units (Total)	
7. Course administrator's name (mention all, if more than one name)	
Name: SHAIMA ALBAZZAZ	
Email: shaima.shueayb@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	1. Develop a strong foundation in material and energy balance principles for chemical and biochemical processes. 2. Teach students to apply the law of conservation of mass and energy to simple and complex chemical engineering systems. 3. Enable students to perform systematic calculations for single-unit operations such as reactors, distillation columns, heat exchangers, and evaporators. 4. Introduce problem-solving techniques for steady-state and transient processes. 5. Foster the ability to construct process flow diagrams and identify system boundaries for analysis. 6. Promote critical thinking to analyze material and energy efficiency and optimize process operations.

	7. Prepare students for professional engineering practice by linking theoretical knowledge with real-world industrial applications. 8. Encourage teamwork and communication skills through group exercises and presentations in process calculations.
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9. Teaching and Learning Strategies

Strategy	- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma screens. 3- Self-learning through homework and mini-projects within the lectures. 4- conversation 5- Scientific visits. 6- Seminars held in the department. 7- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand basic concepts of material and energy balances	Introduction to Material and Energy Balances	Lecture + Discussion	Quiz
2	3	Apply the law of conservation of mass	Material Balances – Single Unit Systems	Lecture + Problem Solving	Assignment

3	3	Solve material balances with chemical reactions	Material Balances – Reactive Systems	Lecture + Worked Examples	Quiz
4	3	Perform energy balance calculations	Energy Balances – Basic Concepts	Lecture + Examples	Assignment
5	3	Combine material and energy balances	Material & Energy Balances – Non-reactive Systems	Lecture + Problem Solving	Midterm Exam
6	3	Solve energy balances in reactive systems	Energy Balances – Reactive Systems	Lecture + Case Studies	Assignment
7	3	Analyze systems with recycle, bypass, and purge	Material Balances – Complex Systems	Lecture + Tutorial	Quiz

11. Course Evaluation

Component	Description	Weight (%)
Midterm Exam	Assessment of theoretical concepts from the first half of the course	20%
Final Exam	Comprehensive theoretical assessment covering the entire course	40%
Quizzes & Assignments	Short quizzes, problem-solving tasks, and written assignments	10%
Laboratory Work	Hands-on experiments and practical application of petroleum product testing	15%
Lab Reports & Practical Exam	Written reports and practical skill assessment in the lab	10%
Class Participation & Presentations	Active participation in discussions, group projects, and oral presentations	5%

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: Fuels and Sustainable Energy	
2. Course Code: (CHE 225)	
3. Semester / Year: Semester	
4. Description Preparation Date:10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total) 30	
7. Course administrator's name (mention all, if more than one name)	
Name: Hayfaa swadi Email: hyfaa.swadi@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	The world must move toward a more sustainable energy future, and the development of technologies that facilitate this for transport, heating, and power systems is crucial. This journal encourages papers on any aspect and scale of technologies for energy generation and/or utilization that decrease the impact of that production and use, from the laboratory to commercial applications. Papers on technology development/improvement, integration, regulation, standards and policy are within the scope of the journal, as well as case studies. Technology assessments estimating and discussing metrics such as scale of application, size and weight per unit of energy output, economics, efficiency, and state of technology development are particularly welcomed, for both individual or comparative systems. The main fields of

	focus are generation, storage, and conversion; energy efficiency and distribution; and policy and economics. Energy fields include, but are not limited to, carbon capture and storage, wind, bioenergy, solar/PV, hydro, geothermal, and conventional fuels, along with system analysis, environmental issues, energy harvesting, and building design. Papers that incorporate more than one of these topics, either in a unified system or through a comparison of these fields
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9. Teaching and Learning Strategies

Strategy	1. Explanation and clarification through lectures 2. How to display scientific materials using display devices: data shows, smart boards, plasma screens. 3. Self-learning through homework and mini-projects within lectures 4. Laboratories 5. Graduation projects 6. Scientific visits 7. Seminars held in the department 8. Summer training
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method
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Week	Subject	(hr/w)	Required learning outcomes	Teaching method	Exam(hr/w) Evaluation method
1	Fuels and Combustion, Introduction, Classification of Fuels, Solid Fuel, Liquid Fuels, Petroleum, Classification of petroleum.	2	Fuels and Combustion	a lecture	Exam
2	Gas Fuel, Calorific Value, Dulong's formula for the theoretical calculation of calorific value, Flue Gas Analysis (Orsat's method), Solve some models of problems regarding Fuel combustion and calorific values.	2		a lecture	Exam
3	Energy , Forms of energy , Heat energy (Thermal), Mechanical energy, Light (Radiant) energy ,Electrical energy, Sound energy,	2		a lecture	Exam

	Chemical energy, Nonrenewable and Renewable Resources, Illustrate examples between sustainable and unsustainable energies.				
4	Heat Engines, Heat Pumps, and Refrigerators, Heat Engine Concept, Heat to Work, Power Plant Arrangement, What's this Entropy Business, The Laws of Thermodynamics, Quantifying heat energy, Heat Engine Nomenclature.	2	Heat Engines, Heat Pumps, and Refrigerators	a lecture	Exam
5	How much work can be extracted from heat, Let's crank up the efficiency, Examples of Maximum Efficiency, What to do with the waste heat ($\square Q_c$).	2		a lecture	Exam
6	Heat Pumps, Heat Pump Diagram, Heat Pumps and Refrigerators: Thermodynamics Heat Pump/Refrigerator Efficiencies, Example Efficiencies, Example Labels (U.S. & Canada).	2		a lecture	Exam
7	Mid-term Exam	2		a lecture	Exam
8	Turbines, Positive-Displacement Turbines, Dynamic Turbines, Impulse Turbines.	2	Turbines Two phase gas oil separations	a lecture	Exam
9	Reaction Turbines, Turbine Scaling Laws, Dimensionless Turbine Parameters, Turbine Specific Speed. Solve some examples.	2		a lecture	Exam
10	Gas and Steam Turbines, discuss turbines that are designed for use with gases, like combustion products or steam. In a coal or nuclear power plant, high-pressure steam is produced by a boiler and then sent to a steam turbine to produce electricity.	2		a lecture	Exam
11	Discussion to Solve Examples about Turbines.	2		a lecture	Exam
12	Furnace: Type and classification, The principle objectives, the components of a furnace, Furnaces and their applications in high temperature industries, Physical processing, Chemical processing, Issues in Furnace design	2		a lecture	Exam
13	Discussion to Solve Examples about Furnace.	2		a lecture	Exam
14	The Greenhouse, The Natural Greenhouse Effect, The Enhanced Greenhouse Effect, Greenhouse Gases.	2		a lecture	Exam
15	The Effects of Global Warming, Relationship Between Climate Change and Global Public Health.	2		a lecture	Exam

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

Course Description Form

1. Course Name:	
Fluid mechanics 2	
2. Course Code:	
CHE206	
3. Semester / Year:	
2 nd semester /second year	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
Attendance in the classroom	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Nibras raad fajri Email:: nebras.raad@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	Covering the basic principles of fluid flow material, and preparing real problems of engineering reality to enable the student to feel the importance of the material in applied engineering. Understanding matter fundamentally by clarifying special physical problems and familiarity with the equations for the movement and flow of fluids A study of static fluids or fluids with relative stability in order to calculate the pressures and forces resulting from them.
9. Teaching and Learning Strategies	
Lectures (Theoretical Presentation of the Subject and According to the Teaching Curriculum of the Subject) Presenting Power Point Slides and Theoretical Presentation Using a Data Show Discussions Data collection and reporting	

Laboratory presentation method using instruments for measuring the different properties of the material under experiment

Strategy

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3+2	pumps	Pumps, pumps relations with centrifugal force,	Lecture + tutorial	Homework or Quiz or report writing
2	3+2		pumps in parallel and series, positive displacement pumps, pump efficiency,	Lecture + tutorial	Homework or Quiz or report writing
3	3+2	Flow measurements	factors affecting the selection of pumps	Lecture + tutorial	Homework or Quiz or report writing
4	3+2		Introduction; general equation for internal flow meters; Local velocity measurement: Pitot tube. Hot wire anemometer, mass flowmeter	Lecture + tutorial	Homework or Quiz or report writing
5	3+2		Orifice meter; Venturimeter;	Lecture + tutorial	Homework or Quiz or report writing
6	3+2		Weirs, concept of area meters: rotameter; Local velocity measurement: Pitot tube	Lecture + tutorial	Homework or Quiz or report writing

7	3+2	Flow Through Porous Media	Introduction Darcy's Law Porosity and Specific Surface Carman Relation Ergun Equation	Lecture + tutorial	Homework or Quiz or report writing
8	3+2		Kozeny Equation Relationships for Streamline and Turbulent flow	Lecture + tutorial	Homework or Quiz or report writing
9	3+2		Carman Relation	Lecture + tutorial	Homework or Quiz or report writing
10	3+2		Ergun Equation	Lecture + tutorial	Homework or Quiz or report writing
11	3+2	Fluid flow past solid particles	Introduction; concept of drag and lift variation of drag coefficient with Reynolds number;	Lecture + tutorial	Homework or Quiz or report writing
12	3+2		stream-lined body and bluff body; packed bed; concept of sphericity; modified friction factor	Lecture + tutorial	Homework or Quiz or report writing
13	3+2		modified friction factor.	Lecture + tutorial	Homework or Quiz or report writing
14	3+2		Measurement of the pressure drop in the pipes and fittings because of friction, moment of impact	Lecture + tutorial	Homework or Quiz or report writing

15	3+2			Lecture + tutorial	Homework or Quiz or report writing
11. Course Evaluation					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Fluid Mechanics for Engineer by Albertson, Barton & Simons Coulson, J.M. and J.F. Richardson, “Chemical Engineering”, Vol.I “ Fluid Flow, Heat Transfer, and Mass Transfer” 5th edition Holland, F.A. “Fluid Flow for Chemical Engineers” Arnold - McCabe, W.L., Smith, J.C., and Harriott, P. “ Unit Operations of Chemical Engineering” 6th edition		
Main references (sources)					
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites			Sober websites. Library Locations in Some International Universities.		

Course Description Form

1. Course Name:					
Computer II					
2. Course Code:					
UOB203					
3. Semester / Year:					
2 nd Semester/second Year					
4. Description Preparation Date:					
11/9/2025					
5. Available Attendance Forms:					
Attendance in the classroom					
6. Number of Credit Hours (Total) / Number of Units (Total)					
3units					
7. Course administrator's name (mention all, if more than one name)					
Name: Nawras talib Jassim Email: nawras.algreeb@uobasrah.edu.iq					
8. Email: Course Objectives					
Course Objectives		What is relevant to the topic. • Networks, their interconnections, and their importance • What is relevant to the topic. • The course also aims to provide students with knowledge of e-commerce applications and their practical application in computer labs, along with • Theoretical explanations. • Encouraging students to learn how to use the internet and its websites effectively • Computer problems and how to address them • Artificial intelligence and its applications.			
9. Teaching and learning strategies					
Strategy					
10. Course Structure					
We ek	Hour s	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	Introducer lecture on networks		lecture	

2	1	The importance of networks + their features and types		lecture	
3	1	E-BANKNG	Security measures, uses and benefits	lecture	
4	1	Quiz	Word processing basic	lecture	
5	1	Security measures, uses and benefits	Basics of spreadsheet	lecture	
6	1	-Understanding the Basics -Common Hardware Problems and Solutions	Basics of Presentation software	lecture	
7	1	Common Software Problems and Solutions	Computer network basics	lecture	
8	1	Basic Troubleshooting Techniques Essential Troubleshooting Tools	Basics of electronic mail	lecture	
9	1				Quiz
10	1	Example: Slow Computer Performance	Identifying and solving	lecture	
11			Exam		
12	1	Artificial intelligence (AI) -How AI Works in Smartphones and Virtual Assistants		lecture	
13	1	. AI Application		lecture	
14	2		Exam		
15	1	The future of AI		lecture	
11. Course Evaluation					
20%) Monthly exam, (20%) (distributed between daily exams, reports, daily preparation and commitment to lectures) + (60%) Final exam.					
12. Learning and Teaching Resources					
Required textbooks		NO			

(curricular books, if any)	
Main references (sources)	NO
Recommended books and references (scientific journals, reports...)	The book (Computer Basics) / Author: Dr. Al-Khader Ali Al-Khader Adel Abdel Nour (Introduction to Artificial Intelligence)
Electronic References, Websites	https://uomustansiriyah.edu.iq/media/lectures/12/12_2023_01_09!10_21_50_PM.pptx

Course Description Form

1. Course Name: Physical Chemistry	
2. Course Code: 207	
3. Semester / Year: semester	
4. Description Preparation Date: 10-2025	
5. Available Attendance Forms:	
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: anwar abdlhassan abood	
Email: anwar.abood@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	identifying the branches of physical chemistry and practical applications in physical chemistry. The program has been arranged in a way that covers all areas of physical chemistry, where the kinetic theory of gases, the foundations of thermodynamics, thermochemistry, chemical equilibrium, phase equilibrium, the kinetics of chemical reactions, electrochemistry, and surface chemistry (adsorption) have been identified.
9. Teaching and Learning Strategies	
Strategy	Learn about the branches of physical chemistry, basics of thermodynamics, thermochemistry, kinetics, electrochemistry, surface chemistry, solved problems that demonstrate practical applications in physical chemistry.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	Gases [ideal gas laws, Kinetic theory of gases, Maxwells distribution of molecular velocities,	Physical Chemistry	Lectures, discussion of	assignments and reports
2	6	collision properties, mean free path, deviation from ideal behavior-vander waals equation	Physical Chemistry	Lectures, discussion of	assignments and reports
3	6	Thermochemistry	Physical Chemistry	Lectures, discussion of	assignments and reports
4	6	Thermochemistry	Physical Chemistry	Lectures, discussion of	assignments and reports
5	6	Second law of thermodynamics and its applications	Physical Chemistry	Lectures, discussion of	assignments and reports
6	6	Second law of thermodynamics and its applications	Physical Chemistry	Lectures, discussion of	assignments and reports
7	6	Chemical equilibrium of homogenous	Physical Chemistry	Lectures, discussion of	assignments and reports
8	6	Chemical equilibrium of heterogeneous reaction	Physical Chemistry	Lectures, discussion of	assignments and reports
9	6	Colligative properties [Osmotic pressuer,boiling point elevation, freezing point depression]	Physical Chemistry	Lectures, discussion of	assignments and reports
10	6	Definition of terms, derivation of phase rule, application of phase rule to three component systems: acetic acid - chloroform- water system, system consisting of two salts and water. Raoult's law, ideal and non-ideal solutions	Physical Chemistry	Lectures, discussion of	assignments and reports
11	6	vapour pressure and boiling point diagrams of completely miscible binary solutions, completely immiscible liquids:	Physical Chemistry	Lectures, discussion of	assignments and reports

		steam distillation and its application, solubility of partially miscible liquids, solubility of gases in liquids: factors affecting solubility, Henry's law			
12	6	Vapour pressure lowering, Osmosis and Osmotic pressure, boiling point elevation, freezing point depression, determination of molecular weight from colligative properties	Physical Chemistry		
13	6	Adsorption, chemisorption, applications of adsorption, adsorption of gases by solids, Freundlich adsorption isotherm, Longmuir's theory of	Physical Chemistry		
14	6	adsorption. B.E.T. theory of multilayer adsorption (quantitative treatment only).	Physical Chemistry		
15	6	Phase equilibria: phase rule and its application. Electrolytic conduction. Electrical properties of solution	Physical Chemistry		

11. Course Evaluation

Interaction within the lecture

- Homework and reports
- Quizzes (Quizat)
- Midterm and final exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Physical Chemistry, AtKines
Main references (sources)	1.K.K. Sharma " Physical Chemistry "
Recommended books and references (scientific journals, reports...)	2.Arun Bahl , B.S.Bahl ,G.D.Tuli "Essentials of Physical Chemistry "S.Chand and Company ltd 2008
Electronic References, Websites	Robert A. Alberty "Physical Chemistry " seven edition

Course Description Form

1. Course Name:	
Materials and Energy Balance	
2. Course Code:	
CHE226/2nd Semester	
3. Semester / Year:	
Semester	
4. Description Preparation Date:	
10-9-2025	
5. Available Attendance Forms:	
10-9-2025	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3th	
7. Course administrator's name (mention all, if more than one name)	
Name: SHAIMA ALBAZZAZ Email: shaima.shueayb@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	1. Multiple unit systems involving chemical reactions, recycle streams, and purge streams. 2. Material balances with chemical reactions and multiple components, including the use of algebraic techniques. Simultaneous material and energy balances. 3. Flow sheet development and performing complete material and energy balances for chemical engineering projects. 4. Unsteady-state material and energy balances and their applications in dynamic processes. 5. .
9. Teaching and Learning Strategies	
Strategy	- Explanation and clarification through lectures. 2- Display scientific materials with projectors: data show, smart boards, plasma

	screens. 3- Self-learning through homework and mini-projects within the lectures. 4- conversation 5- Scientific visits. 6- Seminars held in the department. 7- Summer training. Assessment methods 1- Short exams (Quiz). 2- Homework. 3- Semester and final exams for theoretical and practical subjects. 4- Small projects within the lesson. 5- Interaction within the lecture. 6- Reports.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand how to deal with interconnected units and complex flow schemes	Multiple unit systems	Lecture + Discussion	Quiz
2	3	Solve mass balance problems involving reactions and multi-component systems	Material balances with reactions	Lecture + Problem Solving	Assignment
3	3	Apply conservation of mass and energy in an integrated manner	Simultaneous balances	Lecture + Worked Examples	Quiz
4	3	Construct process flow diagrams and perform overall balances	Flow sheets	Lecture + Examples	Assignment
11. Course Evaluation					

Component	Description	Weight (%)
Midterm Exam	Assessment of theoretical concepts from the first half of the course	20%
Final Exam	Comprehensive theoretical assessment covering the entire course	40%
Quizzes & Assignments	Short quizzes, problem-solving tasks, and written assignments	10%
Laboratory Work	Hands-on experiments and practical application of petroleum product testing	15%
Lab Reports & Practical Exam	Written reports and practical skill assessment in the lab	10%
Class Participation & Presentations	Active participation in discussions, group projects, and oral presentations	5%
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: Environmental pollution and water technology
2. Course Code: CHE228
3. Semester / Year: Second semester/ Second year
4. Description Preparation Date:2025
5. Available Attendance Forms: Attendance
6. Number of Credit Hours (Total) / Number of Units (Total): 30hr/ 50
7. Course administrator's name (mention all, if more than one name)

Name: Asst. Prof. Dr. Dina Ali Yaseen
Email:dina.yaseen@upbasrah.edu.iq

8. Email: Course Objectives

Course Objectives	1. Understand the fundamental concepts of environmental pollution, including its types, sources, and effects on ecosystems and human health. 2. Explore water resources (surface and groundwater), their properties, various uses, and standards for drinking water quality. 3. Calculate and estimate water demand for different industrial and urban applications. 4. Analyze river pollution processes and gain insight into the self-purification mechanism. 5. Perform calculations for key pollution indicators such as Biochemical Oxygen Demand (BOD) and Theoretical Oxygen Demand (ThOD). 6. Comprehend the stages and techniques of treating surface and groundwater, as well as industrial and domestic wastewater. 7. Identify sources of air pollution, understand their impacts, and examine modern control methods. 8. Enhance problem-solving skills through applying engineering and mathematical principles to analyze and address environmental pollution issues.
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9. Teaching and Learning Strategies

Strategy	1. Interactive lectures, presentations, and class discussions 2. Problem-based learning (PBL) 3. Practical activities / Laboratory work 4. Cooperative learning (group work) for problem solving in class 5. Individual reports and assignments
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10. Course Structure

Week	Hours	Learning Outcomes (Knowledge – Skills – Attitude)	Topic	Learning Methods	Learning Approach
1	2	Knowledge: Understand the basic concepts of environment and pollution, its types and sources; Knowledge: Identify water resources, their characteristics, and drinking water quality standards	Concept of environment, Components of environment, Environmental pollution, Environmental engineering, Types of environmental pollution; Water, Water resources, Water and Wastewater characteristics, Water consumption	Interactive lectures + Presentations + Class discussions	Discussions
2	2	Skills: Calculate water demand and estimate consumption	Total water demand, Variation in water consumption rates, Water quality and drinking water characteristics	Interactive lectures + Practical activities	Discussions & Group Assignments
3	2	Knowledge & Skills: Analyze pollution sources and understand river pollution and self-purification	Water pollution, Sources of water pollution, Types of pollutants, River pollution and oxygen levels	Problem-based learning + Class discussions	Individual & Group Assignments
4	3	Skills: Calculate pollution indicators (BOD) and adjust according to temperature	BOD Model, Temperature and BOD rate constant adjustment	Practical activities + Reports/Assignments	Quiz

5	2	Attitude: Develop teamwork and collaboration skills	Exam preparation	Cooperative learning (group work) + Group review	Cooperative Learning
6	2	All previous outcomes	Mid Exam	assessment	Assessment
7	2	Skills: Calculate theoretical oxygen demand and analyze DO curves	DO Sag curve, Other measures of oxygen demand, Theoretical Oxygen Demand (ThOD)	Practical activities + Problem-based learning	Discussions & Group Assignments
9	2	Knowledge: Understand water treatment processes and objectives	Purpose of water treatment, Water intakes, Conventional water treatment	Interactive lectures + Presentations + Class discussions	Individual & Group Assignments
10	2	Skills: Apply different water treatment techniques	Rapid mix unit, Flocculation unit, Sedimentation, Filtration, Disinfection unit	Practical activities + Problem-based learning	Discussions
11	2	Knowledge & Skills: Identify sources of groundwater pollution and treatment methods	Groundwater pollution and treatment, Definition, Contamination sources in groundwater	Problem-based learning + Class discussions	Quiz
12	2	Skills: Apply different groundwater treatment methods	Groundwater contaminations, Methods of groundwater treatment: physical, chemical, and biological	Practical activities + Reports/Assignments	Practical Activities
13	2	Knowledge: Understand air pollution, its sources and types	Air pollution, Definition, Classification, Major air pollutants, Sources of pollutants, Non-conventional air pollutants	Interactive lectures + Class discussions	Reports +presentation
14	2	Attitude: Develop teamwork and self-learning skills	Preparatory week before the final exam	Cooperative learning (group work) + Group review	Cooperative Learning
15	2	All outcomes: Knowledge – Skills – Attitude	Final Exam	assessment	Assessment

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)	1.environmental pollution and control, 4th ed. by j. jeffrey peirce , p. aarne vesilind , ruth f. weiner 2.principles of water quality control fifth edition t, h. y, tebbutt

Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.bbau.ac.in/dept/UIET/TCE-033%20%20epdf.pub_environmental-pollution-and-control.pdf