

Academic Program Description Form

University Name: Al-Qadisiyah University

Faculty/Institute: College of Engineering.

Scientific Department: Chemical Engineering Department

Academic or Professional Program Name: BSc Chemical Engineering

Final Certificate Name: Bachelor of Science in Chemical Engineering (B.Sc. Chemical Engineering)

Academic System: Bologna process

Description Preparation Date: 23-08-2026

File Completion Date: 23-08-2026

Signature: 

Head of Department

Name:

Abdul-Razzaq Abd-Zaid Hussein

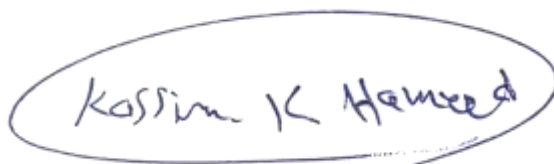
Date: 23-08-2026

Signature: 

Scientific Associate Name:

Prof. Dr. Haitham Ali Badi

Date: 23-08-2026



The file is checked by: Quality Assurance Committee

Chemical Engineering Department

**Director of the Quality Assurance and University
Performance Division:**

Assoc. Prof. Qasim Kadhim Hameed

Date: 23-08-2026

Signature:



Approval of the Dean

Prof. Dr. Ali Abdul-Hussein

Jaza'a Al-Khalidi



Academic Program and Course Description Guide

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

**College of Engineering-Al-Qadisiyah University
Chemical Engineering Department
2025-2026**

ACADEMIC PROGRAM DESCRIPTION

Bachelor's Degree in Chemical Engineering

Chemical Engineering Department

College of Engineering - Al-Qadisiyah University

University Name	Al-Qadisiyah University
College	College of Engineering
Scientific Department	Chemical Engineering Department
Academic Program	Bachelor's Degree in Chemical Engineering
Academic System	Four years (Eight semesters), 240 ECTS; 1 ECTS = 25 hours
Academic Year	2025-2026
Description Preparation Date	23/08/2026

Academic Year 2025-2026

Introduction

This Academic Program Description presents the Bachelor of Chemical Engineering program at Al-Qadisiyah University. The program is organized over four academic years and eight semesters with a total of 240 ECTS and 6,000 student-workload hours. It defines the program vision and mission, educational objectives, graduate outcomes, curriculum structure, teaching and assessment methods, faculty profile, continuous improvement framework, curriculum mapping, and detailed course descriptions. The program is designed to provide students with a balanced foundation in mathematics, sciences, engineering fundamentals, chemical engineering core subjects, laboratory practice, design, computing, professional skills, and graduation-project work relevant to industrial and petroleum sectors.

1. Program Vision

Leadership and excellence in chemical engineering sciences and their applications to serve the national industry and achieve sustainable development.

2. Program Mission

To prepare scientifically and professionally qualified graduates in chemical engineering, equipped with innovation and scientific research skills, and to contribute effectively to solving technical problems and developing chemical and petroleum industries to meet labor market needs.

3. Program Educational Objectives (PEOs)

Graduates of the Chemical Engineering program at Al-Qadisiyah University are expected, within a few years of graduation, to:

PEO	Educational Objective
PEO 1 - Professional Practice	Successfully practice as professional chemical engineers contributing effectively to industrial and petroleum sectors.
PEO 2 - Lifelong Learning	Pursue continuous professional development through graduate studies, lifelong learning, and staying updated with modern technology.
PEO 3 - Responsibility & Ethics	Adhere to professional engineering ethics, occupational health and safety standards, and environmental protection in their engineering practice.
PEO 4 - Leadership & Teamwork	Work effectively within multidisciplinary teams and demonstrate leadership and effective communication skills.

4. Program Accreditation

The Chemical Engineering program is developed and periodically reviewed in accordance with the requirements of the Ministry of Higher Education and Scientific Research and the national standards for engineering education and program accreditation. Quality-assurance practices include curriculum review, assessment of graduate outcomes, course evaluation, faculty development, stakeholder feedback, and documented continuous improvement.

5. Other External Influences

The program operates within Al-Qadisiyah University under the Ministry of Higher Education and Scientific Research, Republic of Iraq. The curriculum master and departmental documents reflect the national higher-education framework and an ECTS-based semester structure.

6. Program Structure

The curriculum comprises 61 listed modules and activities distributed over eight semesters, including one support activity with zero ECTS, for a total of 240 ECTS and 6,000 student-workload hours. Modules are classified as Basic learning activities (B), Core learning activities (C), and Support or related learning activities (S).

Module Classification	No. of Modules	ECTS	Share of 240 ECTS	SWL (hours)
Basic learning activities	23	77	32.1%	1,925
Core learning activities	37	163	67.9%	4,075
Support / related learning activity	1	0	0.0%	0
Total	61	240	100.0%	6,000

Additional graduation requirement: the curriculum master states that the student should complete 4 weeks of summer internship to fulfill the requirements of the bachelor's degree.

7. Program Description / Curriculum

The following table presents the approved study plan by academic level and semester, including course codes, course titles, ECTS credits, student workload, and module classification.

Year / Level	Semester	Course Code	Course Name	ECTS	SWL (h)	Type
First Year	1	CHE114	Mathematics I	7	175	B
First Year	1	CHE111	Organic Chemistry	6	150	B
First Year	1	CHE112	Basic chemical Engineering	8	200	C
First Year	1	QU04	Computer	3	75	B
First Year	1	CHE113	Workshop Technology	2	50	B
First Year	1	QU01	English Language	2	50	B
First Year	1	QU02	Democracy and Human Rights	2	50	B
First Year	2	CHE124	Physics Fundamentals	4	100	B
First Year	2	CHE121	Chemical Engineering principles	6	150	C
First Year	2	CHE122	Analytical Chemistry	5	125	B
First Year	2	CHE123	Engineering Drawing	5	125	B
First Year	2	CHE125	Chemical Safety And Security Of Biological And Radiological	2	50	B
First Year	2	CHE126	Mathematics II	6	150	B
First Year	2	QU06	Arabic Language	2	50	B
Second Year	3	CHE211	Chemical Engineering Calculations	7	175	C
Second Year	3	CHE212	Physical Chemistry 1	5	125	C
Second Year	3	CHE213	Fluid Flow	4	100	B
Second Year	3	ENG211	Mathematics III	3	75	C
Second Year	3	CHE214	Engineering Economics	3	75	B
Second Year	3	CHE215	Engineering Materials Properties	3	75	C
Second Year	3	QU24	Computer 2	3	75	B
Second Year	3	QU26	Arabic Language 2	2	50	B
Second Year	3	ENG212	Sports	0	0	S
Second Year	4	CHE221	Material and Energy Balances	7	175	C
Second Year	4	QU08	The crimes of baath regime in Iraq	2	50	B
Second Year	4	CHE222	Programming with Matlab	4	100	B
Second Year	4	CHE223	Environmental Pollution	4	100	B

Year / Level	Semester	Course Code	Course Name	ECTS	SWL (h)	Type
Second Year	4	CHE224	Statistics and Probability	3	75	C
Second Year	4	CHE225	Physical Chemistry 2	5	125	C
Second Year	4	ENG221	Mathematics 4	3	75	B
Second Year	4	QU21	English Language 2	2	50	B
Third Year	5	CHE311	Thermodynamics I	5	125	C
Third Year	5	CHE312	Heat Transfer I	5	125	C
Third Year	5	CHE313	Mass Transfer I	5	125	C
Third Year	5	CHE314	Reactor Design I	5	125	C
Third Year	5	CHE315	Engineering Analysis	4	100	C
Third Year	5	CHE316	Introduction to Nanotechnology	2	50	C
Third Year	5	QU31	English Language 3	2	50	B
Third Year	5	CHE317	Gas Technology	2	50	C
Third Year	6	CHE321	Mass Transfer II	5	125	C
Third Year	6	CHE322	Heat Transfer II	5	125	C
Third Year	6	CHE323	Reactor Design II	5	125	C
Third Year	6	CHE324	Thermodynamics II	5	125	C
Third Year	6	CHE325	Applied Mathematics	4	100	C
Third Year	6	CHE326	Numerical Methods	4	100	C
Third Year	6	CHE327	Chemical Industries	2	50	C
Fourth Year	7	CHE411	Engineering Project I	3	75	C
Fourth Year	7	CHE412	Unit Operation I	5	125	C
Fourth Year	7	CHE413	Petroleum Refining I	5	125	C
Fourth Year	7	CHE414	Process Control I	5	125	C
Fourth Year	7	CHE415	Process Design and Computer Simulation	5	125	C
Fourth Year	7	CHE416	Engineering Ethics	2	50	C
Fourth Year	7	CHE417	Industrial management	3	75	C
Fourth Year	7	CHE418	Sustainable Engineering	2	50	C
Fourth Year	8	CHE421	Engineering Project II	3	75	C
Fourth Year	8	CHE422	Unit Operation II	5	125	C
Fourth Year	8	CHE423	Petroleum Refining II	5	125	C
Fourth Year	8	CHE424	Process Control II	5	125	C
Fourth Year	8	CHE425	Equipment Design and Computer Simulation	5	125	C
Fourth Year	8	QU41	English Language 4	2	50	B
Fourth Year	8	CHE426	Polymers Technology	5	125	C

8. Expected Program Learning Outcomes / Graduate Outcomes

Upon graduation, students are expected to demonstrate the following approved Graduate Outcomes (GO):

GO	Graduate Outcome
GO 1	An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
GO 2	An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
GO 3	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
GO 4	An ability to communicate effectively with a range of audiences.
GO 5	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
GO 6	An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.
GO 7	An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.

Teaching and Learning Strategies

Teaching and learning are implemented through lectures, tutorials, laboratory and practical work, seminars, projects, case studies, problem-based learning, computer applications, independent study, and collaborative learning. The selected method in each course is aligned with its learning outcomes and the nature of the subject.

- Interactive theoretical lectures for foundational scientific and engineering concepts.
- Tutorials and structured problem-solving sessions to develop analytical and quantitative skills.
- Laboratory and practical activities for experimental competence, measurement, safety, and interpretation of results.
- Problem-based and case-based learning to connect engineering theory with realistic technical and societal problems.
- Project-based learning, including engineering projects, design tasks, and computer-based applications.
- Use of engineering software, computer laboratories, simulations, and digital/virtual learning resources where specified by the course.
- Seminars, presentations, discussions, and report writing to strengthen communication and professional skills.
- Cooperative learning and teamwork through group assignments and collaborative activities.
- Self-directed learning through assignments, reading, research activities, and engagement with current scientific resources.
- Four weeks of summer internship as a graduation requirement according to the curriculum master.

10. Assessment Methods

Assessment is based on a balanced combination of continuous and summative methods, including quizzes, assignments, laboratory and project work, reports, seminars, midterm examinations, and final examinations. Course-level weighting is determined according to the nature and learning outcomes of each module.

- Written examinations, including midterm and final examinations.
- Quizzes and short tests for continuous/formative assessment.
- Onsite and online assignments, homework, and problem sets.
- Laboratory/practical performance assessments and laboratory reports.
- Projects, design tasks, and applied/computer-based activities.
- Reports, seminars, oral presentations, and classroom discussions.
- Continuous assessment of participation, teamwork, communication, and course-specific practical competencies.

11. Faculty

The Chemical Engineering Department is supported by 28 full-time permanent faculty members representing a range of academic ranks and specializations relevant to the program. The faculty profile includes professors, assistant professors, lecturers, and assistant lecturers with doctoral and master degrees in chemical engineering and supporting disciplines.

Faculty Member	Highest Degree	Academic Rank	General Specialization	Specific Specialization
Ali Abdul-Hussein Jaza'a	PhD	Professor	Chemical Engineering	Unit Operations
Rafid Kazem Abbas	PhD	Professor	Petroleum Engineering	Oil Well Drilling
Abdul-Razzaq Abdul-Zaid Hussein	Msc	Lecturer	Chemical Engineering	Catalysts
Hassan Issa Dawood	PhD	Professor	Mechanical Engineering	Heat Transfer in Welding
Abbas Khalaf Mohammad	PhD	Professor	Chemical Engineering	Transport Phenomena
Hisham Mohammed Majeed	PhD	Professor	Chemical Engineering	Petroleum Refining
Qasim Kazem Hameed	PhD	Assistant Professor	Chemical Engineering	Materials
Kanaan Mohammed Mousa	Msc	Assistant Professor	Physics	Materials Physics
Mustafa Jawad Nima	PhD	Lecturer	Chemical Engineering	Renewable Energy
Ali Khedir Jabbar	PhD	Lecturer	Chemical Engineering	Petrochemicals / Polymer Engineering
Kholood Abbas Hussein	PhD	Lecturer	Arabic Language	Modern Literature
Haider Alaa Maabed	PhD	Lecturer	Chemical Engineering	Transport Phenomena
Asaad Saasa Akrab	PhD	Assistant Professor	Accounting	Accounting Information Systems
Ahmed Abbas Ubaid	Msc	Assistant Professor	Chemical Engineering	Process Control
Nawras Shareef Subaih	Msc	Lecturer	Chemical Engineering	Transport Phenomena
Abdul-Ameer Zamil Lateef	Msc	Assistant Professor	Financial Studies	Taxation
Hussein Hantoosh Farhan	Msc	Lecturer	Chemical Engineering	Water Treatment
Ahmed Jiyad Awda	Msc	Lecturer	Chemical Engineering	Chemical Technologies
Dhuha Jawad Hussein	Msc	Lecturer	Chemical Engineering	Polymer
Mohammed Abdul-Hassan Mohammed	Msc	Assistant Lecturer	Mechanical Engineering	Applied Mechanics
Marwa Sattar Jubair	Msc	Assistant Lecturer	Chemical Engineering	Chemical Engineering

Faculty Member	Highest Degree	Academic Rank	General Specialization	Specific Specialization
Shams Asim Mahdi	Msc	Assistant Lecturer	Chemical Engineering	Petroleum Refining
Ali Abdulzahra Amosh	Msc	Assistant Lecturer	Chemical Engineering	Unit Operations
Zahraa Alaa Hawaas	Msc	Assistant Lecturer	Chemical Engineering	Chemical Engineering
Zahraa Mohsin Ghafil	Msc	Assistant Lecturer	Chemical Engineering	Chemical Engineering
Laith Adnan Naji AL-mumar	Msc	Assistant Lecturer	Control and Systems	Mechatronics
Abdullah Yasir Ghjeer	Msc	Assistant Lecturer	Chemical Engineering	Transport Phenomena
Ali Abdulhameed Rageh	Msc	Assistant Lecturer	Materials Engineering	Materials Engineering

Faculty Summary

Indicator	Category	Count
Academic Rank	Professor	5
Academic Rank	Lecturer	9
Academic Rank	Assistant Professor	5
Academic Rank	Assistant Lecturer	9
Highest Degree	PhD	11
Highest Degree	Msc	17

12. Professional Development

Faculty professional development is supported through participation in scientific conferences, seminars, workshops, training courses, research activities, professional organizations, and academic committees. The department encourages continuous improvement in teaching methods, assessment design, laboratory safety, process simulation, digital learning tools, scientific research, academic writing, and engineering accreditation practices. Junior faculty members are integrated into course coordination, research groups, committees, and collaborative academic activities to strengthen teaching and professional competence.

13. Program Development Plan

The program development plan is based on continuous improvement and periodic review. Priorities include: (1) annual review of the curriculum and course content in relation to graduate outcomes and labor-market needs; (2) modernization of laboratories, process-simulation facilities, and digital learning resources; (3) strengthening design, safety, sustainability, and industrial-application components; (4) systematic use of student, alumni, employer, and faculty feedback; (5) continuous faculty development; (6) updating textbooks and electronic resources; and (7) documenting improvement actions and their impact on student learning and program performance.

14. Curriculum Mapping Matrix (Courses vs. Graduate Outcomes)

The curriculum mapping matrix shows the contribution of each course to the seven Graduate Outcomes (GO1-GO7). An X indicates a direct and substantial contribution of the course to the corresponding graduate outcome.

GO1	GO2	GO3	GO4	GO5	GO6	GO7
48	29	28	14	10	39	23

Number of curriculum modules mapped as substantially contributing to each Graduate Outcome. The zero-ECTS Sports activity is included where relevant to teamwork/leadership.

Semester 1 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
CHE114	Mathematics I	X					X	
CHE111	Organic Chemistry	X		X				X
CHE112	Basic Chemical Engineering	X	X					
QU04	Computer	X		X			X	X
CHE113	Workshop Technology			X				X
QU01	English Language				X		X	X
QU02	Democracy and Human Rights				X	X		X

Semester 2 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
CHE124	Physics Fundamentals	X		X				
CHE121	Chemical Engineering Principles	X	X					
CHE122	Analytical Chemistry	X		X				X
CHE123	Engineering Drawing	X	X	X				X
CHE125	Chemical Safety and Security of Biological and Radiological				X	X		X
CHE126	Mathematics II	X					X	
QU06	Arabic Language				X		X	X

Semester 3 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
CHE211	Chemical Engineering Calculations	X						
CHE212	Physical Chemistry 1	X		X				X
CHE213	Fluid Flow	X		X				X
ENG211	Mathematics III	X					X	
CHE214	Engineering Economics		X		X	X		
CHE215	Engineering Materials Properties	X	X					
QU24	Computer 2	X		X			X	X
QU26	Arabic Language 2				X		X	X
ENG212	Sports							X

Semester 4 Mapping

Code	Course Name	GO1	GO2	GO3	GO4	GO5	GO6	GO7
CHE221	Material and Energy Balances	X	X					
QU08	The Crimes of Baath Regime in Iraq				X	X		
CHE222	Programming with Matlab	X		X			X	X
CHE223	Environmental Pollution		X			X		
CHE224	Statistics and Probability	X		X				
CHE225	Physical Chemistry 2	X		X				
ENG221	Mathematics 4	X					X	
QU21	English Language 2				X		X	X

Semester 5 Mapping

Code	Course Name	G01	G02	G03	G04	G05	G06	G07
CHE311	Thermodynamics I	X	X				X	
CHE312	Heat Transfer I	X	X	X			X	
CHE313	Mass Transfer I	X	X	X			X	
CHE314	Reactor Design I	X	X	X			X	
CHE315	Engineering Analysis	X					X	
CHE316	Introduction to Nanotechnology	X					X	
QU31	English Language 3				X		X	X
CHE317	Gas Technology	X	X				X	

Semester 6 Mapping

Code	Course Name	G01	G02	G03	G04	G05	G06	G07
CHE321	Mass Transfer II	X	X	X			X	
CHE322	Heat Transfer II	X	X	X			X	
CHE323	Reactor Design II	X	X	X			X	
CHE324	Thermodynamics II	X	X				X	
CHE325	Applied Mathematics	X					X	
CHE326	Numerical Methods	X		X			X	
CHE327	Chemical Industries	X	X				X	

Semester 7 Mapping

Code	Course Name	G01	G02	G03	G04	G05	G06	G07
CHE411	Engineering Project I	X	X	X	X	X	X	X
CHE412	Unit Operation I	X	X	X			X	
CHE413	Petroleum Refining I	X	X	X			X	
CHE414	Process Control I	X	X	X			X	
CHE415	Process Design and Computer Simulation	X	X	X			X	
CHE416	Engineering Ethics	X			X	X		X
CHE417	Industrial Management	X			X	X		X
CHE418	Sustainable Engineering	X	X			X	X	X

Semester 8 Mapping

Code	Course Name	G01	G02	G03	G04	G05	G06	G07
CHE421	Engineering Project II	X	X	X	X	X	X	X
CHE422	Unit Operation II	X	X				X	
CHE423	Petroleum Refining II	X	X	X			X	
CHE424	Process Control II	X	X	X			X	
CHE425	Equipment Design and Computer Simulation	X	X	X			X	
QU41	English Language 4				X		X	X
CHE426	Polymers Technology	X	X				X	

Graduate Outcome Legend

GO	Outcome Focus
GO1	Engineering problem solving
GO2	Engineering design
GO3	Experimentation and data
GO4	Communication
GO5	Ethics and professional responsibility
GO6	New knowledge / lifelong learning
GO7	Teamwork and leadership

15. Course Description Forms

Course Description Forms

The following **Course Description Forms** provide comprehensive information about the courses included in the Chemical Engineering curriculum. These forms present the course objectives, intended learning outcomes, teaching and learning strategies, course structure, assessment methods, and recommended learning resources.

In accordance with the academic structure adopted by the Chemical Engineering Department, the courses of the **First, Second, and Third Stages** are organized and documented in accordance with the **Bologna Process**, emphasizing student-centered learning, clearly defined learning outcomes, workload, assessment methods, and the development of knowledge, skills, and competencies.

The courses of the **Fourth Stage**, on the other hand, are presented according to the **Course System**, reflecting the academic and curricular requirements applicable to the final stage of the undergraduate program. This stage focuses on consolidating and integrating the knowledge and skills acquired throughout the previous stages and applying them to advanced chemical engineering subjects, design activities, practical applications, and the graduation project.

Accordingly, the following Course Description Forms are intended to provide a clear and standardized representation of the academic content and requirements of each course, while reflecting the educational framework adopted for each stage of the Chemical Engineering program.

MODULE DESCRIPTION FORM

Mathematics I

Module Information					
Module Title	Mathematics I			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE114				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	Semester of Delivery		1
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Mathematics I. 2. Develop analytical and problem-solving skills relevant to Mathematics I. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Mathematics I. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Functions 2. Differentiation 3. Integration 4. Differential equations 5. Series 6. Vectors and matrices 7. Multivariable methods 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Functions 2. Differentiation 3. Integration 4. Differential equations 5. Series 6. Vectors and matrices 7. Multivariable methods 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	93	Structured SWL (h/w)	5.8
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	3.6
Total SWL (h/sem)	150		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Functions
Week 2	Differentiation
Week 3	Integration
Week 4	Differential equations
Week 5	Series
Week 6	Vectors and matrices
Week 7	Multivariable methods
Week 8	Engineering applications
Week 9	Functions
Week 10	Differentiation
Week 11	Integration
Week 12	Differential equations
Week 13	Series
Week 14	Vectors and matrices
Week 15	Multivariable methods
Week 16	Engineering applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Mathematics I.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Organic Chemistry

Module Information				
Module Title	Organic Chemistry		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core			
Module Code	CHE111			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	1	Semester of Delivery	1	
Administering Department	Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	—	
Module Tutor	—		e-mail	—
Peer Reviewer Name	Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date	14/06/2023	Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Organic Chemistry. 2. Develop analytical and problem-solving skills relevant to Organic Chemistry. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Organic Chemistry. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamental principles 2. Chemical structure and properties 3. Quantitative analysis 4. Reactions and mechanisms 5. Thermodynamic and equilibrium concepts 6. Laboratory methods 7. Data interpretation 8. Applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamental principles 2. Chemical structure and properties 3. Quantitative analysis 4. Reactions and mechanisms 5. Thermodynamic and equilibrium concepts 6. Laboratory methods 7. Data interpretation 8. Applications

Student Workload (SWL)			
Structured SWL (h/sem)	108	Structured SWL (h/w)	6.8
Unstructured SWL (h/sem)	67	Unstructured SWL (h/w)	4.2
Total SWL (h/sem)	175		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Fundamental principles
Week 2	Chemical structure and properties
Week 3	Quantitative analysis
Week 4	Reactions and mechanisms
Week 5	Thermodynamic and equilibrium concepts
Week 6	Laboratory methods
Week 7	Data interpretation
Week 8	Applications
Week 9	Fundamental principles
Week 10	Chemical structure and properties
Week 11	Quantitative analysis
Week 12	Reactions and mechanisms
Week 13	Thermodynamic and equilibrium concepts
Week 14	Laboratory methods
Week 15	Data interpretation
Week 16	Applications

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Organic Chemistry.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Basic Chemical Engineering

Module Information				
Module Title	Basic Chemical Engineering		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core			
Module Code	CHE112			
ECTS Credits	8			
SWL (hr/sem)	200			
Module Level	1	Semester of Delivery	1	
Administering Department	Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	—	
Module Tutor	—		e-mail	—
Peer Reviewer Name	Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date	14/06/2023	Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Basic Chemical Engineering. 2. Develop analytical and problem-solving skills relevant to Basic Chemical Engineering. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Basic Chemical Engineering. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Basic Chemical Engineering 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Basic Chemical Engineering 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	124	Structured SWL (h/w)	7.8
Unstructured SWL (h/sem)	76	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)	200		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Basic Chemical Engineering
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Basic Chemical Engineering
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Basic Chemical Engineering.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Computer

Module Information				
Module Title	Computer		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core			
Module Code	QU04			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	1	Semester of Delivery	1	
Administering Department	Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	—	
Module Tutor	—		e-mail	—
Peer Reviewer Name	Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date	14/06/2023	Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Computer. 2. Develop analytical and problem-solving skills relevant to Computer. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Computer. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Computer systems and environment 2. Programming fundamentals 3. Variables and data structures 4. Control structures 5. Functions 6. Data handling 7. Visualization 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Computer systems and environment 2. Programming fundamentals 3. Variables and data structures 4. Control structures 5. Functions 6. Data handling 7. Visualization 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Computer systems and environment
Week 2	Programming fundamentals
Week 3	Variables and data structures
Week 4	Control structures
Week 5	Functions
Week 6	Data handling
Week 7	Visualization
Week 8	Engineering applications
Week 9	Computer systems and environment
Week 10	Programming fundamentals
Week 11	Variables and data structures
Week 12	Control structures
Week 13	Functions
Week 14	Data handling
Week 15	Visualization
Week 16	Engineering applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Computer.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Workshop Technology

Module Information					
Module Title	Workshop Technology			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE113				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		1	Semester of Delivery		1
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Workshop Technology. 2. Develop analytical and problem-solving skills relevant to Workshop Technology. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Workshop Technology. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Workshop Technology 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Workshop Technology 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Workshop Technology
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Workshop Technology
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Workshop Technology.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

English Language

Module Information					
Module Title	English Language			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	QU01				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	Semester of Delivery		1
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in English Language. 2. Develop analytical and problem-solving skills relevant to English Language. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of English Language. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Technical vocabulary 2. Grammar 3. Reading 4. Writing 5. Listening 6. Speaking 7. Academic communication 8. Professional communication

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Technical vocabulary 2. Grammar 3. Reading 4. Writing 5. Listening 6. Speaking 7. Academic communication 8. Professional communication

Student Workload (SWL)			
Structured SWL (h/sem)	31	Structured SWL (h/w)	1.9
Unstructured SWL (h/sem)	19	Unstructured SWL (h/w)	1.2
Total SWL (h/sem)	50		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Technical vocabulary
Week 2	Grammar
Week 3	Reading
Week 4	Writing
Week 5	Listening
Week 6	Speaking
Week 7	Academic communication
Week 8	Professional communication
Week 9	Technical vocabulary
Week 10	Grammar
Week 11	Reading
Week 12	Writing
Week 13	Listening
Week 14	Speaking
Week 15	Academic communication
Week 16	Professional communication

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in English Language.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Democracy and Human Rights

Module Information					
Module Title	Democracy and Human Rights		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Type	Core				
Module Code	QU02				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	Semester of Delivery		1
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Democracy and Human Rights. 2. Develop analytical and problem-solving skills relevant to Democracy and Human Rights. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Democracy and Human Rights. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Democracy and Human Rights 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Democracy and Human Rights 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	31	Structured SWL (h/w)	1.9
Unstructured SWL (h/sem)	19	Unstructured SWL (h/w)	1.2
Total SWL (h/sem)	50		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Democracy and Human Rights
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Democracy and Human Rights
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Democracy and Human Rights.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Physics Fundamentals

Module Information					
Module Title	Physics Fundamentals			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE124				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		1	Semester of Delivery		1
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Physics Fundamentals. 2. Develop analytical and problem-solving skills relevant to Physics Fundamentals. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Physics Fundamentals. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Physics Fundamentals 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Physics Fundamentals 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Physics Fundamentals
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Physics Fundamentals
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Physics Fundamentals.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Chemical Engineering Principles

Module Information					
Module Title	Chemical Engineering Principles			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE121				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		1	Semester of Delivery		1
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Chemical Engineering Principles. 2. Develop analytical and problem-solving skills relevant to Chemical Engineering Principles. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Chemical Engineering Principles. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Chemical Engineering Principles 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Chemical Engineering Principles 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Chemical Engineering Principles
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Chemical Engineering Principles
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Chemical Engineering Principles.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Analytical Chemistry

Module Information					
Module Title	Analytical Chemistry			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE122				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		2	Semester of Delivery		2
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Analytical Chemistry. 2. Develop analytical and problem-solving skills relevant to Analytical Chemistry. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Analytical Chemistry. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamental principles 2. Chemical structure and properties 3. Quantitative analysis 4. Reactions and mechanisms 5. Thermodynamic and equilibrium concepts 6. Laboratory methods 7. Data interpretation 8. Applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamental principles 2. Chemical structure and properties 3. Quantitative analysis 4. Reactions and mechanisms 5. Thermodynamic and equilibrium concepts 6. Laboratory methods 7. Data interpretation 8. Applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamental principles
Week 2	Chemical structure and properties
Week 3	Quantitative analysis
Week 4	Reactions and mechanisms
Week 5	Thermodynamic and equilibrium concepts
Week 6	Laboratory methods
Week 7	Data interpretation
Week 8	Applications
Week 9	Fundamental principles
Week 10	Chemical structure and properties
Week 11	Quantitative analysis
Week 12	Reactions and mechanisms
Week 13	Thermodynamic and equilibrium concepts
Week 14	Laboratory methods
Week 15	Data interpretation
Week 16	Applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Analytical Chemistry.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Engineering Drawing

Module Information					
Module Title	Engineering Drawing			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE123				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		2	Semester of Delivery		2
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Engineering Drawing. 2. Develop analytical and problem-solving skills relevant to Engineering Drawing. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Engineering Drawing. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Engineering Drawing 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Engineering Drawing 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Engineering Drawing
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Engineering Drawing
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Engineering Drawing.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Chemical Safety And Security Of Biological And Radiological

Module Information					
Module Title	Chemical Safety And Security Of Biological And Radiological			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE125				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		2	Semester of Delivery		2
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Chemical Safety And Security Of Biological And Radiological. 2. Develop analytical and problem-solving skills relevant to Chemical Safety And Security Of Biological And Radiological. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Chemical Safety And Security Of Biological And Radiological. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Chemical Safety And Security Of Biological And Radiological 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Chemical Safety And Security Of Biological And Radiological 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	31	Structured SWL (h/w)	1.9
Unstructured SWL (h/sem)	19	Unstructured SWL (h/w)	1.2
Total SWL (h/sem)	50		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Chemical Safety And Security Of Biological And Radiological
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Chemical Safety And Security Of Biological And Radiological
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Chemical Safety And Security Of Biological And Radiological.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Mathematics II

Module Information					
Module Title	Mathematics II			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE126				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		2	Semester of Delivery		2
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Mathematics II. 2. Develop analytical and problem-solving skills relevant to Mathematics II. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Mathematics II. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Functions 2. Differentiation 3. Integration 4. Differential equations 5. Series 6. Vectors and matrices 7. Multivariable methods 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Functions 2. Differentiation 3. Integration 4. Differential equations 5. Series 6. Vectors and matrices 7. Multivariable methods 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	93	Structured SWL (h/w)	5.8
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	3.6
Total SWL (h/sem)	150		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Functions
Week 2	Differentiation
Week 3	Integration
Week 4	Differential equations
Week 5	Series
Week 6	Vectors and matrices
Week 7	Multivariable methods
Week 8	Engineering applications
Week 9	Functions
Week 10	Differentiation
Week 11	Integration
Week 12	Differential equations
Week 13	Series
Week 14	Vectors and matrices
Week 15	Multivariable methods
Week 16	Engineering applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Mathematics II.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Arabic Language

Module Information					
Module Title	Arabic Language			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	QU06				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		2	Semester of Delivery		2
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Arabic Language. 2. Develop analytical and problem-solving skills relevant to Arabic Language. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Arabic Language. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Arabic Language 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Arabic Language 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	31	Structured SWL (h/w)	1.9
Unstructured SWL (h/sem)	19	Unstructured SWL (h/w)	1.2
Total SWL (h/sem)	50		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Arabic Language
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Arabic Language
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Arabic Language.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Chemical Engineering Calculations

Module Information					
Module Title	Chemical Engineering Calculations			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE211				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		2	Semester of Delivery		2
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Chemical Engineering Calculations. 2. Develop analytical and problem-solving skills relevant to Chemical Engineering Calculations. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Chemical Engineering Calculations. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Chemical Engineering Calculations 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Chemical Engineering Calculations 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Chemical Engineering Calculations
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Chemical Engineering Calculations
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Chemical Engineering Calculations.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Physical Chemistry 1

Module Information					
Module Title	Physical Chemistry 1			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE212				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2	Semester of Delivery		2
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound foundation in the thermodynamics of chemical systems, gases, and energetic transformations. 2. Apply the first law to chemical and physical changes and to common thermodynamic processes. 3. Introduce entropy, the second and third laws, and thermodynamic potentials. 4. Develop analytical skills for solving chemical-engineering thermodynamics problems.
Module Learning Outcomes	1. Explain ideal and real-gas behavior using appropriate equations of state. 2. Apply the first law to closed and open systems. 3. Calculate enthalpy changes and standard reaction enthalpies. 4. Calculate entropy changes and interpret the second and third laws. 5. Use Helmholtz and Gibbs energies to assess spontaneity and equilibrium.
Indicative Contents	1. Ideal gases 2. Real gases and equations of state 3. First Law of Thermodynamics 4. Thermodynamic processes 5. Enthalpy and heat effects 6. Standard enthalpy of formation and reaction 7. Temperature dependence of reaction enthalpy 8. Second and Third Laws 9. Entropy and entropy calculations 10. Helmholtz and Gibbs energies

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided derivations, worked numerical problems, short quizzes, laboratory demonstrations, and case-based applications.

Topics	
Topics	1. Ideal gases 2. Real gases and equations of state 3. First Law of Thermodynamics 4. Thermodynamic processes 5. Enthalpy and heat effects 6. Standard enthalpy of formation and reaction 7. Temperature dependence of reaction enthalpy 8. Second and Third Laws 9. Entropy and entropy calculations 10. Helmholtz and Gibbs energies

Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	4.9
Unstructured SWL (h/sem)	47	Unstructured SWL (h/w)	2.9
Total SWL (h/sem)	125		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuo us	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Ideal gas behavior
Week 2	Real-gas behavior
Week 3	First-Law concepts
Week 4	Thermodynamic processes
Week 5	Isothermal and adiabatic processes
Week 6	Constant-volume and constant-pressure processes
Week 7	Standard reaction enthalpy
Week 8	Midterm examination
Week 9	Temperature dependence of reaction enthalpy
Week 10	State functions and exact differentials
Week 11	Second and Third Laws
Week 12	Entropy
Week 13	Entropy calculations
Week 14	Helmholtz and Gibbs energies
Week 15	Standard Gibbs energies of reaction
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Calorimeter determination

Week 2	Heat of neutralization: strong acid-strong base
Week 3	Heat of neutralization: weak acid-strong base
Week 4	Solubility of benzoic acid versus temperature
Week 5	Heat of solution of a potassium salt
Week 6	Transition heat by calorimetry
Week 7	Heat of vaporization by calorimetry

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Physical Chemistry, 9th Edition, Peter Atkins and Julio de Paula.	Yes
Recommended Texts	Practical Physical Chemistry and supporting university references.	No
Websites	https://sites.google.com/view/pchem-cwu/	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Fluid Flow

Module Information					
Module Title	Fluid Flow			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE213				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		2	Semester of Delivery		2
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Fluid Flow. 2. Develop analytical and problem-solving skills relevant to Fluid Flow. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Fluid Flow. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Fluid Flow 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Fluid Flow 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Fundamentals of Fluid Flow
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Fluid Flow
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Fluid Flow.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Mathematics III

Module Information					
Module Title	Mathematics III			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	ENG211				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	Semester of Delivery		3
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Mathematics III. 2. Develop analytical and problem-solving skills relevant to Mathematics III. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Mathematics III. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Functions 2. Differentiation 3. Integration 4. Differential equations 5. Series 6. Vectors and matrices 7. Multivariable methods 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Functions 2. Differentiation 3. Integration 4. Differential equations 5. Series 6. Vectors and matrices 7. Multivariable methods 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	4.9
Unstructured SWL (h/sem)	47	Unstructured SWL (h/w)	2.9
Total SWL (h/sem)	125		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Functions
Week 2	Differentiation
Week 3	Integration
Week 4	Differential equations
Week 5	Series
Week 6	Vectors and matrices
Week 7	Multivariable methods
Week 8	Engineering applications
Week 9	Functions
Week 10	Differentiation
Week 11	Integration
Week 12	Differential equations
Week 13	Series
Week 14	Vectors and matrices
Week 15	Multivariable methods
Week 16	Engineering applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Mathematics III.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Engineering Economics

Module Information					
Module Title	Engineering Economics			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE214				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		3	Semester of Delivery		3
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Engineering Economics. 2. Develop analytical and problem-solving skills relevant to Engineering Economics. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Engineering Economics. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Engineering Economics 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Engineering Economics 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Engineering Economics
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Engineering Economics
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Engineering Economics.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Engineering Materials Properties

Module Information					
Module Title	Engineering Materials Properties		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Type	Core				
Module Code	CHE215				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		3	Semester of Delivery		3
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Engineering Materials Properties. 2. Develop analytical and problem-solving skills relevant to Engineering Materials Properties. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Engineering Materials Properties. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Engineering Materials Properties 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Engineering Materials Properties 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Engineering Materials Properties
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Engineering Materials Properties
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Engineering Materials Properties.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Computer 2

Module Information					
Module Title	Computer 2		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Type	Core				
Module Code	QU24				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		3	Semester of Delivery		3
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Computer 2. 2. Develop analytical and problem-solving skills relevant to Computer 2. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Computer 2. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Computer systems and environment 2. Programming fundamentals 3. Variables and data structures 4. Control structures 5. Functions 6. Data handling 7. Visualization 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Computer systems and environment 2. Programming fundamentals 3. Variables and data structures 4. Control structures 5. Functions 6. Data handling 7. Visualization 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Computer systems and environment
Week 2	Programming fundamentals
Week 3	Variables and data structures
Week 4	Control structures
Week 5	Functions
Week 6	Data handling
Week 7	Visualization
Week 8	Engineering applications
Week 9	Computer systems and environment
Week 10	Programming fundamentals
Week 11	Variables and data structures
Week 12	Control structures
Week 13	Functions
Week 14	Data handling
Week 15	Visualization
Week 16	Engineering applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Computer 2.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Arabic Language 2

Module Information					
Module Title	Arabic Language 2			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	QU26				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		3	Semester of Delivery		3
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Develop students' ability to use Arabic correctly in academic and professional contexts. 2. Strengthen reading, writing, expression, and communication skills. 3. Improve command of grammar, spelling, punctuation, and formal Arabic usage.
Module Learning Outcomes	1. Read and understand academic Arabic texts. 2. Write coherent paragraphs and formal academic correspondence. 3. Apply major grammatical and orthographic rules. 4. Analyze and summarize Arabic texts. 5. Communicate ideas clearly in formal Arabic.
Indicative Contents	1. Reading comprehension 2. Arabic grammar 3. Morphology 4. Spelling and punctuation 5. Written expression 6. Academic writing 7. Text analysis 8. Oral communication

Learning and Teaching Strategies	
Strategies	Lectures, guided reading, language exercises, discussion, writing practice, peer review, and continuous feedback.

Topics	
Topics	1. Reading comprehension 2. Arabic grammar 3. Morphology 4. Spelling and punctuation 5. Written expression 6. Academic writing 7. Text analysis 8. Oral communication

Student Workload (SWL)			
Structured SWL (h/sem)	31	Structured SWL (h/w)	1.9
Unstructured SWL (h/sem)	19	Unstructured SWL (h/w)	1.2
Total SWL (h/sem)	50		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Reading and comprehension
Week 2	Nominal sentences
Week 3	Verbal sentences
Week 4	Subject and object
Week 5	Case endings
Week 6	Spelling rules
Week 7	Midterm review
Week 8	Midterm examination
Week 9	Paragraph writing
Week 10	Academic vocabulary
Week 11	Text analysis
Week 12	Formal correspondence
Week 13	Editing and proofreading
Week 14	Oral expression
Week 15	Comprehensive review
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Week 1-7: guided language exercises
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved Arabic Language textbook for university students.	Yes
Recommended Texts	Reference grammar and writing books.	No
Websites	University electronic learning resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Sports

Module Information					
Module Title	Sports			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	ENG212				
ECTS Credits	1				
SWL (hr/sem)	25				
Module Level		3	Semester of Delivery		3
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Develop physical fitness and health awareness. 2. Promote teamwork, discipline, and sportsmanship. 3. Develop basic skills in selected individual and team sports.
Module Learning Outcomes	1. Participate effectively in physical activities. 2. Apply warm-up and safety principles. 3. Demonstrate teamwork and sportsmanship. 4. Improve endurance, strength, flexibility, and coordination.
Indicative Contents	1. Fitness and warm-up 2. Endurance training 3. Strength and flexibility 4. Team games 5. Football and basketball 6. Athletics 7. Physical fitness assessment

Learning and Teaching Strategies	
Strategies	Demonstration, supervised practice, teamwork, drills, fitness activities, and continuous performance feedback.

Topics	
Topics	1. Fitness and warm-up 2. Endurance training 3. Strength and flexibility 4. Team games 5. Football and basketball 6. Athletics 7. Physical fitness assessment

Student Workload (SWL)			
Structured SWL (h/sem)	16	Structured SWL (h/w)	1.0
Unstructured SWL (h/sem)	9	Unstructured SWL (h/w)	0.6
Total SWL (h/sem)	25		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5

	Project / Practical	1	10% (10)	Continuo us	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Fitness and warm-up
Week 2	Running and endurance
Week 3	Strength training
Week 4	Flexibility and mobility
Week 5	Team games
Week 6	Football fundamentals
Week 7	Basketball fundamentals
Week 8	Athletics
Week 9	Agility and coordination
Week 10	Fitness circuits
Week 11	Rules and sportsmanship
Week 12	Practical skills assessment
Week 13	Team activity
Week 14	Endurance assessment
Week 15	Final practical review
Week 16	Final assessment

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	Practical sports activities throughout the semester
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved physical education and sports training references.	Yes
Recommended Texts	Sports rules and coaching manuals.	No
Websites	University sports facilities and resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Material and Energy Balances

Module Information					
Module Title	Material and Energy Balances			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE221				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		4	Semester of Delivery		4
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Material and Energy Balances. 2. Develop analytical and problem-solving skills relevant to Material and Energy Balances. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Material and Energy Balances. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Material and Energy Balances 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Material and Energy Balances 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	108	Structured SWL (h/w)	6.8
Unstructured SWL (h/sem)	67	Unstructured SWL (h/w)	4.2
Total SWL (h/sem)	175		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Material and Energy Balances
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Material and Energy Balances
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Material and Energy Balances.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

The Crimes of Baath Regime in Iraq

Module Information					
Module Title	The Crimes of Baath Regime in Iraq			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	QU08				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		4	Semester of Delivery		4
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in The Crimes of Baath Regime in Iraq. 2. Develop analytical and problem-solving skills relevant to The Crimes of Baath Regime in Iraq. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of The Crimes of Baath Regime in Iraq. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of The Crimes of Baath Regime in Iraq 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of The Crimes of Baath Regime in Iraq 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	31	Structured SWL (h/w)	1.9
Unstructured SWL (h/sem)	19	Unstructured SWL (h/w)	1.2
Total SWL (h/sem)	50		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of The Crimes of Baath Regime in Iraq
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of The Crimes of Baath Regime in Iraq
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in The Crimes of Baath Regime in Iraq.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Programming with Matlab

Module Information					
Module Title	Programming with Matlab			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE222				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		4
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Programming with Matlab. 2. Develop analytical and problem-solving skills relevant to Programming with Matlab. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Programming with Matlab. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Computer systems and environment 2. Programming fundamentals 3. Variables and data structures 4. Control structures 5. Functions 6. Data handling 7. Visualization 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Computer systems and environment 2. Programming fundamentals 3. Variables and data structures 4. Control structures 5. Functions 6. Data handling 7. Visualization 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Computer systems and environment
Week 2	Programming fundamentals
Week 3	Variables and data structures
Week 4	Control structures
Week 5	Functions
Week 6	Data handling
Week 7	Visualization
Week 8	Engineering applications
Week 9	Computer systems and environment
Week 10	Programming fundamentals
Week 11	Variables and data structures
Week 12	Control structures
Week 13	Functions
Week 14	Data handling
Week 15	Visualization
Week 16	Engineering applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Programming with Matlab.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Environmental Pollution

Module Information					
Module Title	Environmental Pollution			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE223				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		4
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Environmental Pollution. 2. Develop analytical and problem-solving skills relevant to Environmental Pollution. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Environmental Pollution. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Air pollution 2. Water pollution 3. Soil pollution 4. Particulate control 5. Wastewater treatment 6. Solid waste 7. Hazardous waste 8. Environmental management

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Air pollution 2. Water pollution 3. Soil pollution 4. Particulate control 5. Wastewater treatment 6. Solid waste 7. Hazardous waste 8. Environmental management

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Air pollution
Week 2	Water pollution
Week 3	Soil pollution
Week 4	Particulate control
Week 5	Wastewater treatment
Week 6	Solid waste
Week 7	Hazardous waste
Week 8	Environmental management
Week 9	Air pollution
Week 10	Water pollution
Week 11	Soil pollution
Week 12	Particulate control
Week 13	Wastewater treatment
Week 14	Solid waste
Week 15	Hazardous waste
Week 16	Environmental management

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Environmental Pollution.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Statistics and Probability

Module Information					
Module Title	Statistics and Probability			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE224				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		4
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Statistics and Probability. 2. Develop analytical and problem-solving skills relevant to Statistics and Probability. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Statistics and Probability. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Statistics and Probability 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Statistics and Probability 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Statistics and Probability
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Statistics and Probability
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Statistics and Probability.	Yes
Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Physical Chemistry 2

Module Information				
Module Title	Physical Chemistry 2		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core			
Module Code	CHE225			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	4	Semester of Delivery	4	
Administering Department	Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	—	
Module Tutor	—		e-mail	—
Peer Reviewer Name	Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date	14/06/2023	Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Introduce phase equilibria, mixtures, chemical potential, and electrochemical thermodynamics. 2. Apply thermodynamic models to multicomponent systems. 3. Develop skills in predicting phase and chemical equilibrium.
Module Learning Outcomes	1. Interpret phase diagrams. 2. Calculate partial molar properties and chemical potentials. 3. Analyze thermodynamics of mixing. 4. Evaluate chemical equilibrium using Gibbs-energy concepts. 5. Apply electrochemical thermodynamics to cells and equilibrium.
Indicative Contents	1. Phase diagrams 2. Mixtures and partial molar quantities 3. Thermodynamics of mixing 4. Chemical potential 5. Phase equilibrium 6. Chemical equilibrium 7. Electrochemical equilibrium 8. Electrochemical cells and applications

Learning and Teaching Strategies	
Strategies	Lectures, worked examples, graphical interpretation, problem-solving, and laboratory demonstrations.

Topics	
Topics	1. Phase diagrams 2. Mixtures and partial molar quantities 3. Thermodynamics of mixing 4. Chemical potential 5. Phase equilibrium 6. Chemical equilibrium 7. Electrochemical equilibrium 8. Electrochemical cells and applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Pure-component phase diagrams
Week 2	Binary mixtures
Week 3	Partial molar quantities
Week 4	Thermodynamics of mixing
Week 5	Chemical potential
Week 6	Phase equilibrium
Week 7	Chemical equilibrium
Week 8	Midterm examination
Week 9	Electrochemical potentials
Week 10	Cells and activities
Week 11	Electrochemical equilibrium
Week 12	Applications
Week 13	Review problems
Week 14	Advanced equilibrium calculations
Week 15	Comprehensive review
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Phase-equilibrium demonstration
Week 2	Activity/mixture property exercise
Week 3	Electrochemical-cell demonstration
Week 4	Potential measurement
Week 5	Concentration-cell exercise
Week 6	Data analysis
Week 7	Laboratory review

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Physical Chemistry, Peter Atkins and Julio de Paula.	Yes

Recommended Texts	University physical chemistry references.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Mathematics 4

Module Information					
Module Title	Mathematics 4			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	ENG221				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		4	Semester of Delivery		4
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Mathematics 4. 2. Develop analytical and problem-solving skills relevant to Mathematics 4. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Mathematics 4. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Functions 2. Differentiation 3. Integration 4. Differential equations 5. Series 6. Vectors and matrices 7. Multivariable methods 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Functions 2. Differentiation 3. Integration 4. Differential equations 5. Series 6. Vectors and matrices 7. Multivariable methods 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Functions
Week 2	Differentiation
Week 3	Integration
Week 4	Differential equations
Week 5	Series
Week 6	Vectors and matrices
Week 7	Multivariable methods
Week 8	Engineering applications
Week 9	Functions
Week 10	Differentiation
Week 11	Integration
Week 12	Differential equations
Week 13	Series
Week 14	Vectors and matrices
Week 15	Multivariable methods
Week 16	Engineering applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Mathematics 4.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

English Language 2

Module Information					
Module Title	English Language 2			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	QU21				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		4	Semester of Delivery		4
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in English Language 2. 2. Develop analytical and problem-solving skills relevant to English Language 2. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of English Language 2. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Technical vocabulary 2. Grammar 3. Reading 4. Writing 5. Listening 6. Speaking 7. Academic communication 8. Professional communication

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Technical vocabulary 2. Grammar 3. Reading 4. Writing 5. Listening 6. Speaking 7. Academic communication 8. Professional communication

Student Workload (SWL)			
Structured SWL (h/sem)	31	Structured SWL (h/w)	1.9
Unstructured SWL (h/sem)	19	Unstructured SWL (h/w)	1.2
Total SWL (h/sem)	50		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Technical vocabulary
Week 2	Grammar
Week 3	Reading
Week 4	Writing
Week 5	Listening
Week 6	Speaking
Week 7	Academic communication
Week 8	Professional communication
Week 9	Technical vocabulary
Week 10	Grammar
Week 11	Reading
Week 12	Writing
Week 13	Listening
Week 14	Speaking
Week 15	Academic communication
Week 16	Professional communication

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in English Language 2.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Thermodynamics I

Module Information					
Module Title	Thermodynamics I			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE311				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	5		Semester of Delivery	5	
Administering Department	Chemical Eng. Dept.		College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	—	
Module Tutor	—		e-mail	—	
Peer Reviewer Name	Ahmed Abbas Obaid		e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date	14/06/2023		Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Establish a rigorous engineering foundation in thermodynamics. 2. Apply the first and second laws to chemical-engineering systems. 3. Analyze pure-substance properties and thermodynamic cycles.
Module Learning Outcomes	1. Apply energy balances to closed and open systems. 2. Use property tables and diagrams. 3. Analyze common thermodynamic processes. 4. Calculate efficiencies and performance. 5. Apply entropy and the second law.
Indicative Contents	1. Basic concepts and systems 2. Work and heat 3. First law 4. Open systems 5. Pure substances 6. Thermodynamic processes 7. Second law 8. Entropy 9. Power cycles 10. Refrigeration cycles

Learning and Teaching Strategies	
Strategies	Interactive lectures, derivations, property-table exercises, worked calculations, and engineering case studies.

Topics	
Topics	1. Basic concepts and systems 2. Work and heat 3. First law 4. Open systems 5. Pure substances 6. Thermodynamic processes 7. Second law 8. Entropy 9. Power cycles 10. Refrigeration cycles

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Basic concepts
Week 2	Heat and work
Week 3	First law for closed systems
Week 4	Open systems
Week 5	Properties of pure substances
Week 6	Property diagrams
Week 7	Thermodynamic processes
Week 8	Midterm examination
Week 9	Second law
Week 10	Entropy
Week 11	Power cycles
Week 12	Gas power cycles
Week 13	Vapor power cycles
Week 14	Refrigeration
Week 15	Cycle analysis
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Demonstration of thermodynamic properties
Week 2	Energy-balance exercise
Week 3	Thermodynamic cycle analysis
Week 4	Property-table laboratory exercise
Week 5	Efficiency calculation
Week 6	Refrigeration-cycle exercise
Week 7	Laboratory review

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Chemical Engineering Thermodynamics, a standard university text.	Yes
Recommended Texts	Thermodynamics reference books.	No
Websites	Approved engineering learning resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Heat Transfer I

Module Information					
Module Title	Heat Transfer I			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE312				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		5	Semester of Delivery		5
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Introduce heat transfer by conduction, convection, and radiation. 2. Analyze steady and transient heat-transfer systems. 3. Provide a foundation for thermal equipment analysis and design.
Module Learning Outcomes	1. Solve steady conduction problems. 2. Analyze transient conduction. 3. Calculate convection coefficients and heat rates. 4. Analyze radiation exchange. 5. Apply heat-transfer principles to thermal equipment.
Indicative Contents	1. Steady conduction 2. Transient conduction 3. Thermal resistance 4. Forced convection 5. Natural convection 6. Radiation 7. Heat exchangers 8. Thermal equipment basics

Learning and Teaching Strategies	
Strategies	Lectures, derivations, numerical examples, demonstrations, and equipment-based case studies.

Topics	
Topics	1. Steady conduction 2. Transient conduction 3. Thermal resistance 4. Forced convection 5. Natural convection 6. Radiation 7. Heat exchangers 8. Thermal equipment basics

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Introduction to heat transfer
Week 2	Steady one-dimensional conduction
Week 3	Composite walls
Week 4	Cylindrical conduction
Week 5	Transient conduction
Week 6	Thermal resistance networks
Week 7	Forced convection
Week 8	Midterm examination
Week 9	Internal-flow convection
Week 10	External-flow convection
Week 11	Natural convection
Week 12	Radiation
Week 13	Heat exchangers
Week 14	Overall heat-transfer coefficient
Week 15	Applications and review
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Thermal conductivity experiment
Week 2	Convection experiment
Week 3	Heat-exchanger demonstration
Week 4	Radiation experiment
Week 5	Cooling experiment
Week 6	Data analysis
Week 7	Laboratory review

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Fundamentals of Heat and Mass Transfer, a standard university text.	Yes

Recommended Texts	Heat-transfer design references.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Mass Transfer I

Module Information					
Module Title	Mass Transfer I			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE313				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		5	Semester of Delivery		5
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Introduce fundamental mass-transfer mechanisms and rate concepts. 2. Develop understanding of molecular diffusion and convective mass transfer. 3. Apply mass-transfer principles to common separation operations.
Module Learning Outcomes	1. Apply Fick's laws. 2. Calculate diffusion rates. 3. Estimate mass-transfer coefficients. 4. Analyze interphase mass transfer. 5. Relate transport principles to separation equipment.
Indicative Contents	1. Diffusion fundamentals 2. Fick's laws 3. Diffusion through films 4. Convective mass transfer 5. Mass-transfer coefficients 6. Interphase transfer 7. Multicomponent transfer 8. Applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, derivations, worked examples, laboratory demonstrations, and process applications.

Topics	
Topics	1. Diffusion fundamentals 2. Fick's laws 3. Diffusion through films 4. Convective mass transfer 5. Mass-transfer coefficients 6. Interphase transfer 7. Multicomponent transfer 8. Applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Introduction to mass transfer
Week 2	Molecular diffusion
Week 3	Fick's first law
Week 4	Fick's second law
Week 5	Steady diffusion
Week 6	Transient diffusion
Week 7	Film theory
Week 8	Midterm examination
Week 9	Convective mass transfer
Week 10	Mass-transfer coefficients
Week 11	Interphase transfer
Week 12	Gas-liquid transfer
Week 13	Liquid-liquid transfer
Week 14	Solid-fluid transfer
Week 15	Applications and review
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Diffusion experiment
Week 2	Mass-transfer coefficient measurement
Week 3	Gas-liquid transfer
Week 4	Liquid-liquid transfer
Week 5	Solid-fluid transfer
Week 6	Data analysis
Week 7	Laboratory review

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Transport Phenomena or an equivalent Mass Transfer textbook.	Yes
Recommended Texts	Mass-transfer references.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Reactor Design I

Module Information					
Module Title	Reactor Design I			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE314				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		5	Semester of Delivery		5
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Introduce chemical-reaction engineering and ideal-reactor design. 2. Develop reaction-rate and kinetic analysis skills. 3. Design batch and continuous ideal reactors.
Module Learning Outcomes	1. Determine reaction-rate expressions. 2. Estimate kinetic parameters. 3. Design batch reactors. 4. Design CSTRs and PFRs. 5. Analyze conversion and reactor performance.
Indicative Contents	1. Reaction engineering fundamentals 2. Reaction rates 3. Reaction orders 4. Temperature effects 5. Batch reactors 6. CSTR 7. PFR 8. Multiple-reactor systems

Learning and Teaching Strategies	
Strategies	Lectures, kinetic derivations, design calculations, reactor comparisons, and case studies.

Topics	
Topics	1. Reaction engineering fundamentals 2. Reaction rates 3. Reaction orders 4. Temperature effects 5. Batch reactors 6. CSTR 7. PFR 8. Multiple-reactor systems

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Introduction to reactor design
Week 2	Reaction-rate concepts
Week 3	Rate laws
Week 4	Temperature dependence
Week 5	Batch reactors
Week 6	Batch-reactor design
Week 7	CSTR
Week 8	Midterm examination
Week 9	PFR
Week 10	PFR design
Week 11	Multiple CSTRs
Week 12	CSTR-PFR comparison
Week 13	Series reactors
Week 14	Selectivity and yield
Week 15	Design review
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Kinetic-rate experiment
Week 2	Batch-reactor demonstration
Week 3	CSTR demonstration
Week 4	PFR demonstration
Week 5	Conversion analysis
Week 6	Data fitting
Week 7	Laboratory review

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Elements of Chemical Reaction Engineering, a standard university text.	Yes

Recommended Texts	Reaction-engineering reference books.	No
Websites	Approved simulation resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Engineering Analysis

Module Information					
Module Title	Engineering Analysis			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE315				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		5	Semester of Delivery		5
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Develop mathematical analysis techniques for engineering systems. 2. Use differential equations, transforms, vectors, and matrices in engineering analysis. 3. Apply analytical models to chemical-engineering problems.
Module Learning Outcomes	1. Formulate engineering models. 2. Solve ordinary differential equations. 3. Apply Laplace-transform methods. 4. Analyze linear systems. 5. Interpret analytical results.
Indicative Contents	1. Engineering differential equations 2. First-order ODEs 3. Second-order ODEs 4. Laplace transforms 5. Linear algebra 6. Matrices and systems 7. Series solutions 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Lectures, worked derivations, guided exercises, computational checks, and engineering modeling.

Topics	
Topics	1. Engineering differential equations 2. First-order ODEs 3. Second-order ODEs 4. Laplace transforms 5. Linear algebra 6. Matrices and systems 7. Series solutions 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Engineering models
Week 2	First-order ODEs
Week 3	Second-order ODEs
Week 4	Boundary and initial conditions
Week 5	Laplace transform
Week 6	Inverse transforms
Week 7	Linear systems
Week 8	Midterm examination
Week 9	Matrix methods
Week 10	Series solutions
Week 11	Vector methods
Week 12	Model formulation
Week 13	Engineering applications
Week 14	Problem-solving workshop
Week 15	Comprehensive review
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Computational mathematics exercise
Week 2	ODE solution exercise
Week 3	Matrix computation
Week 4	Laplace-transform exercise
Week 5	Modeling exercise
Week 6	Data interpretation
Week 7	Laboratory review

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, a standard university text.	Yes
Recommended Texts	Engineering analysis references.	No
Websites	Approved software resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Introduction to Nanotechnology

Module Information				
Module Title	Introduction to Nanotechnology		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core			
Module Code	CHE316			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	5	Semester of Delivery	5	
Administering Department	Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	—	
Module Tutor	—		e-mail	—
Peer Reviewer Name	Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date	14/06/2023	Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Introduce the fundamental concepts of nanoscience and nanotechnology. 2. Relate nanoscale structure to material properties. 3. Review nanomaterial preparation, characterization, and engineering applications.
Module Learning Outcomes	1. Classify major nanomaterial types. 2. Explain size-dependent and surface effects. 3. Describe major synthesis routes. 4. Interpret common characterization techniques. 5. Discuss environmental, catalytic, and industrial applications.
Indicative Contents	1. Introduction to nanotechnology 2. Size and surface effects 3. Nanoparticles 4. Nanofilms and nanotubes 5. Synthesis methods 6. SEM and TEM 7. XRD and FTIR 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Lectures, visual demonstrations, characterization examples, literature discussion, and application case studies.

Topics	
Topics	1. Introduction to nanotechnology 2. Size and surface effects 3. Nanoparticles 4. Nanofilms and nanotubes 5. Synthesis methods 6. SEM and TEM 7. XRD and FTIR 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Introduction to nanotechnology
Week 2	Nanoscale effects
Week 3	Nanoparticle classes
Week 4	Surface chemistry
Week 5	Synthesis methods
Week 6	Bottom-up methods
Week 7	Top-down methods
Week 8	Midterm examination
Week 9	SEM and TEM
Week 10	XRD
Week 11	FTIR
Week 12	Nanocatalysis
Week 13	Adsorption and environmental applications
Week 14	Energy applications
Week 15	Review and case studies
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Nanomaterial preparation demonstration
Week 2	SEM image interpretation
Week 3	XRD interpretation
Week 4	FTIR interpretation
Week 5	Particle-size analysis
Week 6	Application case study
Week 7	Laboratory review

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Nanotechnology: Principles and Applications, a standard university reference.	Yes
Recommended Texts	Nanomaterials characterization references.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

English Language 3

Module Information					
Module Title	English Language 3			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	QU31				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		5	Semester of Delivery		5
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Develop advanced English skills for engineering study and scientific communication. 2. Strengthen academic reading, writing, speaking, and presentation. 3. Build technical vocabulary and professional communication skills.
Module Learning Outcomes	1. Read technical texts effectively. 2. Write structured academic and technical texts. 3. Use engineering terminology accurately. 4. Deliver technical presentations. 5. Communicate appropriately in professional contexts.
Indicative Contents	1. Technical vocabulary 2. Scientific reading 3. Advanced grammar 4. Academic writing 5. Summarizing and paraphrasing 6. Technical reports 7. Presentations 8. Professional communication

Learning and Teaching Strategies	
Strategies	Communicative language teaching, technical reading and writing, presentations, role play, and continuous feedback.

Topics	
Topics	1. Technical vocabulary 2. Scientific reading 3. Advanced grammar 4. Academic writing 5. Summarizing and paraphrasing 6. Technical reports 7. Presentations 8. Professional communication

Student Workload (SWL)			
Structured SWL (h/sem)	31	Structured SWL (h/w)	1.9
Unstructured SWL (h/sem)	19	Unstructured SWL (h/w)	1.2
Total SWL (h/sem)	50		

Module Evaluation					
Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Technical vocabulary
Week 2	Scientific reading
Week 3	Advanced grammar
Week 4	Academic paragraphs
Week 5	Summarizing
Week 6	Paraphrasing
Week 7	Technical descriptions
Week 8	Midterm examination
Week 9	Technical reports
Week 10	Data commentary
Week 11	Professional correspondence
Week 12	Oral presentations
Week 13	Presentation practice
Week 14	Engineering communication
Week 15	Comprehensive review
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Language laboratory activities and speaking practice
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	English for Engineering, a standard university reference.	Yes
Recommended Texts	Technical English reference materials.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Gas Technology

Module Information					
Module Title	Gas Technology			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE317				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		5	Semester of Delivery		5
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Gas Technology. 2. Develop analytical and problem-solving skills relevant to Gas Technology. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Gas Technology. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Gas Technology 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Gas Technology 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Gas Technology
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Gas Technology
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Gas Technology.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Mass Transfer II

Module Information					
Module Title	Mass Transfer II			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE321				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		6	Semester of Delivery		6
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Mass Transfer II. 2. Develop analytical and problem-solving skills relevant to Mass Transfer II. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Mass Transfer II. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Diffusion 2. Fick's laws 3. Mass-transfer coefficients 4. Interphase transfer 5. Gas-liquid transfer 6. Liquid-liquid transfer 7. Solid-fluid transfer 8. Separation applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Diffusion 2. Fick's laws 3. Mass-transfer coefficients 4. Interphase transfer 5. Gas-liquid transfer 6. Liquid-liquid transfer 7. Solid-fluid transfer 8. Separation applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Diffusion
Week 2	Fick's laws
Week 3	Mass-transfer coefficients
Week 4	Interphase transfer
Week 5	Gas-liquid transfer
Week 6	Liquid-liquid transfer
Week 7	Solid-fluid transfer
Week 8	Separation applications
Week 9	Diffusion
Week 10	Fick's laws
Week 11	Mass-transfer coefficients
Week 12	Interphase transfer
Week 13	Gas-liquid transfer
Week 14	Liquid-liquid transfer
Week 15	Solid-fluid transfer
Week 16	Separation applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Mass Transfer II.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Heat Transfer II

Module Information					
Module Title	Heat Transfer II			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE322				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		6	Semester of Delivery		6
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Heat Transfer II. 2. Develop analytical and problem-solving skills relevant to Heat Transfer II. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Heat Transfer II. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Conduction 2. Thermal resistance 3. Transient conduction 4. Forced convection 5. Natural convection 6. Radiation 7. Heat exchangers 8. Thermal applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Conduction 2. Thermal resistance 3. Transient conduction 4. Forced convection 5. Natural convection 6. Radiation 7. Heat exchangers 8. Thermal applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Conduction
Week 2	Thermal resistance
Week 3	Transient conduction
Week 4	Forced convection
Week 5	Natural convection
Week 6	Radiation
Week 7	Heat exchangers
Week 8	Thermal applications
Week 9	Conduction
Week 10	Thermal resistance
Week 11	Transient conduction
Week 12	Forced convection
Week 13	Natural convection
Week 14	Radiation
Week 15	Heat exchangers
Week 16	Thermal applications

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Heat Transfer II.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Reactor Design II

Module Information					
Module Title	Reactor Design II			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE323				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		6	Semester of Delivery		6
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Reactor Design II. 2. Develop analytical and problem-solving skills relevant to Reactor Design II. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Reactor Design II. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Reaction kinetics 2. Rate laws 3. Temperature effects 4. Batch reactors 5. CSTR 6. PFR 7. Multiple reactors 8. Reactor performance

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Reaction kinetics 2. Rate laws 3. Temperature effects 4. Batch reactors 5. CSTR 6. PFR 7. Multiple reactors 8. Reactor performance

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Reaction kinetics
Week 2	Rate laws
Week 3	Temperature effects
Week 4	Batch reactors
Week 5	CSTR
Week 6	PFR
Week 7	Multiple reactors
Week 8	Reactor performance
Week 9	Reaction kinetics
Week 10	Rate laws
Week 11	Temperature effects
Week 12	Batch reactors
Week 13	CSTR
Week 14	PFR
Week 15	Multiple reactors
Week 16	Reactor performance

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Reactor Design II.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Thermodynamics II

Module Information					
Module Title	Thermodynamics II			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE324				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		6	Semester of Delivery		6
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Thermodynamics II. 2. Develop analytical and problem-solving skills relevant to Thermodynamics II. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Thermodynamics II. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Systems and properties 2. Heat and work 3. First law 4. Open systems 5. Pure substances 6. Second law 7. Entropy 8. Thermodynamic cycles

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Systems and properties 2. Heat and work 3. First law 4. Open systems 5. Pure substances 6. Second law 7. Entropy 8. Thermodynamic cycles

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Systems and properties
Week 2	Heat and work
Week 3	First law
Week 4	Open systems
Week 5	Pure substances
Week 6	Second law
Week 7	Entropy
Week 8	Thermodynamic cycles
Week 9	Systems and properties
Week 10	Heat and work
Week 11	First law
Week 12	Open systems
Week 13	Pure substances
Week 14	Second law
Week 15	Entropy
Week 16	Thermodynamic cycles

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Thermodynamics II.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Applied Mathematics

Module Information				
Module Title	Applied Mathematics		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core			
Module Code	CHE325			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	6	Semester of Delivery	6	
Administering Department	Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	—	
Module Tutor	—		e-mail	—
Peer Reviewer Name	Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date	14/06/2023	Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Apply advanced mathematical methods to engineering problems. 2. Develop competence in partial differential equations, transforms, series, and boundary-value problems. 3. Connect applied mathematics with engineering modeling.
Module Learning Outcomes	1. Solve selected partial differential equations. 2. Apply separation of variables. 3. Use Laplace and Fourier transforms. 4. Solve boundary-value problems. 5. Apply series and vector methods to engineering models.
Indicative Contents	1. Partial differential equations 2. Separation of variables 3. Laplace transforms 4. Fourier transforms 5. Series methods 6. Boundary-value problems 7. Special functions 8. Engineering applications

Learning and Teaching Strategies	
Strategies	Interactive lectures, derivations, worked examples, guided problem solving, and engineering applications.

Topics	
Topics	1. Partial differential equations 2. Separation of variables 3. Laplace transforms 4. Fourier transforms 5. Series methods 6. Boundary-value problems 7. Special functions 8. Engineering applications

Student Workload (SWL)			
Structured SWL (h/sem)	62	Structured SWL (h/w)	3.9
Unstructured SWL (h/sem)	38	Unstructured SWL (h/w)	2.4
Total SWL (h/sem)	100		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Functions of several variables
Week 2	Partial derivatives
Week 3	Chain rule
Week 4	Applications of partial derivatives
Week 5	Multiple integrals
Week 6	Double integrals
Week 7	General regions
Week 8	Polar coordinates
Week 9	Applications of double integrals
Week 10	Triple integrals
Week 11	Triple-integral applications
Week 12	Introduction to differential equations
Week 13	First-order ODEs
Week 14	Boundary-value problems
Week 15	Solution methods review
Week 16	Final examination

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Computer-based mathematical analysis
Week 2	Differential-equation exercise
Week 3	Transform methods
Week 4	Numerical verification
Week 5	Modeling exercise
Week 6	Data interpretation
Week 7	Laboratory review

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Thomas' Calculus, a standard university text.	Yes

Recommended Texts	Advanced Engineering Mathematics references.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Numerical Methods

Module Information					
Module Title	Numerical Methods			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core				
Module Code	CHE326				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		6	Semester of Delivery		6
Administering Department		Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		—
Module Tutor	—		e-mail	—	
Peer Reviewer Name		Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date		14/06/2023	Version Number		1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Numerical Methods. 2. Develop analytical and problem-solving skills relevant to Numerical Methods. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Numerical Methods. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Numerical Methods 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Numerical Methods 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Fundamentals of Numerical Methods
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Numerical Methods
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Approved university textbook in Numerical Methods.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

MODULE DESCRIPTION FORM

Chemical Industries

Module Information				
Module Title	Chemical Industries		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Type	Core			
Module Code	CHE327			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	6	Semester of Delivery	6	
Administering Department	Chemical Eng. Dept.	College	Engineering	
Module Leader	To be assigned		e-mail	—
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	—	
Module Tutor	—		e-mail	—
Peer Reviewer Name	Ahmed Abbas Obaid	e-mail	ahmed.ubeed@qu.edu.iq	
Scientific Committee Approval Date	14/06/2023	Version Number	1.0	

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. Provide a sound academic foundation in Chemical Industries. 2. Develop analytical and problem-solving skills relevant to Chemical Industries. 3. Connect theoretical knowledge with engineering practice and applications.
Module Learning Outcomes	1. Explain the principal concepts of Chemical Industries. 2. Apply appropriate methods to engineering problems. 3. Interpret results and communicate conclusions. 4. Demonstrate professional and safe practice.
Indicative Contents	1. Fundamentals of Chemical Industries 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Learning and Teaching Strategies	
Strategies	Interactive lectures, guided exercises, worked examples, discussion, and continuous feedback.

Topics	
Topics	1. Fundamentals of Chemical Industries 2. Core concepts and terminology 3. Engineering methods 4. Worked examples 5. Applications 6. Case studies 7. Professional practice 8. Review and integration

Student Workload (SWL)			
Structured SWL (h/sem)	46	Structured SWL (h/w)	2.9
Unstructured SWL (h/sem)	29	Unstructured SWL (h/w)	1.8
Total SWL (h/sem)	75		

Module Evaluation

Type		Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 10	LO #1–3
	Assignments	2	10% (10)	2, 12	LO #2–5
	Project / Practical	1	10% (10)	Continuous	LO #4–7
Formative assessment	Report	1	10% (10)	13	LO #5–8
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO #1–6
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Fundamentals of Chemical Industries
Week 2	Core concepts and terminology
Week 3	Engineering methods
Week 4	Worked examples
Week 5	Applications
Week 6	Case studies
Week 7	Professional practice
Week 8	Review and integration
Week 9	Fundamentals of Chemical Industries
Week 10	Core concepts and terminology
Week 11	Engineering methods
Week 12	Worked examples
Week 13	Applications
Week 14	Case studies
Week 15	Professional practice
Week 16	Review and integration

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Approved university textbook in Chemical Industries.	Yes

Recommended Texts	Specialized reference books.	No
Websites	Approved electronic resources.	

Grading Scheme				
Group	Grade	Equivalent	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	Excellent	90 - 100	Outstanding Performance
	B - Very Good	Very Good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Sound work with notable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	Fail (remediation)	45 - 49	More work required but credit awarded
	F - Fail	Fail	0 - 44	Considerable amount of work required
Note: Marks with decimal places above or below 0.5 will be rounded to the higher or lower full mark.				

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The Course Description
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47. CHE411 - Engineering Project I

Course Name	Engineering Project I
Course Code	CHE411
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	62 / 13 hours
Module Type	Core learning activity
Attendance Forms	Tutorial + Laboratory + Seminar
Course Administrator	Abdalrazzaq. A. Hussein

Course Objectives

Course Learning Outcomes

1. Define a clear process-design problem and establish an appropriate design basis.
2. Prepare process descriptions, material balances, energy balances, and process flow diagrams.
3. Select and preliminarily size major process equipment using engineering principles.
4. Incorporate safety, environmental, operability, and sustainability considerations into process decisions.
5. Apply introductory economic analysis to the proposed process.
6. Work effectively within a project team and manage tasks and deadlines.
7. Prepare and present a structured technical project report using accepted engineering conventions.

Teaching and Learning Strategies

Project-based learning is the principal approach. Students work individually and in teams under academic supervision to define the design basis, perform process calculations, prepare drawings and design documents, evaluate alternatives, and present progress. Regular project meetings, technical discussions, seminars, and written feedback support integration of knowledge from previous chemical-engineering courses.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,4,5,6,7	Introduction Week(1-5) Selected Equipment's Design Week(2-3) Theoretical Review Week(6-10) Mechanical Equipment's Design Week (4-6) PFD Week(11-15) Total Project cost Week (7-8) PI&D	Tutorial + Laboratory + Seminar	Project / Report	4	1
1,2,3,4,5,6,7	Final Report Week (9-11) Material Balance Week (10-11) Pollution Control Week (12-15) Energy Balance	Tutorial + Laboratory + Seminar	Continuous Assessment	4	16
1,2,3,4,5,6,7	Full report	Tutorial + Laboratory + Seminar	Continuous Assessment	4	16

Laboratory / Practical Weekly Plan

Stage	Practical / Project Activity
1	Literature review, design basis, process definition, and data collection
2	Material and energy balance calculations and process-flow development
3	Equipment sizing, simulation, and preparation of engineering calculations
4	Safety, environmental, and economic evaluation as required by the project

5	Preparation of drawings, results, final report, and project presentation
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Course Evaluation

Assessment Plan

Assessment Method	Weight	Week / Notes
Project Progress / Assignments	20%	Continuous
Technical Report / Design Work	20%	Continuous
Seminar / Presentation	10%	During semester
Midterm Review	10%	Mid-semester
Final Project Assessment	40%	End of semester

Learning and Teaching Resources

Resource	Details
Required Texts	Gavin Towler and Ray Sinnott, Chemical Engineering Design.
Recommended Texts	Turton et al., Analysis, Synthesis, and Design of Chemical Processes; Peters, Timmerhaus and West, Plant Design and Economics for Chemical Engineers.
Websites / Electronic Resources	AspenTech educational documentation, AIChE resources, and relevant engineering standards and manufacturer data.

48. CHE412 - Unit Operation I

Course Name	Unit Operation I
Course Code	CHE412
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	77 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Abbas Khalaf Mohammad

Course Objectives

engineering-based appreciation of unit operations and separation processes in the context of modern chemical processing. The course includes classical heat- and mass-transfer-based processes commonly used in the chemical and processing industries, as well as a selected range of processes for particulates' handling. On completion of this module, students should be able to:

Course Learning Outcomes

- Demonstrate an understanding of the analysis of a range of separation processes in terms of equilibrium stages as applied to chemical, oil & gas processing systems.
- Design and analyze batch and continuous binary systems to achieve a specified degree of separation.
- Apply the preliminary design of multi-component systems.
- Specify appropriate system configurations for mixing processes.
- Design packed bed columns, based on the height and number of transfer units, and on the generalised pressure drop correlation.
- Develop and apply the fundamental equations required for the design of fluidization systems.
- Specify the configuration and operating conditions of a selected range of solid-liquid and solid-gas separation systems.

Teaching and Learning Strategies

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.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Transfer of heat, mass and momentum	Lecture + Tutorial + Laboratory	Continuous Assessment	5	1
1,2,3,6	Transfer of heat, mass and momentum	Lecture + Tutorial + Laboratory	Continuous Assessment	5	2
1,2,3,6	Reynolds analogy	Lecture + Tutorial + Laboratory	Continuous Assessment	5	3
1,2,3,6	Reynolds analogy	Lecture + Tutorial + Laboratory	Continuous Assessment	5	4
1,2,3,6	Boundary layer theory	Lecture + Tutorial + Laboratory	Continuous Assessment	5	5
1,2,3,6	Boundary layer theory	Lecture + Tutorial + Laboratory	Continuous Assessment	5	6
1,2,3,6	Mid-term Exam	Lecture + Tutorial + Laboratory	Midterm / Test	2	7
1,2,3,6	Newtonian fluids	Lecture + Tutorial + Laboratory	Continuous Assessment	5	8
1,2,3,6	Non Newtonian fluids	Lecture + Tutorial + Laboratory	Continuous Assessment	5	9
1,2,3,6	Mixing	Lecture + Tutorial + Laboratory	Continuous Assessment	5	10

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Fluid flow through packed columns	Lecture + Tutorial + Laboratory	Continuous Assessment	5	11
1,2,3,6	Fluidization	Lecture + Tutorial + Laboratory	Continuous Assessment	5	12
1,2,3,6	Filtration	Lecture + Tutorial + Laboratory	Continuous Assessment	5	13
1,2,3,6	Flow of particles through fluids	Lecture + Tutorial + Laboratory	Continuous Assessment	5	14
1,2,3,6	Sedimentation	Lecture + Tutorial + Laboratory	Continuous Assessment	5	15
1,2,3,6	Preparatory week before the final Exam	Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Liquid-Solid Adsorption
2	Liquid-Solid Adsorption
3	Liquid-Liquid Extraction
4	Liquid-Liquid Extraction
5	Chemical Crystallization
6	Chemical Crystallization
7	Packed Bed Catalytic Reactor 4

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Julian C. Smith,. Peter Harriott. - 5th ed. P. cm. - (McGraw-Hill chemical engineering series).1993
Recommended Texts	Recent textbooks, handbooks, and peer-reviewed references relevant to the course.
Websites / Electronic Resources	University e-learning platform, recognized academic databases, and professional educational resources.

49. CHE413 - Petroleum Refining I

Course Name	Petroleum Refining I
Course Code	CHE413
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	77 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Husham Mohammed Majeed

Course Objectives

its composition, methods of evaluation, 2. How to benefit from it and convert it into oil derivatives that enter into daily uses as means of energy and transportation, as well as its other importance as it enters the field of chemical and petrochemical industries.

Course Learning Outcomes

- Students will demonstrate the ability to identify petroleum fluids and its components
- Students will demonstrate the ability to evaluate methods of crude oil and gas and its derivatives and know the base and origin of petroleum fluids.
- Students will demonstrate the ability to analyze petroleum fluids and its derivatives
- Determining the physical, thermal and various properties charts for crude oil and its derivatives.
- The ability to know the various types of oil distillation processes, oil harvests, and methods of production and treatment.

Teaching and Learning Strategies

The course is delivered through structured lectures and interactive problem-solving sessions that encourage active student participation and critical thinking. Tutorials, examples, assignments, discussions, and practical or laboratory activities are used as appropriate to connect theoretical concepts with engineering applications and to provide continuous feedback on student progress.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Introduction	Lecture + Tutorial + Laboratory	Continuous Assessment	5	1
1,2,3,6	Composition of crude oils and its products	Lecture + Tutorial + Laboratory	Continuous Assessment	5	2
1,2,3,6	Physical and chemical characteristics of crude oil and its products	Lecture + Tutorial + Laboratory	Continuous Assessment	5	3
1,2,3,6	Evaluation of crude oil	Lecture + Tutorial + Laboratory	Continuous Assessment	5	4
1,2,3,6	Degassing process	Lecture + Tutorial + Laboratory	Continuous Assessment	5	5
1,2,3,6	Preparation of crude oil for refining	Lecture + Tutorial + Laboratory	Continuous Assessment	5	6
1,2,3,6	Heating of crude oils	Lecture + Tutorial + Laboratory	Continuous Assessment	5	7
1,2,3,6	Design of Furnaces	Lecture + Tutorial + Laboratory	Continuous Assessment	5	8
1,2,3,6	Atmospheric Distillation of crude oil	Lecture + Tutorial + Laboratory	Continuous Assessment	5	9
1,2,3,6	Vacuum Distillation of crude oil	Lecture + Tutorial + Laboratory	Continuous Assessment	5	10
1,2,3,6	Material and energy balance on distillation columns in refineries. Test	Lecture + Tutorial + Laboratory	Continuous Assessment	2	11
1,2,3,6	(In class, 90-minute)	Lecture + Tutorial + Laboratory	Continuous Assessment	5	12

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Design of Distillation columns	Lecture + Tutorial + Laboratory	Continuous Assessment	5	13
1,2,3,6	Petroleum Refineries	Lecture + Tutorial + Laboratory	Continuous Assessment	5	14
1,2,3,6	Reading Day(Questions and Answers)	Lecture + Tutorial + Laboratory	Continuous Assessment	5	15
1,2,3,6	Preparatory week before the final Exam	Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: measuring the density of petroleum and gas
2	Lab 2: : measuring the viscosity of petroleum
3	Lab 3: Combustion characteristics of petroleum and gas
4	Lab 4: Smoke point
5	Lab 5: Flash and fire point
6	Lab 6: Aniline point
7	Lab 7: petroleum distillation 4

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	William D. McCain Jr., The Properties of Petroleum Fluids.
Recommended Texts	Håvard Devold, Oil and Gas Production Handbook; Gary, Handwerk and Kaiser, Petroleum Refining: Technology and Economics.
Websites / Electronic Resources	University e-learning materials and recognized petroleum-refining educational resources.

50. CHE414 - Process Control I

Course Name	Process Control I
Course Code	CHE414
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	62 / 63 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Prof. Dr. Ali A. Jazie

Course Objectives

2. To understand process control. 3. This course deals the governing fundamental principles of chemical process control. 4. This is the basic subject for all types of process control. 5. To understand first order system, second order system, time delay. 6. To perform connections of different types of control systems. a) Knowledge objective:

Course Learning Outcomes

- Students will demonstrate the ability to model and analyze chemical process control system.
- Students will understand the concept of control system.
- Students will demonstrate the ability to model feedback control system.
- Identify the differences between the controllers.
- Design the full plant control system. b) Skills objective:
- Application of process control.
- The use of mathematical skills in design of control system.
- Use basic knowledge to research new techniques in analysis of process control.
- Derive and evaluate the feedback control system. c) General and qualifying skills (Other skills related to employability and personal development)
- Develop the ability to perform duties and deliver them on time.
- logical and programmatic thinking to find solutions to various problems.
- Develop the student's ability to dialogue and discuss.
- Developing the student's ability to deal with modern technology and electronic classrooms.

Teaching and Learning Strategies

Assignments, reports, seminars, and examination work are expected to be the sole effort of the student submitting the work. Students are expected to follow The University of Al-Qadisiyah Regulations and should expect that every instance of a suspected violation will be reported. All students are obliged to follow the code of academic responsibility. Cheating in any form will be prosecuted to the full extent possible. Discussing homework is allowed and encouraged, but blind copying is NOT acceptable.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Laplace transform	Lecture + Tutorial	Continuous Assessment	4	1
1,2,3,6	Transforming of nonlinear equations to linear	Lecture + Tutorial	Continuous Assessment	4	2
1,2,3,6	Effective functions	Lecture + Tutorial	Continuous Assessment	4	3
1,2,3,6	Review of Laplace transform	Lecture + Tutorial	Continuous Assessment	4	4
1,2,3,6	Calculation of time delay	Lecture + Tutorial	Continuous Assessment	4	5
1,2,3,6	Steady state coefficient	Lecture + Tutorial	Continuous Assessment	4	6
1,2,3,6	Mid-term Exam + Unit-Step Forcing, Forced Response, the RLC Circuit	Lecture + Tutorial	Midterm / Test	2	7

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Final value theorem and Pure time delay	Lecture + Tutorial	Continuous Assessment	4	8
1,2,3,6	Response of first order systems	Lecture + Tutorial	Continuous Assessment	4	9
1,2,3,6	Reacted and non-reacted systems	Lecture + Tutorial	Continuous Assessment	4	10
1,2,3,6	Second order system and Characteristics and response	Lecture + Tutorial	Continuous Assessment	4	11
1,2,3,6	Closed loop systems	Lecture + Tutorial	Continuous Assessment	4	12
1,2,3,6	Transfer function	Lecture + Tutorial	Continuous Assessment	4	13
1,2,3,6	Flow diagram	Lecture + Tutorial	Continuous Assessment	4	14
1,2,3,6	Transfer of signals between the elements of system	Lecture + Tutorial	Continuous Assessment	4	15
1,2,3,6	Preparatory week before the final Exam	Lecture + Tutorial	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: First order control system
2	Lab 2: Second order non- interacted system
3	Lab 3: Second order interacted system
4	Lab 4: Continuous stirred tank heater
5	Lab 5: Temperature control
6	Lab 6: Level control
7	Lab 7: concentration control

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Practice, 4th Edition. Authors: George Stephanopoulos Process Dynamics and Control, 4th Edition, Dale E. Seborg,
Recommended Texts	Thomas F. Edgar, Duncan A. Mellichamp, Francis J. Doyle III https://www.coursera.org/browse/physical-science-and-engineering/chemical
Websites / Electronic Resources	engineering

51. CHE415 - Process Design and Computer Simulation

Course Name	Process Design and Computer Simulation
Course Code	CHE415
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	77 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Salih A. Rushdi

Course Objectives

optimization. 5. To understand the safety and environmental considerations in chemical process design, including process hazards analysis (PHA) and environmental impact assessment (EIA). 6. To develop skills in the economic analysis of chemical processes, including cost estimation and profitability analysis. 7. To develop skills in the communication of technical information through the preparation of technical reports and presentations. 8. To apply the knowledge and skills gained in the course to design a complete chemical process from concept to final design.

Course Learning Outcomes

- Ability to apply the fundamental principles of chemical engineering to the design of chemical processes and equipment.
- Ability to develop and interpret process flow diagrams (PFDs) and piping and instrumentation diagrams (P&IDs).
- Ability to select appropriate process equipment, such as reactors, heat exchangers, distillation columns, and pumps, based on process requirements.
- Ability to use software tools for process simulation and optimization.
- Ability to perform safety and environmental assessments, including process hazards analysis (PHA) and environmental impact assessment (EIA).
- Ability to perform economic analysis of chemical processes, including cost estimation and profitability analysis.
- Ability to communicate technical information through the preparation of technical reports and presentations.
- Ability to apply the knowledge and skills gained in the course to design a complete chemical process from concept to final design 2

Teaching and Learning Strategies

The learner's scientific and research skills are developed through teaching and learning activities of analyzing skills and solving specific problems that address mass transfer operation. Teaching starts from simple and familiar engineering concepts and is then developed further by sets of problems prepared by the instructor and given to small study groups. It is taught in the usual theoretical presentation method using the blackboard and relying on the method (how and why) to motivate the student to learn and know. The theoretical presentation method is also used with a data projector and direct discussions between the instructor and the students to solve practical problems. 3

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Introduction-Flowsheet Presentation	Lecture + Tutorial + Laboratory	Continuous Assessment	5	1
1,2,3,6	The Anatomy of a Chemical Manufacturing -Selection, Modification, and Improvement of Commercially	Lecture + Tutorial + Laboratory	Continuous Assessment	5	2

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Proven Processes-Synthesis of Novel Flowsheets	Lecture + Tutorial + Laboratory	Continuous Assessment	5	3
1,2,3,6	PFD Review-Overall Procedure for Flowsheet Development	Lecture + Tutorial + Laboratory	Continuous Assessment	5	4
1,2,3,6	Utilities -Energy Recovery	Lecture + Tutorial + Laboratory	Continuous Assessment	5	5
1,2,3,6	The P&I Diagram-Process Instrumentation and Control-Conventional Control Schemes	Lecture + Tutorial + Laboratory	Continuous Assessment	5	6
1,2,3,6	Alarms, Safety Trips, and Interlocks-Batch Process Control 4	Lecture + Tutorial + Laboratory	Continuous Assessment	5	7
1,2,3,6	Material Properties-Mechanical Properties-Corrosion Resistance-Selection for Corrosion Resistance- Material Costs.	Lecture + Tutorial + Laboratory	Continuous Assessment	5	8
1,2,3,6	Commonly Used Materials of Construction-Design for Corrosion Resistance	Lecture + Tutorial + Laboratory	Continuous Assessment	5	9
1,2,3,6	Components of Capital Cost-Accuracy and Purpose of Capital Cost Estimates-Order of Magnitude Estimates-Estimating Purchased Equipment Costs	Lecture + Tutorial + Laboratory	Continuous Assessment	5	10
1,2,3,6	Estimating Installed Costs: The Factorial Method-Cost Escalation-Location Factors-Estimating Offsite Capital Costs	Lecture + Tutorial + Laboratory	Continuous Assessment	5	11
1,2,3,6	Costs, Revenues, and Profits-Product and Raw Material Prices	Lecture + Tutorial + Laboratory	Continuous Assessment	5	12
1,2,3,6	Estimating Variable Production Costs-Estimating Fixed Production Costs-Summarizing Revenues and Production Costs	Lecture + Tutorial + Laboratory	Continuous Assessment	5	13
1,2,3,6	Cash Flows during a Project-Project Financing-Taxes and Depreciation-Annualized Cost Methods	Lecture + Tutorial + Laboratory	Project / Report	5	14
1,2,3,6	Plant Location and Site Selection -Site Layout - Plant Layout - Environmental Considerations	Lecture + Tutorial + Laboratory	Continuous Assessment	5	15
1,2,3,6	Preparatory Week Before the Final Exam	Lecture + Tutorial + Laboratory	Final Examination	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Lab 1: Introduction-PFD design using Aspen Hysys
2	Lab 2: Example of PFD design using Aspen Plus
3	Lab 3: Material Balance design using Aspen Hysys
4	Lab 4: Energy Balance design using Aspen Hysys
5	Lab 5: Cost estimation using Aspen Hysys
6	Lab 6: Example 1 for plant design using Aspen Hysys
7	Lab 7: Example 2 for plant design using Aspen Plus

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester

Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Gavin Towler and Ray Sinnott, Chemical Engineering Design.
Recommended Texts	Turton et al., Analysis, Synthesis, and Design of Chemical Processes; Peters, Timmerhaus and West, Plant Design and Economics for Chemical Engineers.
Websites / Electronic Resources	Aspen HYSYS/Aspen Plus documentation, AIChE resources, and recognized process-design educational materials.

52. CHE416 - Engineering Ethics

Course Name	Engineering Ethics
Course Code	CHE416
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	32 / 18 hours
Module Type	Core learning activity
Attendance Forms	Lecture
Course Administrator	Ahmed Abbas Obaid

Course Objectives

in this module the learners will be guided with the necessary attitudes, motivation, and knowledge to apply ethical conduct. Understanding of the world around us need to be engaged, otherwise motivation may be low, and may fail to understand new concepts or internalize Apply and conduct his or her engineering activities ethically, with the principles by professional ethics and responsibilities of the engineering practice • principles of ethics in the practice of the engineering profession (3 hours) • The obligations of the engineer according to the ethics of practicing the engineering profession (3 hours) • Obligations towards employers (3 hours) • Community commitments (3 hours) • Obligations towards the profession (3 hours) • Obligations towards co-workers and counterparts (4 hours) • Engineer Responsibilities (4 hours) • Cases of failure to implement commitments (3 hours)

Course Learning Outcomes

1. Explain the fundamental principles of engineering ethics and professional responsibility.
2. Recognize ethical issues that arise in engineering practice and professional decision making.
3. Apply ethical reasoning to cases involving safety, public welfare, employers, clients, colleagues, and the environment.
4. Explain professional obligations related to competence, honesty, confidentiality, conflicts of interest, and intellectual property.
5. Evaluate the social and environmental consequences of engineering decisions.
6. Demonstrate professional communication and responsible conduct in engineering situations.

Teaching and Learning Strategies

✓ Giving detailed lectures online or in class. ✓ Requesting the preparation of reports and homework on the basic topics of the subjects 2

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,4,5,7	Introduction to Ethical Reasoning and Engineer Ethics	Lecture	Continuous Assessment	2	1
1,4,5,7	Introduction to Ethical Reasoning and Engineer Ethics (Cont.) 3	Lecture	Continuous Assessment	2	2
1,4,5,7	Professional Practice in Engineering	Lecture	Continuous Assessment	2	3
1,4,5,7	Professional Practice in Engineering (Cont.)	Lecture	Continuous Assessment	2	4
1,4,5,7	Ethics as Design - Doing Justice to Moral Problems	Lecture	Continuous Assessment	2	5
1,4,5,7	Ethics as Design - Doing Justice to Moral Problems (Cont.)	Lecture	Continuous Assessment	2	6
1,4,5,7	Central Professional Responsibilities of Engineers	Lecture	Continuous Assessment	2	7
1,4,5,7	Central Professional Responsibilities of Engineers (Cont.)	Lecture	Continuous Assessment	2	8
1,4,5,7	Computers, Software, and Digital Information	Lecture	Continuous Assessment	2	9

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,4,5,7	Computers, Software, and Digital Information (Cont.)	Lecture	Continuous Assessment	2	10
1,4,5,7	Rights and Responsibilities Regarding Intellectual Property	Lecture	Continuous Assessment	2	11
1,4,5,7	Rights and Responsibilities Regarding Intellectual Property (Cont.)	Lecture	Continuous Assessment	2	12
1,4,5,7	Workplace Rights and Responsibilities	Lecture	Continuous Assessment	2	13
1,4,5,7	Workplace Rights and Responsibilities (Cont.)	Lecture	Continuous Assessment	2	14
1,4,5,7	Responsibility for the Environment	Lecture	Continuous Assessment	2	15
1,4,5,7	Preparatory week before the final Exam	Lecture	Final Examination	2	16

Course Evaluation

Assessment Method	Weight	Week / Notes
Continuous Assessment (quizzes, assignments, reports, laboratory/practical work, projects or seminars as applicable)	40%	Throughout the semester
Midterm Examination	10%	Middle of semester
Final Examination	50%	Week 16

Learning and Teaching Resources

Resource	Details
Required Texts	Caroline Whitbeck, Ethics in Engineering Practice and Research.
Recommended Texts	Mike W. Martin and Roland Schinzinger, Ethics in Engineering.
Websites / Electronic Resources	Professional engineering codes of ethics, university e-learning materials, and recognized engineering-ethics resources.

53. CHE417 - Industrial Management

Course Name	Industrial Management
Course Code	CHE417
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	47 / 28 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Department Teaching Assignment

Course Objectives

Industrial Management introduces management principles needed by chemical engineers working in process industries. It covers organizational structures, production planning, project management, maintenance, quality, inventory and supply chains, human resources, safety culture, economic decision making, and continuous improvement.

Course Learning Outcomes

- Explain the functions of planning, organizing, leading, and controlling in industrial organizations.
- Apply basic production planning, capacity, inventory, and scheduling concepts.
- Use project-management tools including work breakdown, Gantt charts, CPM/PERT, and risk registers.
- Interpret basic quality-management, maintenance, and reliability indicators.
- Evaluate engineering-management decisions considering cost, safety, people, environment, and productivity.
- Work in teams to analyze an industrial-management case and communicate recommendations professionally.

Teaching and Learning Strategies

The course uses lectures, case studies from process industries, management exercises, team projects, and short presentations. Spreadsheet tools and simple project-management methods are used to connect organizational and operational decisions with engineering performance, safety, quality, cost, and sustainability.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Role of industrial management in chemical/process industries	Lecture + Tutorial / Case Study	Continuous Assessment	3	1
1,2,3,6	Organizational structures and functions of management	Lecture + Tutorial / Case Study	Continuous Assessment	3	2
1,2,3,6	Leadership, communication and decision making	Lecture + Tutorial / Case Study	Continuous Assessment	3	3

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Production systems, capacity and productivity	Lecture + Tutorial / Case Study	Continuous Assessment	3	4
1,2,3,6	Forecasting and production planning	Lecture + Tutorial / Case Study	Continuous Assessment	3	5
1,2,3,6	Inventory management and supply-chain fundamentals	Lecture + Tutorial / Case Study	Continuous Assessment	3	6
1-4	Midterm examination and case review	Lecture + Tutorial / Case Study	Midterm / Test	2	7
1,2,3,6	Scheduling, Gantt charts and resource allocation	Lecture + Tutorial / Case Study	Continuous Assessment	3	8
1,2,3,6	Project management, WBS, CPM and PERT	Lecture + Tutorial / Case Study	Continuous Assessment	3	9
1,2,3,6	Cost control, budgeting and engineering decision making	Lecture + Tutorial / Case Study	Continuous Assessment	3	10
1,2,3,6	Quality management, SPC and continuous improvement	Lecture + Tutorial / Case Study	Continuous Assessment	3	11
1,2,3,6	Maintenance management, reliability and asset performance	Lecture + Tutorial / Case Study	Continuous Assessment	3	12
1,2,3,6	Human factors, motivation and industrial relations	Lecture + Tutorial / Case Study	Continuous Assessment	3	13
1,2,3,6	Safety management systems and organizational safety culture	Lecture + Tutorial / Case Study	Continuous Assessment	3	14
1,2,3,6	Integrated industrial-management	Lecture + Tutorial / Case Study	Continuous Assessment	3	15

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	case study and presentations				
All	Comprehensive review / final examination preparation	Lecture + Tutorial / Case Study	Final Examination / Review	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Case Study / Project	10%	6, 13
Report / Presentation	10%	14
Midterm Exam	10%	7
Final Exam	50%	16
Laboratory	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Heizer, J.; Render, B.; Munson, C. Operations Management: Sustainability and Supply Chain Management.
Recommended Texts	Nicholas, J. M. and Steyn, H. Project Management for Engineering, Business and Technology.
Websites / Electronic Resources	PMI educational resources; ISO quality-management overview materials

54. CHE418 - Sustainable Engineering

Course Name	Sustainable Engineering
Course Code	CHE418
Year / Semester	Fourth Year / Semester 7
Language	English
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	32 / 18 hours
Module Type	Core learning activity
Attendance Forms	Lecture
Course Administrator	Department Teaching Assignment

Course Objectives

Sustainable Engineering introduces environmental, economic, and social dimensions of sustainable chemical-process design. Students learn life-cycle thinking, material and energy efficiency, green engineering, cleaner production, carbon and water footprints, circular-economy concepts, and multi-criteria evaluation of engineering alternatives.

Course Learning Outcomes

- Explain sustainability concepts, systems boundaries, and triple-bottom-line considerations in engineering.

- Apply material/energy efficiency and waste-prevention principles to chemical-process alternatives.
- Use basic life-cycle assessment and footprint concepts to compare engineering options.
- Identify opportunities for cleaner production, circularity, renewable energy, and industrial symbiosis.
- Evaluate process alternatives using environmental, economic, safety, and social indicators.
- Communicate a sustainability assessment and recommend practical improvements for a chemical-engineering case.

Teaching and Learning Strategies

Interactive lectures are combined with life-cycle and footprint calculations, short case studies, group discussions, and a mini-project. Students compare alternative process or product options using transparent assumptions and quantitative/qualitative sustainability indicators.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Introduction to sustainability and sustainable development goals	Interactive Lecture + Case Study	Continuous Assessment	2	1
1,2,3,6	Systems thinking, boundaries and sustainability indicators	Interactive Lecture + Case Study	Continuous Assessment	2	2
1,2,3,6	Material efficiency, atom economy and waste prevention	Interactive Lecture + Case Study	Continuous Assessment	2	3
1,2,3,6	Energy efficiency and process integration concepts	Interactive Lecture + Case Study	Continuous Assessment	2	4
1,2,3,6	Green engineering and inherently safer design	Interactive Lecture + Case Study	Continuous Assessment	2	5
1,2,3,6	Life-cycle thinking and life-cycle assessment framework	Interactive Lecture + Case Study	Continuous Assessment	2	6
1-4	Midterm examination / case review	Interactive Lecture + Case Study	Midterm / Test	2	7

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Life-cycle inventory and impact categories: introductory calculations	Interactive Lecture + Case Study	Continuous Assessment	2	8
1,2,3,6	Carbon footprint and greenhouse-gas accounting concepts	Interactive Lecture + Case Study	Continuous Assessment	2	9
1,2,3,6	Water footprint and water stewardship	Interactive Lecture + Case Study	Continuous Assessment	2	10
1,2,3,6	Renewable energy and decarbonization in process industries	Interactive Lecture + Case Study	Continuous Assessment	2	11
1,2,3,6	Circular economy, recycling and resource recovery	Interactive Lecture + Case Study	Continuous Assessment	2	12
1,2,3,6	Sustainable materials and product/process design	Interactive Lecture + Case Study	Continuous Assessment	2	13
1,2,3,6	Industrial symbiosis and cleaner-production case studies	Interactive Lecture + Case Study	Continuous Assessment	2	14
1,2,3,6	Student sustainability project presentations	Interactive Lecture + Case Study	Continuous Assessment	2	15
All	Comprehensive review / final examination preparation	Interactive Lecture + Case Study	Final Examination / Review	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Case Study / Project	10%	6, 13

Assessment Method	Weight	Week Due (if stated)
Report / Presentation	10%	14
Midterm Exam	10%	7
Final Exam	50%	16
Laboratory	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Allen, D. T. and Shonnard, D. R. Sustainable Engineering: Concepts, Design and Case Studies.
Recommended Texts	Allen, D. T. and Shonnard, D. R. Green Engineering: Environmentally Conscious Design of Chemical Processes.
Websites / Electronic Resources	UN Sustainable Development Goals resources; EPA life-cycle and green-engineering resources

55. CHE421 - Engineering Project II

Course Name	Engineering Project II
Course Code	CHE421
Year / Semester	Fourth Year / Semester 8
Language	English
Total Study Hours / ECTS	75 Hours / 3 ECTS
Structured / Unstructured SWL	62 / 13 hours
Module Type	Core learning activity
Attendance Forms	Tutorial + Laboratory + Seminar
Course Administrator	Department Teaching Assignment

Course Objectives

Engineering Project II is the capstone stage in which students integrate process synthesis, material and energy balances, equipment design, control and safety, economics, environmental considerations, and professional communication into a complete chemical-engineering project. The course culminates in a written report, engineering drawings/simulation files, and oral defense.

Course Learning Outcomes

- Integrate chemical-engineering knowledge to define and complete an open-ended design/project problem.
- Develop process flow diagrams, material and energy balances, and justified process specifications.
- Perform detailed design/sizing of selected process equipment using appropriate standards and software.
- Evaluate process safety, environmental impacts, controllability, and sustainability considerations.
- Prepare an economic evaluation and compare feasible design alternatives.
- Produce a professional technical report and defend engineering decisions orally.
- Work effectively in a project team, manage tasks and deadlines, and demonstrate professional and ethical responsibility.

Teaching and Learning Strategies

Project-based learning is used under faculty supervision. Teams hold scheduled design reviews, maintain project records, use process simulation and engineering design tools, consult standards and literature, and receive iterative feedback on technical calculations, drawings, safety, economics, sustainability, report writing, and presentation.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Project re-scoping, objectives, deliverables and responsibility matrix	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	1
1,2,3,6	Process basis, design criteria and updated literature review	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	2
1,2,3,6	Final process flow diagram and stream specifications	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	3
1,2,3,6	Material balance verification and simulation convergence	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	4
1,2,3,6	Energy balance and utility system definition	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	5
1,2,3,6	Detailed design of major equipment I	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	6
1-4	Midterm design review / oral progress presentation	Tutorial + Laboratory + Seminar / Project Supervision	Midterm / Test	2	7
1,2,3,6	Detailed design of major equipment II	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	8
1,2,3,6	Mechanical/material-selection considerations and equipment specifications	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	9

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	P&ID development, instrumentation and control philosophy	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	10
1,2,3,6	Process safety review: hazards, relief/containment and safeguards	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	11
1,2,3,6	Environmental assessment, emissions/effluents and waste management	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	12
1,2,3,6	Capital/operating cost estimation and economic evaluation	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	13
1,2,3,6	Sustainability review, optimization and design reconciliation	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	14
1,2,3,6	Final report, drawings, appendices and quality check	Tutorial + Laboratory + Seminar / Project Supervision	Continuous Assessment	4	15
All	Final presentation / viva and submission of complete project	Tutorial + Laboratory + Seminar / Project Supervision	Final Examination / Review	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Project simulation and stream-table verification
2	Equipment-sizing calculations and design spreadsheets
3	Process-flow-diagram / P&ID development
4	Safety and relief-system calculations / HAZOP-style review
5	Economic evaluation spreadsheet / cost estimation
6	Integrated process simulation and optimization

Week	Laboratory / Practical Content
7	Final drawings, model files and technical-report compilation

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Supervisor Progress Reviews	15%	Continuous
Design Calculations and Technical Quality	20%	6, 10, 14
Simulation / Drawings / Project Artifacts	15%	Continuous
Safety, Environmental and Economic Evaluation	15%	11-14
Final Written Report	20%	15
Oral Presentation and Viva	15%	16
Written Midterm	0%	N/A
Written Final	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Towler, G. and Sinnott, R. Chemical Engineering Design.
Recommended Texts	Peters, M. S.; Timmerhaus, K. D.; West, R. E. Plant Design and Economics for Chemical Engineers; applicable codes and standards.
Websites / Electronic Resources	AspenTech / process-simulation documentation; relevant API, ASME, and AIChE/CCPS references as applicable

56. CHE422 - Unit Operation II

Course Name	Unit Operation II
Course Code	CHE422
Year / Semester	Fourth Year / Semester 8
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	62 / 63 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Department Teaching Assignment

Course Objectives

Unit Operation II develops advanced analysis and design skills for mechanical and separation unit operations used in chemical processing. The course emphasizes particle technology, size reduction and classification, filtration and sedimentation, fluidization, mixing, membrane and adsorption operations, and integration of unit operations into process design.

Course Learning Outcomes

- Analyze particle-size distributions and select suitable solid-handling and size-reduction operations.
- Design or evaluate filtration, sedimentation, centrifugation, and solid-fluid separation equipment.
- Analyze packed and fluidized beds using pressure-drop and fluidization correlations.

- Evaluate mixing/agitation power requirements and mixing performance.
- Apply fundamental design concepts to membrane, adsorption, and selected advanced separation operations.
- Select and integrate appropriate unit operations for an industrial separation/processing problem.

Teaching and Learning Strategies

Lectures and tutorials emphasize equipment selection and design calculations. Industrial examples and case studies are used to compare alternative unit operations, and students perform design exercises with property data, correlations, and spreadsheet/computational tools.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Particle properties, size distributions and characterization	Lecture + Tutorial	Continuous Assessment	4	1
1,2,3,6	Size reduction: crushing, grinding and energy requirements	Lecture + Tutorial	Continuous Assessment	4	2
1,2,3,6	Screening, classification and cyclones	Lecture + Tutorial	Continuous Assessment	4	3
1,2,3,6	Sedimentation and thickening	Lecture + Tutorial	Continuous Assessment	4	4
1,2,3,6	Filtration theory and filter design	Lecture + Tutorial	Continuous Assessment	4	5
1,2,3,6	Centrifugation and centrifugal separations	Lecture + Tutorial	Continuous Assessment	4	6
1-4	Midterm examination and design review	Lecture + Tutorial	Midterm / Test	2	7
1,2,3,6	Flow through packed beds and pressure-drop correlations	Lecture + Tutorial	Continuous Assessment	4	8
1,2,3,6	Fluidization regimes and minimum fluidization velocity	Lecture + Tutorial	Continuous Assessment	4	9

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Fluidized-bed design and industrial applications	Lecture + Tutorial	Continuous Assessment	4	10
1,2,3,6	Mixing and agitation: power, impellers and scale-up	Lecture + Tutorial	Continuous Assessment	4	11
1,2,3,6	Solid-liquid mixing and suspension	Lecture + Tutorial	Continuous Assessment	4	12
1,2,3,6	Membrane separations: fundamentals and module concepts	Lecture + Tutorial	Continuous Assessment	4	13
1,2,3,6	Adsorption and ion-exchange operations: design fundamentals	Lecture + Tutorial	Continuous Assessment	4	14
1,2,3,6	Integrated unit-operation selection and industrial case study	Lecture + Tutorial	Continuous Assessment	4	15
All	Comprehensive review / final examination preparation	Lecture + Tutorial	Final Examination / Review	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Case Study / Project	10%	6, 13
Report / Presentation	10%	14
Midterm Exam	10%	7
Final Exam	50%	16
Laboratory	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	McCabe, W. L.; Smith, J. C.; Harriott, P. Unit Operations of Chemical Engineering.

Resource	Details
Recommended Texts	Wankat, P. C. Separation Process Engineering; Coulson & Richardson's Chemical Engineering, Vol. 2.
Websites / Electronic Resources	LearnChemE unit-operations resources

57. CHE423 - Petroleum Refining II

Course Name	Petroleum Refining II
Course Code	CHE423
Year / Semester	Fourth Year / Semester 8
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	77 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Department Teaching Assignment

Course Objectives

Petroleum Refining II extends refinery knowledge to conversion, upgrading, treatment, hydrogen and sulfur-management processes, product blending, and refinery integration. Students analyze the purpose, operating variables, catalysts, yields, product quality, safety, and environmental aspects of modern refinery units.

Course Learning Outcomes

- Explain the objectives and flowsheets of major conversion and treating processes in a petroleum refinery.
- Perform simplified material/yield calculations for cracking, reforming, hydrotreating, and related units.
- Relate feed properties, catalysts, operating conditions, and process severity to product yields and quality.
- Evaluate hydrogen, sulfur, energy, safety, and environmental interactions among refinery units.
- Use process simulation or engineering calculations to analyze selected refinery operations.
- Integrate refinery units into a simplified overall refinery configuration and justify process choices.

Teaching and Learning Strategies

Lectures, tutorials, laboratory/computer exercises, refinery flowsheet analysis, and industrial case studies are used. Students interpret product specifications, carry out simplified yield and energy calculations, and use simulation spreadsheets/software for selected refining operations.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Review of refinery configuration, crude assay and fractionation products	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	1
1,2,3,6	Catalytic cracking	Lecture + Tutorial +	Continuous Assessment	5	2

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	fundamentals and FCC process flow	Laboratory / Simulation			
1,2,3,6	Hydrocracking and conversion severity	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	3
1,2,3,6	Catalytic reforming and gasoline octane improvement	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	4
1,2,3,6	Isomerization and alkylation	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	5
1,2,3,6	Hydrotreating of naphtha, kerosene and gas oil	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	6
1-4	Midterm examination and flowsheet review	Lecture + Tutorial + Laboratory / Simulation	Midterm / Test	2	7
1,2,3,6	Hydrogen production and refinery hydrogen networks	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	8
1,2,3,6	Sulfur recovery: Claus process and tail-gas treatment	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	9
1,2,3,6	Delayed coking and residue upgrading	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	10
1,2,3,6	Lube-oil and wax processing overview	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	11
1,2,3,6	Product blending, specifications and quality control	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	12
1,2,3,6	Refinery utilities, energy	Lecture + Tutorial +	Continuous Assessment	5	13

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	integration and fuel-gas systems	Laboratory / Simulation			
1,2,3,6	Refinery safety, emissions and wastewater / sour-water systems	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	14
1,2,3,6	Integrated refinery case study and simulation exercise	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	15
All	Comprehensive review / final examination preparation	Lecture + Tutorial + Laboratory / Simulation	Final Examination / Review	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Crude assay / distillation-data interpretation
2	FCC yield and product-distribution calculation
3	Catalytic-reforming simulation / octane sensitivity
4	Hydrotreating material-balance exercise
5	Hydrogen-network balance and optimization exercise
6	Sulfur-recovery process calculation / simulation
7	Integrated refinery flowsheet simulation and product blending

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Laboratory / Project	10%	Continuous
Laboratory Report	10%	6, 13
Midterm Exam	10%	7
Final Exam	50%	16
Seminar / Presentation	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Gary, J. H.; Handwerk, G. E.; Kaiser, M. J. Petroleum Refining: Technology and Economics.

Resource	Details
Recommended Texts	Speight, J. G. The Chemistry and Technology of Petroleum; Meyers, R. A. Handbook of Petroleum Refining Processes.
Websites / Electronic Resources	Relevant refinery process-simulation resources and industry technical references

58. CHE424 - Process Control II

Course Name	Process Control II
Course Code	CHE424
Year / Semester	Fourth Year / Semester 8
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	77 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Department Teaching Assignment

Course Objectives

Process Control II develops advanced regulatory and supervisory control concepts for chemical processes. It builds on dynamic modeling and basic feedback control to cover controller tuning, cascade, feedforward, ratio, override and selective control, multivariable interactions, digital implementation, and plantwide control concepts.

Course Learning Outcomes

- Tune PID controllers using appropriate response-based and model-based methods.
- Analyze closed-loop stability, performance, disturbance rejection, and robustness.
- Design cascade, feedforward, ratio, override, and selective control configurations.
- Assess multivariable process interactions and apply pairing concepts.
- Implement and test control strategies using MATLAB/Simulink, process simulators, or equivalent software.
- Develop a basic plantwide control strategy that considers safety, economics, and operating constraints.

Teaching and Learning Strategies

Lectures and tutorials are paired with laboratory/computer exercises in dynamic simulation and controller tuning. Students analyze process response data, compare control configurations, and implement feedback, cascade, feedforward, and multivariable strategies in simulation-based case studies.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Review of feedback control, PID algorithms and closed-loop response	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	1
1,2,3,6	Controller tuning criteria	Lecture + Tutorial +	Continuous Assessment	5	2

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	and performance indices	Laboratory / Simulation			
1,2,3,6	Ziegler-Nichols, Cohen-Coon and model-based tuning	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	3
1,2,3,6	Stability analysis and robustness concepts	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	4
1,2,3,6	Cascade control design and implementation	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	5
1,2,3,6	Feedforward control and feedforward-feedback combination	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	6
1-4	Midterm examination and simulation review	Lecture + Tutorial + Laboratory / Simulation	Midterm / Test	2	7
1,2,3,6	Ratio control and blending applications	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	8
1,2,3,6	Override, split-range and selective control	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	9
1,2,3,6	Interaction in multivariable processes	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	10
1,2,3,6	Relative Gain Array and variable pairing	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	11
1,2,3,6	Decoupling and multivariable control concepts	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	12
1,2,3,6	Digital control implementation,	Lecture + Tutorial +	Continuous Assessment	5	13

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	sampling and discrete PID	Laboratory / Simulation			
1,2,3,6	Constraints, alarms, safety interlocks and control-system architecture	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	14
1,2,3,6	Plantwide control structure and integrated case study	Lecture + Tutorial + Laboratory / Simulation	Continuous Assessment	5	15
All	Comprehensive review / final examination preparation	Lecture + Tutorial + Laboratory / Simulation	Final Examination / Review	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	PID tuning using MATLAB/Simulink or equivalent
2	Closed-loop response and robustness comparison
3	Cascade-control simulation
4	Feedforward / ratio-control simulation
5	Override / split-range control exercise
6	Multivariable interaction and RGA analysis
7	Integrated plantwide-control simulation case

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Laboratory / Project	10%	Continuous
Laboratory Report	10%	6, 13
Midterm Exam	10%	7
Final Exam	50%	16
Seminar / Presentation	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Seborg, D. E.; Edgar, T. F.; Mellichamp, D. A.; Doyle, F. J. Process Dynamics and Control, 4th ed.
Recommended Texts	Stephanopoulos, G. Chemical Process Control: An Introduction to Theory and Practice.
Websites / Electronic Resources	MATLAB/Simulink and process-simulator dynamics documentation; LearnChemE process-control resources

59. CHE425 - Equipment Design and Computer Simulation

Course Name	Equipment Design and Computer Simulation
Course Code	CHE425
Year / Semester	Fourth Year / Semester 8
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	77 / 48 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial + Laboratory
Course Administrator	Department Teaching Assignment

Course Objectives

Equipment Design and Computer Simulation develops detailed design and rating skills for major chemical-process equipment. Students combine process calculations, mechanical constraints, materials selection, safety, standards, and computer-aided tools to design heat exchangers, separators, columns, vessels, pumps/compressors, and related equipment within an integrated process context.

Course Learning Outcomes

- Translate process specifications into equipment design bases and datasheet requirements.
- Perform process and preliminary mechanical design calculations for major chemical-process equipment.
- Select suitable materials, design margins, and operating conditions considering corrosion and safety.
- Use computer simulation/design tools to rate and size selected equipment.
- Interpret relevant engineering codes, standards, and vendor-style data sheets at an introductory level.
- Compare design alternatives using technical, economic, operability, safety, and sustainability criteria.

Teaching and Learning Strategies

Design lectures are integrated with tutorials and computer laboratories. Students work from process specifications to equipment datasheets and perform rating/sizing calculations using spreadsheets and process/equipment simulation software. Case studies emphasize design assumptions, code awareness, safety margins, and design review.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Equipment-design workflow, design basis, margins and datasheets	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	1
1,2,3,6	Pressure vessels: process requirements and preliminary sizing	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	2
1,2,3,6	Materials selection, corrosion allowance and design temperature/pressure	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	3

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Shell-and-tube heat-exchanger rating and sizing	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	4
1,2,3,6	Heat-exchanger pressure drop, fouling and design trade-offs	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	5
1,2,3,6	Distillation/absorption column diameter, trays and hydraulics	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	6
1-4	Midterm design review / examination	Lecture + Tutorial + Laboratory / Computer-Aided Design	Midterm / Test	2	7
1,2,3,6	Packed-column sizing and pressure-drop checks	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	8
1,2,3,6	Separators, drums and knockout vessels	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	9
1,2,3,6	Pumps: system curves, NPSH and equipment selection	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	10
1,2,3,6	Compressors and gas-handling equipment: preliminary design	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	11
1,2,3,6	Storage tanks and basic ancillary equipment	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	12
1,2,3,6	Relief and flare-system design	Lecture + Tutorial + Laboratory /	Continuous Assessment	5	13

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	concepts / safety margins	Computer-Aided Design			
1,2,3,6	Computer-aided equipment simulation and sensitivity analysis	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	14
1,2,3,6	Integrated equipment design package and datasheet review	Lecture + Tutorial + Laboratory / Computer-Aided Design	Continuous Assessment	5	15
All	Comprehensive review / final examination preparation	Lecture + Tutorial + Laboratory / Computer-Aided Design	Final Examination / Review	2	16

Laboratory / Practical Weekly Plan

Week	Laboratory / Practical Content
1	Process simulator equipment-rating setup and design basis
2	Heat-exchanger sizing / rating using Aspen EDR or equivalent
3	Column hydraulics and diameter calculation
4	Separator / flash-drum sizing exercise
5	Pump and piping-system selection spreadsheet / simulator
6	Relief-load screening and equipment datasheet preparation
7	Integrated equipment-design case with simulation and design report

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Laboratory / Project	10%	Continuous
Laboratory Report	10%	6, 13
Midterm Exam	10%	7
Final Exam	50%	16
Seminar / Presentation	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Towler, G. and Sinnott, R. Chemical Engineering Design.
Recommended Texts	Peters, M. S.; Timmerhaus, K. D.; West, R. E. Plant Design and Economics for Chemical Engineers; appropriate ASME/API design references.
Websites / Electronic Resources	AspenTech equipment-design documentation and manufacturer technical data

60. QU41 - English Language 4

Course Name	English Language 4
Course Code	QU41
Year / Semester	Fourth Year / Semester 8
Language	English
Total Study Hours / ECTS	50 Hours / 2 ECTS
Structured / Unstructured SWL	32 / 18 hours
Module Type	Basic learning activity
Attendance Forms	Lecture
Course Administrator	Department Teaching Assignment

Course Objectives

English Language 4 prepares final-year engineering students for advanced academic and professional communication. It focuses on technical reports, graduation-project writing, abstracts, presentations, meetings, interviews, professional correspondence, and communicating engineering decisions to technical and non-technical audiences.

Course Learning Outcomes

- Read and synthesize information from technical articles, standards, and engineering reports.
- Write clear abstracts, introductions, methods, results, conclusions, and executive summaries.
- Prepare professional emails, CV content, cover letters, and concise engineering correspondence.
- Present technical information using effective slides, figures, and spoken explanations.
- Participate in meetings, discussions, interviews, and project defenses using appropriate professional language.
- Edit technical writing for clarity, coherence, grammar, terminology, and audience needs.

Teaching and Learning Strategies

The course is workshop-oriented and uses authentic or adapted engineering texts, writing tasks, peer review, oral presentations, mock meetings/interviews, and graduation-project communication activities. Students develop a portfolio containing technical writing and presentation artifacts.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Advanced technical-reading strategies and	Interactive Workshop + Language Tasks	Continuous Assessment	2	1

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	source synthesis				
1,2,3,6	Academic integrity, paraphrasing and citation language	Interactive Workshop + Language Tasks	Continuous Assessment	2	2
1,2,3,6	Technical-report structure and document organization	Interactive Workshop + Language Tasks	Continuous Assessment	2	3
1,2,3,6	Writing abstracts and executive summaries	Interactive Workshop + Language Tasks	Continuous Assessment	2	4
1,2,3,6	Writing methods / procedures and passive technical style	Interactive Workshop + Language Tasks	Continuous Assessment	2	5
1,2,3,6	Presenting results, graphs, tables and uncertainty	Interactive Workshop + Language Tasks	Continuous Assessment	2	6
1-4	Midterm examination / writing review	Interactive Workshop + Language Tasks	Midterm / Test	2	7
1,2,3,6	Writing discussion and conclusion sections	Interactive Workshop + Language Tasks	Continuous Assessment	2	8
1,2,3,6	Technical editing for clarity, cohesion and concision	Interactive Workshop + Language Tasks	Continuous Assessment	2	9
1,2,3,6	Professional email, memo and meeting language	Interactive Workshop + Language Tasks	Continuous Assessment	2	10
1,2,3,6	CV, cover letter and job-application communication	Interactive Workshop + Language Tasks	Continuous Assessment	2	11
1,2,3,6	Engineering meetings, negotiation and	Interactive Workshop +	Continuous Assessment	2	12

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	teamwork language	Language Tasks			
1,2,3,6	Presentation design and technical storytelling	Interactive Workshop + Language Tasks	Continuous Assessment	2	13
1,2,3,6	Mock technical presentation / project defense	Interactive Workshop + Language Tasks	Continuous Assessment	2	14
1,2,3,6	Peer review, portfolio completion and interview practice	Interactive Workshop + Language Tasks	Continuous Assessment	2	15
All	Comprehensive review / final examination preparation	Interactive Workshop + Language Tasks	Final Examination / Review	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments / Technical Writing	10%	5, 12
Oral Presentation	10%	8, 14
Class Participation / Communication Tasks	10%	Continuous
Midterm Exam	10%	8
Final Exam	50%	16
Portfolio / Self-learning	0%	Continuous
Laboratory	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Ibbotson, M. Cambridge English for Engineering. Cambridge University Press.
Recommended Texts	Bailey, S. Academic Writing: A Handbook for International Students; College-approved advanced English materials.
Websites / Electronic Resources	British Council LearnEnglish; Purdue OWL-style academic-writing resources and engineering glossaries

61. CHE426 - Polymers Technology

Course Name	Polymers Technology
Course Code	CHE426

Year / Semester	Fourth Year / Semester 8
Language	English
Total Study Hours / ECTS	125 Hours / 5 ECTS
Structured / Unstructured SWL	62 / 63 hours
Module Type	Core learning activity
Attendance Forms	Lecture + Tutorial
Course Administrator	Department Teaching Assignment

Course Objectives

Polymers Technology provides chemical-engineering students with an integrated understanding of polymer chemistry, structure-property relationships, polymerization processes, rheology, processing operations, characterization, additives, composites, degradation, recycling, and industrial polymer production.

Course Learning Outcomes

- Classify polymers and relate molecular structure, molecular weight, crystallinity, and glass transition to properties.
- Explain step-growth and chain-growth polymerization mechanisms and industrial reactor considerations.
- Perform basic polymer molecular-weight and conversion calculations.
- Describe polymer rheology and select suitable processing methods such as extrusion, injection molding, and film formation.
- Interpret common polymer characterization data and assess the effects of additives and reinforcement.
- Evaluate polymer selection, degradation, recycling, safety, and sustainability considerations in industrial applications.

Teaching and Learning Strategies

Lectures and tutorials are linked to industrial polymer examples and design calculations. Students analyze polymerization routes, processing conditions, rheological behavior, and material-selection cases. Short literature assignments or mini-projects address modern polymer applications, recycling, and sustainability.

Course Structure

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
1,2,3,6	Introduction, classification and industrial importance of polymers	Lecture + Tutorial	Continuous Assessment	4	1
1,2,3,6	Polymer molecular structure, molecular weight and distributions	Lecture + Tutorial	Continuous Assessment	4	2
1,2,3,6	Step-growth polymerization and kinetics	Lecture + Tutorial	Continuous Assessment	4	3
1,2,3,6	Chain-growth/free-radical	Lecture + Tutorial	Continuous Assessment	4	4

Required Learning Outcomes	Unit / Subject Name	Learning Method	Evaluation Method	Hours	Week
	polymerization and kinetics				
1,2,3,6	Copolymerization and polymer architecture	Lecture + Tutorial	Continuous Assessment	4	5
1,2,3,6	Polymerization reactors and heat-removal considerations	Lecture + Tutorial	Continuous Assessment	4	6
1-4	Midterm examination and problem review	Lecture + Tutorial	Midterm / Test	2	7
1,2,3,6	Thermal transitions, crystallinity and structure-property relationships	Lecture + Tutorial	Continuous Assessment	4	8
1,2,3,6	Polymer rheology and viscoelasticity	Lecture + Tutorial	Continuous Assessment	4	9
1,2,3,6	Extrusion and compounding	Lecture + Tutorial	Continuous Assessment	4	10
1,2,3,6	Injection molding, compression molding and thermoforming	Lecture + Tutorial	Continuous Assessment	4	11
1,2,3,6	Film, fiber and coating processes	Lecture + Tutorial	Continuous Assessment	4	12
1,2,3,6	Polymer characterization: DSC, TGA, GPC and mechanical testing	Lecture + Tutorial	Continuous Assessment	4	13
1,2,3,6	Additives, blends, composites and nanocomposites	Lecture + Tutorial	Continuous Assessment	4	14
1,2,3,6	Degradation, recycling, circularity and sustainable polymers	Lecture + Tutorial	Continuous Assessment	4	15
All	Integrated industrial case study / final examination preparation	Lecture + Tutorial	Final Examination / Review	2	16

Course Evaluation

Assessment Method	Weight	Week Due (if stated)
Quizzes	10%	4, 10
Assignments	10%	3, 12
Case Study / Project	10%	6, 13
Report / Presentation	10%	14
Midterm Exam	10%	7
Final Exam	50%	16
Laboratory	0%	N/A
Other	0%	N/A

Learning and Teaching Resources

Resource	Details
Required Texts	Fried, J. R. Polymer Science and Technology, 3rd ed.
Recommended Texts	Young, R. J. and Lovell, P. A. Introduction to Polymers; Odian, G. Principles of Polymerization.
Websites / Electronic Resources	Polymer processing / characterization resources from professional societies and manufacturer technical literature