Ministry of Higher Education and Scientific Research
Academic Supervision and Evaluation Authority Quality Assurance and Academic

Accreditation Department Accreditation Department

Academic program description

2026-2025

Introduction:

The educational program is a coordinated and organized package of courses that include procedures and experiences organized into curricular modules. The primary purpose is to build and refine graduates' skills, making them qualified to meet the demands of the labor market. The program is reviewed and evaluated annually through internal or external audit procedures and programs, such as the External Examiner Program. The academic program description provides a concise overview of the program's key features and courses, outlining the skills students are expected to develop in alignment with the program's objectives. The program description is crucial because it serves as the cornerstone of program accreditation. It is co-written by faculty members under the supervision of academic committees in the academic departments.

This second edition of the guide includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the latest developments in the Iraqi educational system. This includes a description of the academic program in its traditional form (annual, semester), as well as adopting the academic program description circulated pursuant to the Department of Studies Circular No. 3/2906 dated May 3, 2023, regarding programs that adopt the Bologna Process as the basis for their work. In this regard, we cannot but emphasize the importance of writing descriptions of academic programs and courses to ensure the smooth running of the educational process.

Concepts and terms:

Academic Program Description:
The academic program description provides a concise summary of the program's vision, mission, and objectives, including a detailed description of the targeted learning outcomes based on specific learning strategies.

Course Description: Provides a concise summary of the course's key features and the learning outcomes expected of the student, demonstrating whether the student has made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious vision for the future of the academic program to be an advanced, inspiring, motivating, realistic, and applicable program.

Program mission: It briefly explains the objectives and activities required to achieve them, and also identifies the program's development paths and directions.

Program objectives: These are statements that describe what the academic program intends to achieve within a specific time and are measurable and observable.

Curriculum structure: All courses/subjects included in the academic program according to the approved learning system (semester, annual, Bologna track), whether required by (ministry, university, college, or scientific department), along with the number of academic units.

Learning outcomes: A consistent set of knowledge, skills, and values acquired by a student after successfully completing the academic program. Learning outcomes for each course must be defined in a manner that achieves the program's objectives.

Teaching and learning strategies: These are the strategies used by faculty members to develop student teaching and learning. They are plans followed to achieve learning objectives, describing all classroom and extracurricular activities to achieve the program's learning outcomes.

Academic Program Description Form

University Name: Al-Turath University

College/Institute: College of Engineering

Department: Department of Oil and Gas Refining Engineering

Academic or Professional Program Title: Bachelor's Final Degree

Title: Bachelor's in Oil and Gas Refining Engineering

Academic System: Semester Description

Preparation Date: October 2025

File Completion Date: October 2025

Signature:

Name of Academic Assistant: Prof. Dr. Jamal Mani Ali

Date: October 2025

Signature:

Name of Department Head: Prof. Dr. M.F. Abid

Date: October 2025

Name of the Director of the Quality Assurance and College Performance Division:
Assist. Lecturer Farah Ghazi Fahad

Date: 10/4/2026

Signature

Dean's approval

Prof. Dr. Mohammad Fadhil Abid

1. Program Vision:

The department strives to achieve academic excellence by enriching its students with scientific and applied capabilities and expertise, drawing on the unique nature of Al-Turath University. The department's vision is evident through its scientific specialization, which aims to adopt the principles of high performance and quality in this field to achieve innovation and development in oil and gas refining engineering sciences.

2. Program mission

Preparing engineering cadres in the field of oil and gas refining engineering to serve the country's oil industry, conducting applied research and studies in the fields of oil and gas refining engineering, and solving industrial problems that arise in oil refineries and gas processing plants.

3. Program objectives:

1- Preparing engineers with the basic scientific and engineering expertise and knowledge in the field of oil and gas refining engineering and its technological developments.

2- Preparing graduates capable of operating and managing laboratories and factories related to oil and gas refining engineering by focusing on the practical and applied aspects of their studies.

3- Providing graduates with the ability to design laboratories and factories related to the petroleum and petrochemical industries.

4- Enriching the educational process with sound applied scientific research, emphasizing its role in serving society and solving operational problems in the field.

4. Program accreditation

Is the program accredited? By which authority? We do not currently have an accredited accreditation program.

5. Other external influences

Is there a sponsor for the program? Yes. The University of Technology/Chemical Engineering College

Curriculum structure .6				
*Notes	percentage	Credit hours	Number of courses	Curriculum structure
	4.6%	6	3	Institutional requirements
	23%	30	13	College requirements
	72.3%	94	40	Department requirements
	N.A.	N.A.	2 months	Summer training
				Others

Notes may include whether the course is core or optional. *

Academic Program Description .4			.3	.2	.1
Credit hours			Course name	Course code	Year\ Level
Credits	Lab	Course lecture			
2	0	2	Technical English I	CES.R.111	First Year\ 2025
2	0	3	Mathematics I	CES.R.121	
3	2	2	Chemistry	CES.R.123	
2		3	Physics	CES.R.125	
2	2	1	Engineering Drawing	CES.R.126	
2	2	1	Computer Science	CES.R.113	
----	6	-----	Workshop I	CES.R.114	
2	0	2	Technical English II	CES.R.121	
2	0	3	Mathematics II	CES.R.122	
3	0	4	Chemical Engineering Principles I	CES.R.131	
3	2	2	Chemistry of Petroleum	CES.R.124	
2	2	1	AutoCAD	CES.R.127	
2	0	3	Engineering Mechanics &Strength of Materials	CES.R.128	
-----	6	-----	Workshop II	CES.R.115	
2	0	2	Human Rights & Democracy	CES.R.116	

Academic Program Description .4			.3	.2	.1	
Credit hours			Course name	Course code		Year\ Level
Credits	**Lab**	**Course lecture**				
2	**0**	**3**	Mathematics III	**CES.R.221**		**2nd / 2025 Year**
2	**0**	**3**	Chemical Eng. Principles II	**CES.R.231**		
3	**2**	**3**	Fluid Flow I	**CES.R.233**		
3	**2**	**2**	Physical Chemistry I	**CES.R.235**		
2	**2**	**2**	Computer Programming I	**CES.R.223**		
3	**2**	**2**	Fuel Technology	**CES.R.237**		
2	**0**	**3**	Materials Engineering I	**CES.R.225**		
2	**0**	**3**	Mathematics IV	**CES.R.222**		
2	**0**	**3**	Chemical Eng. Principles III	**CES.R.232**		
3	**2**	**3**	Fluid Flow II	**CES.R.234**		
2	**0**	**2**	Physical Chemistry II	**CES.R.236**		
2	**2**	**2**	Computer Programming II	**CES.R.224**		
3	**2**	**3**	Materials Engineering II	**CES.R.226**		
2	**0**	**3**	Statistics	**CES.R.227**		

Academic Program Description .4			.3		.2	.1
Credit hours			Course name	Course code		Year\ Level
Credits	**Lab**	**Course lecture**				
2	0	3	Thermodynamics I	**CES.R.331**		**3rd / 2025 Year**
3	2	3	Numerical Analysis	**CES.R.321**		
3	2	3	Mass Transfer	**CES.R.333**		
2	0	3	Chemical Reaction Kinetics	**CES.R.335**		
2	0	3	Heat Transfer I	**CES.R.337**		
2	0	2	Combustion	**CES.R.339**		
2	0	3	Equipment Design	**CES.R.3311**		
2	0	3	Chemicals from Petroleum	**CES.R.3310**		
2	0	3	Reactor Design	**CES.R.336**		
3	2	3	Heat Transfer II	**CES.R.338**		
2	0	3	Applied Mathematics in Chemical Engineering	**CES.R.322**		
3	2	3	Thermodynamics II	**CES.R.332**		
3	0	4	Unit Operation I	**CES.R.334**		
3	2	3	Equipment Design Using CAD	**CES.R.3312**		
2	0	2	Petroleum and Gas	**CES.R.3313**		

			Field Processing				

Academic Program Description .4			.3		.2	.1	
Credit hours			Course name	Course code			Year\ Level
Credits	**Lab**	**Course lecture**					**4th / 2025 Year**
3 2	2 2	3 1	Unit Operations II **Project I**	**CES.R. 431** **CES.R. 421**			
2	0	3	Process Dynamics	**CES.R. 433**			
3	2	3	Petroleum Refinery Eng. I	**CES.R.435**			
2	0	3	Refinery Management & Ethics	**CES.R.423**			
2	0	3	Heterogeneous Reactor &Catalyst	**CES.R. 437**			
2	0	3	Environment Pollution & Safety in Petroleum Refineries	**CES.R. 438**			
2	2	1	**Project II**	**CES.R.422**			
3	0	4	Unit Operations III	**CES.R.432**			
3	2	3	Process Control	**CES.R.434**			
2	0	3	Petroleum Refinery Eng. II	**CES.R.436**			
2	0	2	Optimization	**CES.R.424**			
2	0	2	Corrosion Eng. In Petroleum Refinery	**CES.R.439**			

2	0	2	Petroleum Refinery Economics	**CES.R.4310**			

7. Expected learning outcomes of the program	
knowledge	
1. Preparing academically qualified graduates in oil and **2**. Preparing academically gas refining engineering. qualified personnel for admission to postgraduate studies. **3**. Keeping pace with scientific developments in the **4**. Scientific cooperation with educational process. **5**. government ministries and the private sector. Contributing to scientific research, organizing seminars **6**. and conferences, and participating in conferences. Contributing to solving institutional problems using scientific methods.	Cognitive objectives
Skills	
	Skill objectives
1- Professional skills in aspects of oil and gas refining **2-** Data analysis skills in oil and gas engineering. **3-** Acquire the necessary skills in refining engineering**.** the field of specialization.	
Evaluation	
1. Using smart tools such as smart boards and display screens. 2- Student participation in the lecture. 3- Preparing the material in advance and using exercises as homework. 4- Expanding students' knowledge by asking questions about their previous studies. 5- Researching solutions to the problem using academic sources and the internet.	Evaluation methods
1- The student understands the teaching methods. 2-Direct observation	Emotional and value goals

8- Teaching and learning strategies
Teaching and learning strategies and methods adopted in implementing the program **1**. Delivering lectures that promote moral values**. 2**. Holding seminars and workshops for students throughout the academic year. **3**. Field visits to relevant ministries and health institutions.

Professional development **.9**
Guidance of new faculty members
1- Commitment to the educational institution's regulations. 2- Respect for the teaching staff at the deanship level (deanship, assistants, and teachers). 3. For new faculty members, prepare and support them in participating in intensive experiential programs (workshops and courses), given their impact on developing the academic capabilities of instructors.
Professional development for faculty members
1- Building and strengthening the capacity of academic circles to utilize digital platforms and emphasizing the use of diverse teaching methods that enhance training to meet the challenges of the knowledge quest. **2**- Working to provide high-quality work in the field of the humanities.

10. Acceptance Criteria
Central admission and interview

11. Program Development Plan
Teamwork: Working effectively and energetically within a group. - Time Management: Managing time effectively and setting priorities, with the ability to

work in an organized and timely manner.
- Leadership: The ability to direct and motivate others.
- Work independently.
- Preparing research and reports.

1. Expected learning outcomes of the program	
Knowledge	
A1	Mathematics, science and engineering underlying the practice of chemical engineering.
A2	The interactions involved in chemical engineering systems and analytical and computational tools to deal with these.
A3	The scope of chemical engineering from the molecular to the large scale.
A4	The economic, management and statutory requirements involved in the practice of chemical engineering.
Skills	
B1	Communicate clearly the findings of experiments, projects and other assignments using written reports, oral and visual presentations as well work effectively in a team, recognizing the roles played by different team members.
B2	Creatively employ applied science and engineering concepts in the design of industrial processes and equipment. Which in turn will demonstrate awareness of the importance of scaling techniques in design work.
B3	Perform complete mass and energy balances for chemical engineering plants. apply the principles of chemical equilibrium process thermodynamics to systems with chemical reactions.
B4	Chemical engineering graduates will be able to write coherent, concise, accurate technical reports ,use computers effectively for solving chemical engineering problems.
Ethics	
C1.	An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations
C2	Apply the principles of the law as well as understanding of responsible research and innovation, data protection, ethics and bias relevant to AI research and innovation
C3	know how to support the development of 'sustainability thinking
C4	have developed an awareness of a chemical engineer's issues, obligations, and responsibilities with regard to ethics

13. Program Skills Map

Required learning outcomes of the program															
ethics				**skills**				knowledge				Essential or elective?	Course name	Course code	Year/Level
4C	**3C**	**2C**	**1C**	**4B**	**3B**	**2B**	**1B**	**4A**	**3A**	**2A**	**1A**				
											✓	Essential	Technical English I	**CES.R.111**	**1st / 2025 Year**
						✓				✓	✓	Essential	Mathematics I	**CES.R.121**	
										✓	✓	Essential	Chemistry	**CES.R.123**	
										✓	✓	Essential	Physics	**CES.R.125**	
				✓					✓	✓	✓	Essential	Engineering Drawing	**CES.R.126**	
						✓	✓				✓	Essential	Computer Science	**CES.R.113**	
✓		✓	✓	✓	✓	✓				✓	✓	Essential	Workshop **I**	**CES.R.114**	
											✓	Essential	Technical English I I	**CES.R.121**	

						✓				✓	✓	Essential	Mathematics II	**CES.R.121**	
			✓	✓	✓	✓	✓		✓	✓	✓	Essential	Chemical Engineering Principles I	**CES.R.131**	
			✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Chemistry of Petroleum	**CES.R.121**	
			✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	AutoCAD	**CES.R.127**	
			✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Engineering Mechanics &Strength of Materials	**CES.R.128**	
			✓	✓	✓	✓				✓	✓	Essential	Workshop II	**CES.R.115**	
											✓	Essential	Human Rights & Democracy	**CES.R.116**	
			✓			✓				✓		Essential	Mathematics III	**CES.R.221**	**/ 2025**
			✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Chemical Eng. Principles II	**CES.R.231**	**2nd Year**
			✓		✓	✓	✓		✓	✓	✓	Essential	Fluid Flow I	**CES.R.233**	
			✓			✓			✓		✓	Essential	Physical	**CES.R.235**	

												Chemistry I		
			✓			✓					Essential	Fuel Technology	**CES.R.237**	
			✓		✓	✓	✓			✓	Essential	Computer Programming I	**CES.R.223**	
			✓			✓			✓		✓	Essential	Materials Engineering I	**CES.R.225**
			✓	✓	✓	✓				✓		Essential	Mathematics IV	**CES.R.222**
			✓	✓	✓		✓	✓	✓		✓	Essential	Chemical Eng. Principles III	**CES.R.232**
			✓	✓	✓	✓	✓		✓	✓	✓	Essential	Fluid Flow II	**CES.R.234**
			✓	✓	✓	✓	✓		✓		✓	Essential	Physical Chemistry II	**CES.R.236**
			✓	✓	✓	✓	✓			✓	✓	Essential	Computer Programming II	**CES.R.224**
			✓	✓			✓	✓	✓		✓	Essential	Materials Engineering II	**CES.R.226**
			✓	✓	✓	✓	✓			✓	✓	Essential	Statistics	**CES.R.227**

		✓	✓	✓	✓	✓	✓	✓	✓		✓	Essential	Thermodynamics I	**CES.R.331**	**2025/3rd Year**
			✓	✓	✓	✓	✓			✓		Essential	Numerical Analysis	**CES.R.321**	
		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Mass Transfer	**CES.R.333**	
		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Chemical Reaction Kinetics	**CES.R.335**	
		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Heat Transfer I	**CES.R.337**	
		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Combustion	**CES.R.339**	
		✓	✓	✓	✓	✓	✓	✓	✓		✓	Essential	Equipment Design	**CES.R.3311**	
		✓	✓	✓		✓	✓	✓	✓		✓	Essential	Chemicals from Petroleum	**CES.R.3310**	

		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Reactor Design	**CES.R.336**	
		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Heat Transfer II	**CES.R.338**	
		✓	✓	✓	✓	✓	✓			✓		Essential	Applied Mathematics in Chemical Engineering	**CES.R.322**	
		✓	✓	✓	✓	✓	✓	✓	✓		✓	Essential	Thermodynamics II	**CES.R.332**	
		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Unit Operation I	**CES.R.334**	
		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Equipment Design Using CAD	**CES.R.3312**	
		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Petroleum and Gas Field Processing	**CES.R.3313**	

		✓	✓	✓	✓	✓	✓	✓	✓		✓	Essential	Project I	**CES.R. 421**	**2025 /4th Year**
		✓	✓	✓	✓	✓	✓		✓	✓	✓	Essential	Unit Operations II	**CES.R. 431**	
		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Process Dynamics	**CES.R. 433**	
		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Petroleum Refinery Eng. I	**CES.R.435**	
		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Refinery Management & Ethics	**CES.R.423**	
		✓	✓	✓		✓	✓		✓		✓	Essential	Heterogeneous Reactor &Catalyst	**CES.R. 437**	
		✓	✓	✓	✓	✓	✓	✓		✓	✓	Essential	Environment Pollution &	**CES.R. 438**	

													Safety in Petroleum Refineries		
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	Essential	Project II	**CES.R.422**	
			✓	✓	✓	✓	✓		✓	✓	✓	Essential	Unit Operations III	**CES.R.432**	
			✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Process Control	**CES.R.434**	
			✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Petroleum Refinery Eng. II	**CES.R.436**	
			✓	✓	✓	✓	✓	✓	✓	✓	✓	Essential	Optimization	**CES.R.424**	
			✓	✓		✓	✓		✓		✓	Essential	Corrosion Eng. In Petroleum Refinery	**CES.R.439**	
			✓	✓		✓	✓		✓		✓	Essential	Petroleum Refinery Economics	**CES.R.4310**	

Please mark in the boxes corresponding to the individual learning outcomes of the program being assessed. ✓

Course Description - Chemistry

Course Overview: This course description provides a concise summary of the main characteristics of the Analytical Chemistry course and the intended learning outcomes that students are expected to achieve, demonstrating the available learning opportunities and connecting them to the program description.

Educational Institution	Al-Turath University
Academic Department	Oil and Gas Refining Engineering
Course Name / Code	Chemistry / CES.R.123
Available Attendance Modes	Classroom
Semester / Year	Courses / 2025–2026
Total Study Hours	30 Theoretical Hours
Date Description Prepared	2025/2026

1. Course Objectives

1. Provide students with knowledge regarding engineering, academic, and professional work standards.
2. Learn types of engineering metrics and how to apply them in the field of specialization.
3. Equip students with necessary knowledge tools in engineering laboratories.
4. Develop engineering awareness among students and benefit from its applications.
5. Stay informed on scientific and practical advancements in engineering, particularly oil and gas refining.

2. Course Intended Learning Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives

- Provide students with knowledge regarding academic and professional work standards.
- Learn types of engineering metrics and their practical applications.
- Equip students with necessary knowledge tools in oil and gas refining engineering.
- Enhance engineering awareness and practical application skills.
- Stay updated with scientific and practical engineering developments, particularly oil and

gas refining.

B. Course Specific Skill Objectives

- Understand the nature of engineering work and its applications.
- Utilize engineering applications in professional careers upon graduation.
- Contribute to scientific research, organize seminars/conferences, and participate in technical conferences.

C. Teaching and Learning Methods

- Lectures.
- Applied seminars and workshops.
- Practical exercises and student discussions among peers and with the instructor.
- Laboratories and utilizing computer software.
- Adopting e-learning platforms and blended learning as required.

D. Assessment Methods

- Student participation in lectures based on prior preparation.
- Assigning homework exercises to be submitted on separate sheets in subsequent lectures.
- Expanding student knowledge through questions related to prior studies and encouraging online research and classroom discussions.

E. Affective and Value Objectives

- Instilling values and principles by emphasizing evaluator independence in expressing an unbiased opinion.
- Emphasizing personal traits of evaluators such as integrity, honesty, confidentiality, and ethics.
- Highlighting professional conduct rules and legal penalties for violations.
- Emphasizing the importance of combating financial and administrative corruption.

F. General and Transferable Skills

- General transferable skills related to employability and personal growth.
- Encouraging creativity, perseverance, and active cooperation among students to fulfill study requirements.
- Providing access to the university online portal regarding future employment opportunities.
- Promoting self-education and broadening knowledge through continuous reading.

3. Course Structure

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
1	2	Introduction of Atom - theories of discovering atom; experiments of scientists; defects of some theories and solutions.	Introduction of Atom	Whiteboard explanation + Discussion	Class participation + Test
2–3	4	Branches of analytical chemistry (definition and classification) ; calculation methods for each branch; oxidation states for ions and valence numbers for acids and bases; mole fraction, weight fraction, volume fraction; solving examples and assigning homework.	Introduction of Analytical Chemistry & Molecular Weight Calculation for Atoms and Molecules	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework
4–5	4	Law and calculation; pH for strong acid and	Molarity, Normality, Strong and Weak Acids	Whiteboard explanation + Discussion + Problem	Discussion + Test + Homework

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
		base; pH for weak acid and base; written exam in practical exercises.	and Bases (Scientist Definitions)	solving	
6–7	4	An exercise forming the number five in English; exercise forming the number nine in English; an exercise in forming an iron model in the form of a circle.	Blacksmith Workshop	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework
8	2	Calculation of pH for common ion; solving exercises and homework; chemical equilibrium - calculating reaction rate at chemical equilibrium, factors affecting chemical equilibrium; solving examples.	pH for Weak Acid and Its Salt, pH for Weak Base and Its Salt; Solving Exercises & Chemical Equilibrium	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework
9–10	4	Introduction to	Spectroscopi c Analysis	Whiteboard explanation +	Discussion + Test +

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
		spectroscopy ; methods of spectroscopic analysis - Ultra Violet (UV), Infra-Red (IR) spectroscopy ; wavelength, sample preparation.		Discussion + Problem solving	Homework
11	2	Water chemistry - fresh water, hydrological cycle, wastewater; water pollutants: chemical water pollutants; characterization of wastewater.	Environmental Chemistry	Whiteboard explanation + Discussion + Problem solving	Discussion + Homework
12–13	4	Air pollutants: primary pollutants, secondary pollutants; photochemical smog; formation and depletion of ozone in the stratosphere.	Air Pollution	Whiteboard explanation + Discussion	Discussion + Test + Homework
14–15	4	Domestic	Soil Pollution	Whiteboard	Discussion +

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
		and municipal wastes; industrial and mining wastes; agricultural wastes; radioactive materials; biological agents.		explanation + Discussion + Problem solving	Test + Homework

4. Infrastructure & References

Required Books

1. Dr. Najat Jumaa, *Analytical Chemistry*. [cite: 234]
2. Skoog, West, and Holler, *Analytical Chemistry*. [cite: 234]

Main References

- Petroleum refining textbooks of various types. [cite: 234]

Recommended Books & Journals

1. *Fundamentals of Analytical Chemistry*. [cite: 234]
2. Gary & Handwerk, *Petroleum Refining Technology and Economics*. [cite: 234, 235]
3. G.D. Hobson, *Modern Petroleum Technology*. [cite: 235]

Electronic References & Websites

1. Scientific American – Chemistry. [cite: 235]
2. SPRESI Database. [cite: 236]
3. Wiley Online Library. [cite: 236]

Course description template

Course description

This course description provides a summary of the most important characteristics of the course (Principles of Chemical Engineering 2) and the learning outcomes expected of the student to achieve, demonstrating the available learning and the need to link them to the program description.

AL-TURATH University	Educational Institution .1
Petroleum and Gas Refining Engineering	Department/Center .2
Principles of Chemical Engineering 2/ CES.R.231	Course Name/Code .3
Classes	Available Attendance Forms .4
Courses	Semester/Year .5
30 hours of theory	Total Credit Hours .6
2026/2025	Date of Preparation of this Description .7

8. Course Objectives

1- To achieve the university's goals within the field of chemical engineering.

2- To provide a sound education in the fundamentals of chemical engineering.

3- To develop the skills and confidence necessary for problem-solving, based on engineering and scientific principles, in the biochemical, chemical, and other industries.

4- To continue producing highly capable graduates.

5- To provide education that meets the needs of the job market and is affiliated with the Engineers Syndicate.

9. Course Outcomes, Teaching and Learning Methods, and Assessment

A. Cognitive Objectives

-Essential facts, concepts, principles, and theories of chemical engineering.

-Expressing concentrations of matter.

-Balancing matter in individual units and in combined units as a complete industrial unit.

-Using material flow diagrams in industrial diagrams.

-Management concepts and ideas.

B. Course-Specific Skills Objectives:

-Material balancing for industrial units.

-Dealing with units and problems related to material balancing with or without a chemical reaction.

-Working with industrial units involving multiple chemical reactions.

Teaching and Learning Methods

1-Teaching Methods

2-Theoretical lectures with whiteboard explanations.

3-Solving exercises and problems with discussion.

4-Regular homework assignments.

5-Classroom discussions.

6-Utilizing online and blended learning platforms when needed.

7-Forming student groups to work on classroom activities.

Assessment Methods

-Daily quizzes with scientific and practical questions.

-Grading of homework and assigned reports.

-Monthly exams in addition to a final exam covering the entire curriculum.

C. Affective and Value-Based Objectives

-Solving industrial problems that may be defined by known or unknown conditions.

-Instilling values and principles in the student by emphasizing the examiner's independence when expressing an impartial opinion.

-Emphasizing the examiner's personal qualities such as integrity, honesty, confidentiality, and ethics.

-Explaining the importance of the examiner's professional code of conduct and the legal penalties for violating it.

-Designing units and processes and implementing necessary improvements.

D - General and transferable skills (other skills related to employability and personal development).

1 - General and transferable skills, other skills related to employability and personal development.

2 - Encouraging students to be creative and fostering a spirit of perseverance and selflessness through continuous encouragement of effective collaboration among them to fulfill their academic requirements.

3 - They were provided with the university's website regarding available future employment opportunities.

4 - They were given an understanding of the importance of developing their skills through self-education by exploring various fields of knowledge.

11. Course Structure

Evaluation Method	Teaching method	Unit/Subject Name	Required learning outcomes	Number of hours	Week
Self-assessment during the lecture	Lectures, presentation slides, and reports	Introduction	**Using the chemical reaction equation to :balance the reactant Low concentration reactant.**	**3**	**1**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Subject Definition	**Using the chemical reaction equation to :balance the reactant , High concentration reactant.**	**3**	**2**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Selectivity and productivity**	**3**	**3**

Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Balance of matter in processes involving a chemical reaction**	**3**	**4**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Balance of matter in processes involving a chemical reaction**	**3**	**5**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Balance of matter in processes involving a chemical reaction**	**3**	**6**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Choosing a basis for the solution + various examples**	**3**	**7**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**multi-reaction processes**	**3**	**8**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**multi-reaction processes**	**3**	**9**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Balance of matter in combustion reactions**	**3**	**10**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Balance of matter in combustion reactions**	**3**	**11**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Degrees of Freedom Analysis of Material Balance Systems + Various Examples**	**3**	**12**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**Material Balance in a Multi-Unit System**	**3**	**13**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**The reflux in the absence of a chemical reaction + various examples**	**3**	**14**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Material balance	**The reflux in the absence of a chemical reaction + various examples**	**3**	**15**

12. Infrastructure

- Himmelblau David M. "Basic Principles and Calculations in Chemical Engineering". 8th Ed. 2012, Prentice Hall PTR. **- Felder Richard M., Rousseau Ronald W."Elementary Principles of Chemical Processes" 3nd. ED. 2001. John Willey & Sons.**	1- Required textbooks

Course description template

Course description

This course description provides a brief summary of the most important characteristics of the course (Principles of Chemical Engineering 3) and the learning outcomes expected of the student to achieve, demonstrating the available learning and the need to link them to

the program description.

AL-TURATH University	Educational Institution .1
Petroleum and Gas Refining Engineering	Department/Center .2
Principles of Chemical Engineering 3 / CES.R.232	Course Name/Code .3
Classes	Available Attendance Forms .4
Courses	Semester/Year .5
30 hours of theory	Total Credit Hours .6
2025/2024	Date of Preparation of this Description .7

8. Course Objectives

1- To acquire quantitative problem-solving skills, specifically the ability to think quantitatively (including numbers and units), the ability to translate words into mathematical diagrams and expressions, the ability to use common sense to interpret ambiguous and obscure language in problem statements, and the ability to use reasonable approximations and assumptions judiciously to simplify problems.

2-To understand typical processes found in the chemical industry, particularly in the field of oil and gas refining engineering.

3-To learn the general principles used in process engineering, especially chemical measurements, material and energy balances, gas laws, and phase balances in the field of oil and gas refining.

4 -To develop the student's engineering awareness and its applications.

9. Course Outcomes, Teaching and Learning Methods, and Assessment

A. Cognitive Objectives

1 .Explain the concepts of dimensions, units, measurement, steam properties, and the conservation of mass and energy.

2 .Solve steady-state and transient mass-energy equilibrium problems involving multi-unit processes, recirculation currents, bypass currents, and purge currents.

3 .Solve and understand simple unsteady-state mass-energy equilibrium problems.

4. Provide clear and concise oral and written solutions to engineering problems.

B. Course-Specific Skills Objectives:

1 .Understanding the nature of engineering work and its applications.

2. Utilizing engineering applications in the professional field upon graduation and knowing how to employ them.

3. Contributing to scientific research, organizing seminars and conferences, and participating in conferences .

Teaching and Learning Methods

1-Teaching Methods

2-Theoretical lectures with whiteboard explanations.

3-Solving exercises and problems with discussion.

4-Regular homework assignments.

5-Classroom discussions.

6-Utilizing online and blended learning platforms when needed.

7-Forming student groups to work on classroom activities.

Assessment Methods

1- By encouraging student participation in the lecture, based on their prior preparation of the material.

2- By assigning exercises as homework and requiring them to complete them on separate sheets of paper, which will be used in the following lecture.

3- By broadening their understanding by posing a simple question related to their previous studies and relevant to their coursework in the department.

This question will be used in the Principles of Chemical Engineering 3 course (and students will be asked to search for the answer online and discuss it in class).

C. Affective and Value-Based Objectives

1- Instilling values and principles in the student by emphasizing the examiner's independence when expressing their impartial opinion.

2- Emphasizing the examiner's personal qualities such as integrity, honesty, confidentiality, and ethics.

3- Explaining the importance of the examiner's professional code of conduct and the legal penalties for violating it.

4- Emphasizing the importance of combating financial and administrative corruption by the relevant authorities .

D - General and transferable skills (other skills related to employability and personal development).

1 - General and transferable skills, other skills related to employability and personal development.

2 - Encouraging students to be creative and fostering a spirit of perseverance and selflessness through continuous encouragement of effective collaboration among them to fulfill their academic requirements.

3 - They were provided with the university's website regarding available future employment opportunities.

4 - They were given an understanding of the importance of developing their skills through self-education by exploring various fields of knowledge.

11. Course Structure

Evaluation Method	Teaching method	Unit/Subject Name	Required learning outcomes	Number of hours	Week
Self-assessment during the lecture	Lectures, presentation slides, and reports	Energy balance in a closed system Kinetic energy Potential energy	**Introduction to the general equation for energy balancing, and its definition.**	**2**	**1**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Energy balance in an open system Steam turbines Heat exchangers	**Applications of the general equation in an open system.** **Calculation of energy and work in turbines and heat exchangers.**	**2**	**2**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Compressor Mechanical energy balancing Bernoulli's equation	**Calculating energy and work in compressors.** **Derivation the mechanical energy equation and Bernoulli's equation from the general energy balance equation.**	**2**	**3**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Compressor Mechanical energy balancing Bernoulli's equation	**Calculating energy and work in compressors.** **Derivation the mechanical energy equation and Bernoulli's equation from the general energy balance equation.**	**2**	**4**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Enthalmic content calculations Changing enthalpy due to temperature Constant heat capacity	**Learn how to calculate enthalpy from steam tables as well as heat capacity theoretically.**	**2**	**5**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Enthalmic content calculations Changing enthalpy due to temperature Constant heat capacity	**Learn how to calculate enthalpy from steam tables as well as heat capacity theoretically.**	**2**	**6**

Self-assessment during the lecture	Lectures, presentation slides, and reports	Enthalmic content calculations with phase changes Energy balancing for open systems with multiple inputs and outputs	**Understanding how to calculate enthalpy in the presence of a phase change. Calculating the enthalpy of multi-output systems.**	**2**	**7**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Enthalmic content calculations with phase changes Energy balancing for open systems with multiple inputs and outputs	**Understanding how to calculate enthalpy in the presence of a phase change. Calculating the enthalpy of multi-output systems.**	**2**	**8**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Enthalmic content calculations with phase changes Energy balancing for open systems with multiple inputs and outputs	**Understanding how to calculate enthalpy in the presence of a phase change. Calculating the enthalpy of multi-output systems.**	**2**	**9**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Heat of reaction Heat of formation and heat of combustion. Range of reaction	**Calculating the heat of reaction and formation.**	**2**	**10**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Heat of reaction Heat of formation and heat of combustion. Range of reaction	**Calculating the heat of reaction and formation.**	**2**	**11**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Reactions in closed processes Energy balancing of reactions The heat of reaction method	**Calculating the heat of reaction for closed systems. How to perform an energy balance for hydrocarbon refining applications.**	**2**	**12**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Reactions in closed processes Energy balancing of reactions The heat of reaction method	**Calculating the heat of reaction for closed systems. How to perform an energy balance for hydrocarbon refining applications.**	**2**	**13**
Self-assessment during the lecture	Lectures, presentation slides, and reports	Method of heat of formation or equilibrium of elements	**Matter and energy balancing operations to calculate heat of reaction for multiple applications.**	**2**	**14**

Self-assessment during the lecture	Lectures, presentation slides, and reports	Method of heat of formation or equilibrium of elements	**Matter and energy balancing operations to calculate heat of reaction for multiple applications.**	**2**	**15**

12. Infrastructure

-Nayef Ghasem and Redhouane Henda, Principles of Chemical Engineering Processes, Material And Energy Balances,Second Edition,2015. **D.M.Himmelblau and J.B.Riggs, Basic Principles and Calculations in Chemical Engineering, 7th Edition, 2004**.	1- Required textbooks

Description - Fuel Technology

Course Overview: This course description provides a brief summary aimed at introducing students to understanding the types and properties of fuel (solid, liquid, and gas), crude oil characteristics, physical and chemical fuel properties, primary crude oil products, refining and distillation processes, and detailed properties of these products.

Educational Institution	Al-Turath University College
Academic Department	Oil and Gas Refining Engineering
Course Name / Code	Fuel Technology / CES.R.237
Available Attendance Modes	Classroom
Semester / Year	Courses / 2025–2026
Total Study Hours	30 Theoretical Hours
Date Description Prepared	2025/2026

1. Course Objectives

1. Understanding types of fuel and their properties (solid, liquid, and gas).
2. Studying the physical and chemical properties of crude oil.
3. Studying most properties of petroleum products derived from crude oil.

2. Course Intended Learning Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives

- Provide students with knowledge regarding the nature of academic and professional work.
- Learn types of engineering metrics and how to apply them in the field of specialization.
- Provide necessary knowledge tools in oil and gas refining engineering.
- Develop engineering awareness among students to benefit from its applications.
- Stay informed on scientific and practical advancements in engineering, particularly oil and gas refining.

B. Course Specific Skill Objectives

- Understand the nature of engineering work and its applications.
- Benefit from engineering applications in professional careers after graduation and know how

to employ them.

- Contribute to scientific research, organize seminars/conferences, and participate in

conferences.

C. Teaching and Learning Methods

- Lectures.
- Practical seminars.
- Practical exercises and group discussions among students and with the instructor.
- Laboratories and utilizing electronic software.
- Adopting e-learning platforms and blended learning when needed.

D. Assessment Methods

- Student participation in lectures based on prior preparation.
- Assigning homework exercises on separate papers for submission in subsequent lectures.
- Expanding student knowledge through simple questions on prior studies related to heat transfer and encouraging online research.

E. General and Transferable Skills

- General transferable skills related to employability and personal growth.
- Encouraging creativity, perseverance, and active cooperation to fulfill study requirements.
- Providing access to the university website regarding future employment opportunities.
- Promoting self-education and broadening knowledge.

3. Course Structure

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
1–3	9	Types of fuels and their importance; coal classification, composition, and foundation; coal preparation and washing; coal combustion, coke production, coal liquefaction.	Introduction to Fuel Technology: Solid Fuels & Coal Combustion Technologies	Whiteboard explanation + Discussion	Class participation + Test

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
4	3	Petroleum formation theories, classification as a hydrocarbon resource, petroleum production, crude oil composition.	Liquid Fuels	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework
5–10	9	Crude oil analysis & properties; Gasoline types and properties (ASTM distillation, RVP, Octane number, oxidation stability, sulfur content); Naphtha types and applications; Kerosene tests (flash/fire point, smoke point, aniline point).	Crude Oil Evaluation	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework
11	2	Midterm Examinations	Midterm Examinations	-	-
12–13	6	Gaseous fuel history, gas production, natural gas composition, classification, sweetening.	Gaseous Fuels	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
14–15	9	LPG properties, composition, production, testing methods.	Liquefied Petroleum Gas (LPG)	Whiteboard explanation + Discussion + Problem solving	Discussion + Homework

4. Infrastructure & References

Required Books

1. Speight, J.G., *Handbook of Petroleum Product Analysis*, John Wiley & Sons, 2002.
2. Speight, J.G. and Ozum, B., *Petroleum Refinery Processes*, Marcel Dekker, New York, 2002.
3. Speight, J.G., *The Chemistry and Technology of Petroleum*, 3rd Edition, Marcel Dekker, New York, 1999.

Main References

1. *Petroleum Fuels Manufacturing Handbook*, Surinder Parkash, McGraw-Hill Companies, 2010.
2. *Fundamentals of Petroleum and Petrochemical Engineering*, Uttam Ray Chaudhuri, Taylor & Francis Group, 2011.

Recommended Periodicals & Websites

- Any reference or online resource related to Fuel Technology.

Course Description - Physical Chemistry

Course Overview: This course introduces students to applying physical problem-solving methods to chemical problems. It encompasses qualitative and quantitative study (experimental and theoretical) of principles determining matter behavior, ideal gas transformations, electrolyte solution properties, electrode processes, and galvanic cells.

Educational Institution	Al-Turath University College
Academic Department	Oil and Gas Refining Engineering
Course Name / Code	Physical Chemistry / CES.R.235
Available Attendance Modes	Classroom
Semester / Year	Courses / 2025–2026
Total Study Hours	30 Theoretical Hours
Date Description Prepared	2025/2026

1. Course Objectives

1. Ability to solve problems involving ideal mixtures and dilute solutions.
2. Understanding principles of phase diagrams and interpreting them for various systems.
3. Ability to solve problems related to surface tension.
4. Ability to solve simple rate laws and related kinetics problems.
5. Applying experimental techniques to determine rate laws and rate constants.

2. Course Intended Learning Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives

- Provide students with knowledge regarding academic and professional work.
- Learn engineering metrics and their practical applications.
- Provide knowledge tools required in oil and gas refining engineering.
- Develop engineering awareness and benefit from practical applications.
- Stay updated with scientific and practical engineering developments.

B. Course Specific Skill Objectives

- Understand the nature of engineering work and its practical applications.

- Utilize engineering applications in professional careers upon graduation.
- Contribute to scientific research, seminars, and conferences.

C. Teaching and Learning Methods

- Lectures.
- Practical workshops/seminars.
- Practical exercises and student discussions.
- Laboratory work and software utilization.
- E-learning and blended learning as required.

D. Assessment Methods

- Active lecture participation based on preparation.
- Homework assignments submitted in subsequent lectures.
- Interactive questions to expand understanding, particularly supporting Heat Transfer topics.

E. General and Transferable Skills

- Transferable personal development and employability skills.
- Promoting perseverance, teamwork, and self-education.
- Leveraging university online portals for employment prospects.

3. Course Structure

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
1–4	12	Consumption /formation rate calculations, reaction rate, empirical rate, rate equations, reaction order (0, 1st, 2nd, 3rd), non-order reactions, rate constants, enzyme	Chemical Reaction Kinetics	Whiteboard explanation + Discussion	Class participation + Test

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
		reaction kinetics, kinetic data analysis.			
5–6	6	Adsorption, heat of adsorption equation, surface tension and capillary rise, solid-liquid interfaces, colloidal systems, electrical properties of colloids, gels, emulsions.	Surface Chemistry	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework
7–8	6	Phase equilibrium, single-compo nent systems, binary vapor systems, vapor-liquid equilibrium for binary systems, non-Raoult law behavior, temperature-composition diagrams (boiling curves), distillation, azeotropes, gas solubility in liquids.	Phase Equilibria	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework

Week	Hours	Required Learning Outcomes	Unit / Subject	Teaching Method	Assessment Method
9	2	Midterm Examinations	Midterm Examinations	-	-
10–11	9	PVT behavior of pure substances, ideal gas law, constant volume process, constant pressure process, adiabatic process, polytropic process.	Phase Applications of Ideal Gas Equations	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework
14–15	9	Electromotiv e force (EMF) of cells, EMF measuremen t (potentiomet er), electrode polarity, cell reactions, reversible cells, free energy, half-cell classification.	Electrochemi cal Cells	Whiteboard explanation + Discussion + Problem solving	Discussion + Test + Homework

4. Infrastructure & References

Required Books

1. Laidler, K.J., *Physical Chemistry and Colloid Science*, Boston: Houghton Mifflin Company, 1999.
2. Mortimer, R.G., *Physical Chemistry and Colloid Science*, San Francisco: Harcourt Science and Technology Company, 2000.

Main References & Websites

- Physical chemistry textbooks of various specializations.
- Websites dedicated to physical chemistry.

Course Description Thermodynamics

This course description provides a concise summary of the key characteristics of the course (Thermodynamics/1) and the expected learning outcomes for students to achieve, demonstrating the available learning methods. It is necessary to link them with the program description.

1. Educational Institution.	Al-Turath University
2. Scientific Department	Petroleum and Gas Refining Engineering
3. Course Name / Code	Thermodynamics / CES.R.331
4. Available Attendance Forms	Classroom Lectures
5. Semester / Year	Bologna System
6. Study Hours (Total)	30 Hours Theoretical
7. Date of Description	2026/2025

Course Objectives

1. To equip students with knowledge of the nature of academic, engineering, and professional work.
2. To learn about the types of engineering standards and how to apply them in the field of specialization.
3. To provide them with the necessary knowledge tools in engineering laboratories.
4. To develop engineering awareness in the student and benefit from its applications.
5. To review the scientific and applied progress in the engineering field, especially in Petroleum and Gas Refining Engineering.

Course Outcomes, Teaching & Learning Methods, and Assessment

A – Cognitive (Knowledge) Objectives

1. To equip students with knowledge of the nature of academic and professional work.
2. To learn about the types of engineering standards and how to apply them in the field of specialization.
3. To provide them with the necessary knowledge tools in Petroleum and Gas Refining Engineering.
4. To develop engineering awareness in the student and benefit from its applications.
5. To review the scientific and applied progress in the engineering field, especially in Petroleum and Gas Refining Engineering.

B – Skill Objectives Specific to the Course

1. Understanding the nature of engineering work and its applications.
2. Benefiting from engineering applications in the professional field upon graduation and knowing how to employ them.
3. Contributing to scientific research, organizing seminars and conferences, and participating in conferences.

Teaching and Learning Methods

1. Adopting a lecture delivery method.
2. Conducting applied seminars.
3. Practical exercises and discussion among students and with the course instructor.
4. Laboratories and utilization of electronic programs.
5. Adopting e-learning and blended learning platforms when necessary.

Assessment Methods

1. Through student participation in lectures, based on their prior preparation.
2. Giving them exercises as homework and requesting the solution on separate sheets to be collected in the following lecture.
3. Broadening their horizons by asking a simple question related to their previous studies which their current studies in the department depend on.

This is used for the Thermodynamics course (students are requested to search the internet to find the answer and discuss it in the lecture hall.

C – Affective (Attitudinal and Value) Objectives

1. Instilling values and principles in the student by emphasizing the impartiality of the assessor when expressing their neutral opinion.
2. Emphasizing the personal attributes of the assessor, such as integrity, honesty, confidentiality, and ethics.
3. Clarifying the importance of professional conduct rules for the assessor and exposure to legal penalties in case of violation.
4. Emphasizing the importance of combating financial and administrative corruption by the competent authorities.

D – General and Transferable Skills (Other skills related to employability and personal development)

1. General and transferable qualifications and skills, other skills related to employability and personal development.
2. Encouraging students to innovate, create a spirit of perseverance and selflessness through continuous encouragement of the necessity of active and cooperative work among themselves to achieve their academic requirements.
3. They have been provided with the university's website related to the availability of future opportunities for appointment and employment.

4. Equipping them with knowledge of the importance of developing their capabilities through self-education by reviewing various fields of knowledge.

11 Course Structure

Week	Hours	Required Learning Outcomes	Unit / Topic Name	Teaching Method	Evaluation Method
1-2	4	Basic definitions, work, energy, heat, types of systems, extensive and intensive properties, thermodynamic processes, zero law of thermodynamics, 1st law of thermodynamic, energy balance for open and close system	Introduction	Explanation Board + Discussion	Participation Class Discussion + Quiz
3-4	4	Review on virile equation of state, cubic equation of state, generalized correlations for gases and for liquids.	Volumetric properties of pure fluids	Explanation Board + Discussion + solving Problems	Discussion + Test + Homework
5-7	6	Review on the 2nd law and Carnot heat engine, entropy balance for open system, calculation of ideal work, lost work.	The 2nd law of thermodynamics	Explanation Board + Discussion + solving Problems	Discussion + Test + Homework
8-9	4	Heat effect, heat capacity calculations, sensible heat, latent heat, standard heat of reaction, heat effect of industrial reactions.	Heat capacity	Explanation Board + Discussion + solving Problems	Discussion + Test + Homework
10	2	Midterm Exams			
11-13	6	Review on the property relations (ΔH, ΔS, ΔU and ΔG	Thermodynamic properties of fluids	Explanation Board + Discussion +	Discussion + Test + Homework

		residual properties, two phase systems, thermodynamic diagrams and tables, generalized property correlations for gases.		solving Problems	
14-15	4	Duct flow of compressible fluids, pipe flow, nozzles, throttling process, turbines, compression processes compressors, ejectors	Applications of thermodynamics to flow processes	Explanation Board + Discussion + solving Problems	Discussion + Test + Homework

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12. Infrastructure	
1. Required Prescribed Textbooks	1-J. M. Smith,H.C.Van Ness, Introduction to chemical engineering thermodynamics, 6th edition (International Edition), Mc-Graw Hall, 2008.
2. Main References (Sources)	K.V.Narayanan, Atext book of chemical engineering thermodynamics, prentice Hall of India, New Delhi, 2011. B.G.Kyle, Chemical and process thermodynamics ,(3rd Edition), prentice Hall Inc.New Jersey, 1984. J. Rayner, Basic engineering thermodynamics inSI units, printed in great Britain

a. Recommended Books and References (Scientific Journals, Reports, etc.)	* Chemical Engineering Journal **Thermodynamics: An Engineering Approach"** *Authors:* Yunus A. Çengel, Michael A. Boles *Publisher:* McGraw-Hill Education
b. Electronic References, Internet Sites	**"Fundamentals of Engineering Thermodynamics"** *Authors:* Michael J. Moran, Howard N. Shapiro *Publisher:* Wiley ➤ Widely used in engineering curricula with good examples and clear methodology.

COURSE DESCRIPTION FORM

Course Description

1. Educational Institution: Al-Turath University College
2. Scientific Department / Center: Petroleum and Gas Refining Engineering
3. Course Name / Code: Petroleum Chemicals / CES.R.3310

4. Available Attendance Forms: Classroom attendance
5. Semester / Year: Courses
6. Total Study Hours: 30 theoretical hours
7. Date of Preparation of This Description: 2025/2026
8. Course Objectives

1. Provide students with knowledge of the nature of academic and professional engineering work.
2. Teach the types of engineering measurements and how to apply them in the field of specialization.
3. Provide students with the necessary knowledge tools for engineering laboratories.
4. Develop students' engineering awareness and benefit from its applications.
5. Familiarize students with scientific and applied advances in the engineering field, particularly petroleum and gas refining engineering.

This course description provides a concise summary of the most important characteristics of the course (petroleum-derived chemicals) and the expected learning outcomes that students are expected to achieve, demonstrating the available learning methods. It should be linked to the program description.

12. Infrastructure

1. Required Textbooks:

- Sami Matar, Lewis F. Hatch, Chemistry of Petrochemical Process, 2nd Edition.
- William D. Callister, David G. Rethwisch, Materials Science and Engineering.

2. Main References (Books / Sources):
Books covering various types of petroleum products.

11. Course Structure

Week / Hours	Unit / Course Topic	Required Learning Outcomes	Teaching Method	Assessment Method
1 / 3 hours	Introduction: Raw Material, Characterization	Participation in classroom discussion + test	Board explanation; discussion + question solving	Discussion participation + test
2–5 / 12 hours	Primary Petrochemicals: Olefins, Diolefins, Higher Olefins, LAB,	Participation in classroom discussion + test	Board explanation; discussion + question solving	Discussion participation + test

	Aromatics, Sun Gas, H_2 Production, Steam Reforming, PO			
6 / 3 hours	Midterm Examination	—	—	Midterm examination
7–9 / 9 hours	Derivatives of Syngas: Methanol, Acetic Acid. Ethylene Derivatives: Vinyl Chloride Monomer (VCM), Ethylene Oxide, Ethylene Glycol, MEA, DEA, TEA, Acrylonitrile, MTBE, Adipic Acid. Propylene Derivatives: Ethylbenzene, Styrene, Nitrobenzene, Aniline, Cyclohexane, Cumene, Phenol, Acetone, Benzoic Acid, Terephthalic Acid. Derivatives of C4 Hydrocarbons. Benzene Derivatives. Toluene Derivatives. Xylene Derivatives.	Discussion + test + homework	Board explanation + discussion + problem solving	Discussion + test + homework
10 / 3 hours	Polymers: LDPE, HDPE, PVC, PP Products	Discussion + test + homework	Board explanation + discussion + problem solving	Discussion + test + homework
11 / 3 hours	Petrochemical Complexes: Ethylene, Propylene,	Discussion + test + homework	Board explanation + discussion + problem solving	Discussion + test + homework

	Benzene, C4, BTX			

Recommended Books and References

A. Recommended Books, Scientific Journals, and Reports:

- Chemical Engineering Journal
- Hydrocarbon Journal

B. Electronic References / Websites:
Petrochemicals

Academic Program Description

This academic program description provides a concise summary of the most important characteristics of the program and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available opportunities. It is accompanied by a description of each course within the program.

Al-Turath University	Educational Institution
Oil & Gas Refining Engineering	Scientific Department/Center
Mass Transfer/ CES.R.333	Name of the academic or professional program
Bachelor of Engineering/Oil & Gas Refining	Name of Final Certificate
Courses	Academic System : Annual/Courses/Other
Study plans approved bny the sectoral committee	Accredited Accreditation Program
Related Laws and Guidelines	Other External Influences
2025/2026	Description Preparation Date

8. Objectives of the Academic Program

1 - Graduation of qualified scientific and professional faculty in the disciplines of oil and gas refining engineering.

2. Prepare the academic financial and human requirements for the morning preliminary studies in the department.

3 - Keeping pace with the scientific development of the educational process and the state of its elaborate implementation.

4. Opening knowledge channels in research, professional and consultative communication with public and private counterparts.

5. Producing and disseminating professional knowledge in the fields of oil and gas refining engineering through the organization of
Seminars, workshops, scientific lectures and scientific courses, conferences and seminars and others.

6. Contribute to solving institutional problems in the field of engineering specialization.

1. Required Program Outcomes and Teaching, Learning and Assessment Methods

1. Cognitive Objectives

1. Numbers of scientifically qualified graduates in oil and gas refining engineering.

2. Preparing academically qualified cadres for admission to postgraduate studies.

3- Keeping pace with the scientific development of the educational process.

4. Scientific cooperation with the ministries of state and the private sector.

5 - Contributing to scientific research, holding seminars and conferences, and participating in conferences.

6- Contribute to solving institutional problems in scientific ways.

B. Program Skills Objectives

1- Professional skills in the aspects of oil and gas refining engineering.
2- Data analysis skills in oil and gas refining engineering.
3- Acquiring the necessary skills in the field of specialization.

C. Teaching and Learning Methods

1. Adopting the method of giving lectures.
2- Giving applied study opportunities.
3- Practical exercises and discussion by students among themselves and with the professor of the subject.
4- Laboratories and benefiting from electronic programs.
5- Adopting platforms and e-learning and blended when needed.

D. Evaluation Methods

1- Adopting smart means such as smart boards and displays.
2- Participation of students in the lecture.
3- Prepare the material in advance and approve the exercises as homework.
4- Broaden their perceptions by asking questions about their previous studies.
5- Research the solution of the issue based on scientific sources and the Internet.

C. Emotional and Values Goals

1. Instilling values and principles in the student
2. Emphasizing the personal characteristics of workers in the oil and gas refining engineering sector and the oil industries in general.Such as integrity, honesty, confidentiality, ethics, and the health of the citizen.
3. Demonstrate the importance of the Code of Professional Conduct.
4. Combating financial and administrative corruption by the competent agencies.

Teaching and Learning Methods

1- Giving lectures that urge emotional values.
2. Holding seminars and workshops for students during the academic year.
3- Field visits to ministries and health institutions related to engineering specialization.

d. Transferable general and qualifying skills (other skills related to employability and personal development)

1- Encouraging students to be creative and creating a spirit of perseverance and selflessness by encouraging the necessity of
Collaborate with each other to accomplish the requirements of understanding the study.
2- Activating the activities of the graduates' follow-up workshops.
3- Volunteer work for students.
4- Providing students through self-education and self-talents such as sports and arts, especially since the university has a Department of Physical Education and Sport Sciences.

2. Program Structure

Credit Hours		Course or course name	Course or course code	Stage of study
practical	theoretical			
2	2	Mass Transfer		Third stage Chapter One

1. Personal Development Planning

Encouraging students to achieve the highest grades in the final stages of their studies at the college in order to be the first in order to Achieving their future dreams of completing their postgraduate studies and encouraging them to work in vocational institutes
Specialized in Oil & Gas Refining Engineering

1. Admission Criteria (Setting Regulations for Admission to a College or Institute)

First: The Ministry's instructions for central admission.
Second: Admission to the department is specific to specific criteria from the Ministry.
Third: Graduates of the scientific branch exclusively.
Fourth:Absorptive capacity.
.Fifth: The sequence of the department within the departments of the college

1. Key sources of information about the program

1 - Methodological and auxiliary books.
2. The Ministry's controls and instructions.
3. Sectoral Committee.
4 – Review the experiences of the corresponding departments in local, Arab and .international universities

Curriculum Skills Chart																			
Please indicate the boxes corresponding to the individual learning outcomes from the program being evaluated																			
Learning Outcomes Required from the Program																			
Transferable general and qualifying skills (other skills related to employability and personal development)				Emotional and Values Goals				Program Skills Objectives				Cognitive Goals				Basic Or optional	Course Name	Course Code	Year/Level
4D	D 3	D 2	D 1	4C	3C	2C	1C	4B	3B	2B	1B	4a	3a	2a	1a				
*	*	*	*	*	*	*	*	*	*	*	*	*			*	basic	Mass Transfer		Third Level

أKnowledge and Understanding

A1 :The mathematics, science, and engineering behind the practice of chemical engineering.

A2 : Mass transmission devices that are included in chemical engineering systems and analytical and computer tools to deal with them.

A3 : The range of chemical engineering from the molecular to the broad range.

A4 : Economic, administrative, and legal requirements that go into the practice of chemical engineering.

b. Program-specific skills

B1: Use mathematics, science, and engineering to support the theoretical and practical analysis of process processes.
B2: Employing concepts from applied and engineering sciences in a creative way to design industrial processes and equipment.
B3: Demonstrate awareness of the importance of scaling technologies in the design of heat transfer devices and heat exchangers.

c.- Thinking skills

A1: The use of existing computers and software in quantitative and analytical work, as well as general information technology for communication and data processing.
A2: Evaluate designs, systems, processes, and products to identify areas of potential hazard and environmental threat, and propose improvements.

A3: Use laboratory, engineering and measurement equipment to provide data to support theoretical understanding.

A4: Analyze and solve engineering problems, often on the basis of limited and contradictory information.

General and transferable skills (other skills relevant to employability and personal development)

D1: Manipulate, sort, and present data into useful forms for understanding. Selection, interpretation, and validation of data, identifying potential errors and inconsistencies

D2: Clearly communicate the results of experiments, projects, and other tasks using written reports and oral and visual presentations.

D3: Work effectively in a team, acknowledging the roles played by different team members.

D4: Development takes place in theexperimental work of the brainand design tasks; for example, students obtain data from manuals and computer databases and use it in calculations, graphical solutions, and computer applications.

Course Description Form

Course Description

This course covers diffusion and mass transfer in binary and multicomponent compounds, molecular diffusion in liquids, convection mass transfer, mass transfer coefficients, mass transfer correlations, interphase mass transition, and mass transfer theories

8. Educational Institution	University of Turath
9. Scientific Department/Center	Oil & Gas Refining Engineering
10. Course Name/Code	Mass Transfer
11. Available Forms of Attendance	Classrooms
12. Semester/Year	Courses
13. Number of Hours (Total)	30 hours of my opinion
14. Date this description was prepared	2027/2026

1. Course Objectives

1. Providing students with knowledge of the nature of engineering, academic, and professional work.

2- Learn the types of engineering standards and how to apply them in the field of specialization.

3. Providing them with the necessary knowledge tools in engineering laboratories.

4. Developing engineering awareness among students and benefiting from their applications.

5. To be informed of the scientific and applied progress of the engineering .field, especially oil and gas refining engineering.

1. Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

A1-1 - Providing students with knowledge of the nature of academic and professional work.

2 – Learn the types of engineering standards and how to apply them in the field of specialization.

3 – Providing them with the necessary knowledge tools in oil and gas refining engineering.

4 – Developing the student's engineering awareness and benefiting from its applications.

5 – Reviewing the scientific and applied progress of the engineering field , .especially oil and gas refining engineering.

b. Skill objectives of the course.

1. 1. Understanding the nature of engineering work and its applications.

B2 - Benefiting from engineering applications in the field of employment upon graduation and knowing how to employ them.

B3 - Contributing to scientific research, holding seminars and conferences, .and participating in conferences.

Teaching and Learning Methods

1. Adopting the method of giving lectures.
2. Giving practical seminars.

3 – Practical exercises and their discussion by the students among themselves and with the professor of the subject.

4- Laboratories and benefiting from electronic programs.

.5- Adoption of platforms and e-learning and blended learning when needed

Evaluation Methods

-1 Through the participation of students in the lecture based on their prior preparation of the subject.

2- Give them exercises as a homework and ask for their solution with independent papers to be taken from them in the next lecture.

3- Broadening their perceptions by asking a simple question related to their previous studies and on which their studies in the department depend. They are used in the heat transfer material (and they are asked to search the Internet to find out the answer and discuss it in the hall).

C. Emotional and Values Goals

A1- Instilling values and principles in the student by emphasizing the independence of the examiner when expressing his neutral opinion.

A2- Emphasizing the examiner's personal characteristics such as integrity,honesty, confidentiality and ethics.

A3- Explaining the importance of the examiner's rules of professional conduct and exposing him to legal penalties in case of violation.

A4- Emphasizing the importance of fighting financial and .administrative corruptionby the competent bodies.

d. Transferable general and qualifying skills (other skills related to employability and personal development).

D1. Transferable general and qualifying skills, other skills related to employability and personal development.

D1- Encouraging students to be creative and creating a spirit of perseverance and selflessness in them through continuous encouragement.

The necessity of joint and effective cooperation among them to achieve their study requirements.

D2- They were provided with the university's website related to the availability of future opportunities for recruitment and employment.

D3- Providing them with knowledge of the importance of developing their abilities through self-education by learning about various knowledge.

11Course structure

Evaluation Method	Teaching Method	Module/Course or Subject Name	Required Learning Outcomes	Watches	The week
Participation in class discussion + test	Whiteboard Explanation + Discussion	Introduction to the topic of mass transition and definitions	Fundamentals of Mass Transfers, Concentrations, Velocities, Mass and Molar Flows.	2	1
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Diffusion in diuregas:	Vick's first law of propagation. Diffusion in mixtures of gases, isoparticle diffusion, diffusion in a fixed layer. Correlations to account for propagation, corrective propagation.	6	2-4
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Diffusion in multi-component mixtures:	Multi-component gas phase systems, efficient diffusion. Maxwell's Law of Diffusion.	4	5-7

Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	==========	Diffusion in liquids.	2	8
			Midterm Exams	3	9
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	==========	.Diffusion in solids	2	10
Discussion + Homework	Whiteboard Explanation + Conflict + Problem Solving	Phase boundary propagation, film theory, film theory, mass transfer coefficients (individual and total) in laminar flow and turbulaense	Diffusion theories:	4	11-12
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Calculate the mass transition resistance in both phases. Calculation of intermediate .concentrations	Diffusion Resistors	4	13
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Introduction to mass transfer in the unstable state, which is accompanied by a chemical reaction.	Mass transition in the unstable state:	6	14-15

Infrastructure .12

Required Textbooks 1 -	1- Coulson, J. M & Richardson J. F. (2006). "Chemical engineering, Volume 1", 3rd Edition, Robert Maxwell. M. C. 2- Dutta Binary K. (2007), "Principles of Mass Transfer &

Separation Process", Bvt. Ltd. Prentice Hall, ISPN 8-1203-2990-2.	
Other support books:- 1- Treybal Robert E. (1975), "Mass transfer Operation" 2ed Edition, Mc-Graw-Hill Book. 2- McCabe, W., Smith, J., Harriott, P. (2004), "Unit Operations of Chemical Engineering", Mc-Graw-Hill Co., 7th Edition, ISBN0072848235	Main References (Sources) -2
*Heat transfer Journal * Chemical Engineering Journal * Hydrocarbon Journal	Recommended Books and a References (Scientific Journals, Reports,....)
	in References, Websites

Course Specification Form

Course Description

This course description provides a brief summary of the most important characteristics of the course (Heat Transfer) and the expected learning outcomes the student is expected to achieve, demonstrating the available learning, and it must be linked to the program description.

Educational Institution	Al-Turath University, College of Engineering
Scientific Department / Center	Oil and Gas Refining Engineering
Course Name / Code	Heat Transfer / CES.R.337
Available Attendance Forms	Classrooms
Semester / Year	Courses
Total Credit Hours	30 Theoretical Hours
Date of Preparing this Description	2025/2026

Course Objectives

1. Equipping students with knowledge of the nature of engineering, academic, and professional work.
2. Learning the types of engineering measurements and how to apply them in the field of specialization.
3. Providing them with the necessary knowledge tools in engineering laboratories.
4. Developing the engineering awareness of the student and benefiting from its applications.
5. Keeping abreast of the scientific and applied progress in the engineering field, especially Oil and Gas Refining Engineering.

Course Outcomes, Teaching, Learning, and Assessment Methods

A - Cognitive Objectives

- A1 - Equipping students with knowledge of the nature of academic and professional work.
- A2 - Learning the types of engineering measurements and how to apply them in the field of specialization.
- A3 - Providing them with the necessary knowledge tools in Oil and Gas Refining Engineering.
- A4 - Developing the student's engineering awareness and benefiting from its applications.
- A5 - Keeping abreast of the scientific and applied progress in the engineering field, especially Oil and Gas Refining Engineering.

B - Course-Specific Skills Objectives

- B1 - Understanding the nature of engineering work and its applications.
- B2 - Benefiting from engineering applications in the career field upon graduation and knowing how to employ them.
- B3 - Contributing to scientific research, holding seminars and conferences, and participating in conferences.

Teaching and Learning Methods

1. Adopting the lecture delivery method.
2. Giving applied seminars.
3. Practical exercises and discussing them among students and with the course professor.
4. Laboratories and utilizing electronic programs.
5. Adopting platforms, e-learning, and blended learning when needed.

Assessment Methods

1. Through student participation in the lecture based on their prior preparation for the material.
2. Giving them exercises as homework and asking them to solve them on separate papers to be collected from them in the next lecture.
3. Expanding their perceptions by asking a simple question regarding their previous studies on which their studies in the department depend.
4. Benefiting from it in the Heat Transfer subject (and they are asked to search the internet to find the answer and discuss it in the classroom).

C - Affective and Value Objectives

- C1 - Planting values and principles in the student by emphasizing the independence of the examiner when expressing their impartial opinion.
- C2 - Emphasizing the personal traits of the examiner, such as integrity, honesty, confidentiality, and ethics.
- C3 - Explaining the importance of professional conduct rules for the examiner and their exposure to legal penalties in case of violation.
- C4 - Emphasizing the importance of combating financial and administrative corruption by the competent authorities.

D - General and Transferable Qualifying Skills

- D1 - Encouraging students to innovate and creating a spirit of perseverance and selflessness in them through continuous encouragement of the necessity of joint and effective cooperation among them to fulfill their academic requirements.
- D2 - Providing them with the university's website regarding the availability of future opportunities for appointment and employment.
- D3 - Equipping them with knowledge of the importance of developing their capabilities through self-education by reviewing various fields of knowledge.

Course Structure

Week	Hours	Required Learning Outcomes	Name of Unit / Course or Topic	Teaching Method	Assessment Method
1	3	Temperature scale Introduction to heat transfer and its definition Heat transfer by conduction, Thermal conductivity Heat transfer by convection Heat transfer by radiation	Introduction to the subject of heat transfer and definitions Types of heat transfer Steady-state one-dimensional heat conduction	Board explanation + discussion	Participation in class discussion + test
2-3	6	Plane wall Heat transfer in composite wall Heat transfer in radial system		Board explanation + discussion + problem solving	Discussion + test + homework
4-5-6	9	Overall heat transfer coefficient Critical thickness of insulation Cylinder with a heat source Conduction and convection heat transfer systems Heat transfer in extended surfaces		Board explanation + discussion + problem solving	Discussion + test + homework
7	3	Introduction Lumped heat system	Unsteady state conduction	Board explanation + discussion +	Discussion + test + homework

				problem solving	
8	3	Mid-term exams			
9-10	6	Types of flow Boundary layer on a flat plate in laminar flow Energy equation Thermal boundary layer	Convection heat transfer	Board explanation + discussion + problem solving	Discussion + test + homework
11	3	Introduction Empirical relations in pipe flow Flow across pipes	Empirical and applied mathematical relations in forced convection heat transfer	Board explanation + discussion + problem solving	Discussion + homework
12-13	6	Introduction Types of heat exchangers Overall heat transfer coefficient Fouling factors Logarithmic mean temperature difference (LMTD) Heat exchanger design by Conventional and Effectiveness-NTU methods Heat exchanger design precautions	Heat Exchangers	Board explanation + discussion + problem solving	Discussion + test + homework
14	3	Full design		Board	Discussion +

		presentation of Shell and Tubes Heat Exchanger Types and various specifications Design calculations by both methods Optimal design calculations		explanation + discussion + problem solving	test + homework
15	3	Introduction Condensation heat transfer phenomenon Condensation number Film condensation inside pipes Boiling heat transfer Simplified relations for boiling heat transfer	Condensation and boiling heat transfer	Board explanation + discussion + problem solving	Discussion + test + homework

Infrastructure

1. Required Course Books	1- Hollman (1999), Heat Transfer, 5th edition, John Wiley & Sons Inc. Any other related books.
2. Main References (Sources)	Various types of Heat Transfer books
A. Recommended books and references	* Heat Transfer Journal * Chemical Engineering Journal * Hydrocarbon Journal
B. Electronic references, internet sites	Heat and Mass Transfer for Chemical Engineering, principles and applications, by Giorgio Carta CHEMICAL ENGINEERING by Coulson & Richardsons, v1

Course Description

This course covers three main processes: gas adsorption, expulsion, distillation of bi- and multi-component mixtures, and the boundary layer. The course also includes concepts for the design of mass transfer equipment. The course aims to provide a deeper knowledge, a wider scope, and a better understanding of the mechanisms of mass transfer, as well as a deeper understanding of the analytical and experimental methods applied in the analysis and synthesis of mass transfer problems

University Of Turath	Educational Institution
Oil & Gas Refining Engineering	Scientific Department/
Unit operations I / CES. R.334	Course Name/Code
Classrooms	Available Forms of Attendance
Courses	Semester 2/Year3
45 hours of observation	Number of Hours (Total)
2027/2026	Date this description was prepared

1. Course Objectives

1. Providing students with knowledge of the nature of engineering, academic, and professional work.
2. 2- Learn the types of engineering standards and how to apply them in the field of specialization.
3. Providing them with the necessary knowledge tools in engineering laboratories.
4. Developing engineering awareness among students and benefiting from their applications.
5. . To be informed of the scientific and applied progress of the engineering field, especially oil and gas refining engineering.

1. Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

A1-1 - Providing students with knowledge of the nature of academic and professional work.

2 – Learn the types of engineering standards and how to apply them in the field of specialization.

3 – Providing them with the necessary knowledge tools in oil and gas refining engineering.

4 – Developing the student's engineering awareness and benefiting from its applications.

5 – Reviewing the scientific and applied progress of the engineering field , .especially oil and gas refining engineering.

B - Skill objectives of the course.

1. 1. Understanding the nature of engineering work and its applications.

B2 - Benefiting from engineering applications in the field of employment upon graduation and knowing how to employ them.

B3 - Contributing to scientific research, holding seminars and conferences, .and participating in conferences.

Teaching and Learning Methods

1. Adopting the method of giving lectures.
2. Giving practical seminars.

3 – Practical exercises and their discussion by the students among themselves and with the professor of the subject.

4- Laboratories and benefiting from electronic programs.

5. Adoption of platforms and e-learning and blended learning when needed.

Evaluation Methods

1 - Through the participation of students in the lecture based on their prior preparation of the material.

2- Give them exercises as a homework and ask for their solution with independent papers to be taken from them in the next lecture.

3- Broadening their perceptions by asking a simple question related to their previous studies and on which their studies in the department depend.

They are used in the course of Operating Units 1 (and they are asked to search the Internet to find out the answer and discuss it in the hall).

C. Emotional and Values Goals

A1- Instilling values and principles in the student by emphasizing the independence of the examiner when expressing his neutral opinion.

A2- Emphasizing the examiner's personal characteristics such as integrity,honesty, confidentiality and ethics.

A3- Explaining the importance of the examiner's rules of professional conduct and exposing him to legal penalties in case of violation.

A4- Emphasizing the importance of fighting financial and nistrative corruptionby the competent bodies.

d. Transferable general and qualifying skills (other skills related to employability and personal development).

D1. Transferable general and qualifying skills, other skills related to employability and personal development.

D1- Encouraging students to be creative and creating a spirit of perseverance and selflessness in them through continuous encouragement.

The necessity of joint and effective cooperation among them to achieve their study requirements.

D2- They were provided with the university's website related to the availability of future opportunities for recruitment and employment.

D3- Providing them with knowledge of the importance of developing their abilities through self-education by learning about various knowledge.

11Course structure

Evaluation Method	Teaching Method	Unit/Course Name or Theme	Required Learning Outcomes	Watches	The week
Participation in class discussion + test	Whiteboard Explanation + Discussion	General Separation Techniques. Mechanism of absorption and removal processes. Flow Systems	Introduction to Separations	3	1
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Design, Mass Transmission Coefficients and Specific Area, Capacity, Column Height Based on Gas Layer, Liquid Layer, General Conditions, Operating Line, Transmission Units, and Importance of Gas and Liquid Flow Rates.	Absorption in Columns of Packaged Layers	6	1-3

Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Types of trays, their number is analytical and graphical. How to Calculate the Efficiency of Trays .and Columns	Absorption in tray towers	6	3-5
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Partial pressure, Dalton's laws, Raoul, and Henry. Relative volatility, imperfect systems. Diffusion method, bi-mixtures, batch distillation, instant distillation, steam distillation. Retail .Column	Introduction to the Distillation Process	6	5-7
			Midterm Exams	3	8
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Number of plates required, importance of bounce ratio, location of feed point, feeding Multi- .Sidestreams	:Hash Process	3	9
Discussion + Homework	Whiteboard Explanation + Conflict + Problem Solving	Unstable Delivery Ingredient Distribution, Balance Data, Feed and Product Formulations, Minimum Bounce Ratio, Calculation of the Number of Trays Required, Relationship between Bounce Ratio and Number .of Plates	Multi-Component :Distillation	9	9-12
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	General Design Methods, Efficiency of Columns	Tablet and Compact Distillation Columns:	3	13

Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Mass transmission with total flow, flow on a flat surface, flow in a tube	:Reynolds analogy	9	13-15

Infrastructure.12

Required Textbooks -1	Course Text 1- Coulson, J. M & Richardson J. F. (2006). "Chemical engineering", Volume 2, 3rd Edition, Robert Maxwell. M. C. 2- Dutta Binary K. (2007), "Principles of.
Main References (Sources) -2	Mass Transfer & Separation Process", Bvt. Ltd. Prentice Hall, ISPN 8-1203-2990-2. Other support books:- 1- Treybal Robert E. (1975), "Mass transfer Operation" 2nd Edition, Mc-Graw-Hill Book. 2-McCabe, W., Smith, J., Harriott, P. (2004), "Unit Operations of Chemical Engineering",Mc-Graw-Hill Co., 7th Edition, ISBN0072848235
Recommended books and references (scientific journals, reports,....)	
ب References, Websites	

Course Description

Program	***Petroleum Refining and Gas Engineering***		
Course Code	**CES.R.335**	Credits hr	Units
Course Title	Chemical Reaction Kinetics		

Term	1st Semester	Theoretical	Practical	Tutorial	Total	
Prerequisite(s)	Physical Chemistry II	**2**	**-**	**1**	**3**	**2**

Course Description

Theory, Kinetic parameters and rate law, multiple reactions, yield and selectivity, stoichiometric considerations and collection and analysis of rate data .

Course Text

1-Octave Levenspiel (1999), Chemical Reactor Engineering, 3rd edition, USA John Wiley & Sons Inc., ISBN: 9780471254249.

2-J.M. Smith (1987), Chemical Engineering Kinetics, 3rd edition, McGraw-Hill International Editions, Singapore. ISBN: 9780070587106

Other support books :-

1- Ronald W. Missen; Charles A. Mims; Bradley A. Saville (1999), Introduction To Chemical Reaction Engineering And Kinetics, 1stedition, John Wiley & Sons Inc.,USA.

Course Objectives : at the end of the semester the student should be able to :-

This course aims to establish fundamental knowledge for the students in chemical reaction kinetics. At the end of this course, students should be able to:-

(i) Interpret and analysechemical reaction kinetics data.
(ii) Apply reaction kinetics principles in chemical reaction.
(iii) Identify and formulate problems in chemical reaction kinetics and find appropriate solutions**.**

Topics Covered (Syllabus)/ Chemical Reaction Kinetics

No.	Contents	Duration
1	**Introduction to reactor design:** L1: Interpretation of rate data, scale-up, and design L2: Classification of reactors.	2 hr
2	**Kinetic parameters and rate law:** L3: Definition in terms of reacting compounds and reaction extent; irreversible and reversible reactions, homogeneous catalyticreactions, conversion, yield. L4: Rate laws, stoichiometry, reaction order and elementary reactions. L5: Reaction rate constants, Arrhenius equation andvan't Hoff equation and Heat of reaction. L6: Temperature and pressure effects on reaction rates.	8 hr

Course Description

Program	*Petroleum Refining and Gas Engineering*					
Course Code	**CES.R.336**	Credits hr				Units
Course Title	Reactor Design					
Term	2nd Semester	Theoretical	Practical	Tutorial	Total	
Prerequisite(s)	Chemical Reaction Kinetics	**2**	**.**	**1**	**3**	**2**

Course Description

Theory, design fundamentals and mass conservation equations for ideal reactors, isothermal reactors for homogeneous reactions, non-isothermal reactors, multiple reactor System.

Course Text

1. **Octave Levenspiel (1999), Chemical Reactor Engineering, 3rd edition, John Wiley & Sons Inc., USA ISBN: 9780471254249.**
2. **J.M. Smith (1987), Chemical Engineering Kinetics, 3rd edition, McGraw-Hill International Editions, Singapore. ISBN: 9780070587106**

Other support books :-

2- Ronald W. Missen; Charles A. Mims; Bradley A. Saville (1999), Introduction To Chemical Reaction Engineering And Kinetics, 1stedition, John Wiley & Sons Inc.,USA.

3- . H. S. Fogler, Elements of Chemical Reaction Engineering, 4th Ed (2006), Prentice Hall,NewYorK.

Course Objectives: at the end of the semester the student should be able to :-

This course aims to establish fundamental knowledge for the students in chemical reactor engineering. At the end of this course, students should be able to:

(i) Apply reaction kinetics principles in chemical reactor engineering.

(ii) Identify and formulate problems in chemical reactor engineering and find appropriate solutions.

(iii) Specify and size the most common industrial chemical reactors to achieve production goals for processes involving homogeneous reaction systems.

Topics Covered (Syllabus)/ Course Title

No.	Contents	Duration
1	**Introduction to reactor design:** L1: Interpretation of rate data, scale-up, and design L2: Classification of reactors.	2 hr
2	**Design fundamentals and mass conservation equations for ideal reactors:** L1: Conservation of mass in reactors. L2: The ideal stirred-tank reactor (Batch and steady-state flow) L3: The ideal tubular flow reactor (PFR) L4: Space time and space velocity	4 hr
3	**Isothermal reactors for homogeneous reactions:** L5: Design procedure: Batch reactor (constant volume and constant pressure) L6: Design procedure: Continuous stirred-tank reactors (Single and multiple reactions) L7: Design procedure: Tubular-flow reactors L8: Comparison of stirred-tank and tubular-flow reactors. L9: Flow recycle reactors L10: Non-steady flow (semi-batch) reactors	8 hr
4	**Non-isothermal reactors:** L11: Energy conservation equations L12: Batch stirred-tank reactors L13: Continuous stirred-tank reactors	8 hr
5	**Multiple reactor System:** L14: Plug flow reactors in series and/or parallel L15: Equal- size mixed flow reactors in series (first order and second order reactions) L16: Mixed Flow Reactors of different sizes in series. L17: Best arrangement of a set of ideal reactors	8 hr

COURSE DESCRIPTION FORM

Course Description

This course description provides a concise summary of the principal characteristics of the course (Applied Mathematics) and the learning outcomes that students are expected to achieve, demonstrating whether they have made full use of the available learning opportunities. It must be linked to the programme description.

1. Educational Institution	Al-Turath University
2. Scientific Department / Centre	Petroleum Refining and Gas Engineering
3. Course Name / Code	Applied Mathematics / CES.R.322
4. Available Attendance Modes	Classroom attendance
5. Semester / Year	Course-based system
6. Total Study Hours	30 theoretical hours
7. Date of Preparation	2025–2026

8. Course Objectives

1. Provide students with knowledge of the nature of engineering, academic, and professional work.
2. Introduce students to the different types of engineering measurements and their application in the field of specialization.
3. Equip students with the knowledge tools required in engineering laboratories.
4. Develop students' engineering awareness and their ability to benefit from its applications.
5. Familiarize students with scientific and applied advances in engineering, particularly petroleum refining and gas engineering.

10. Course Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives

A1. Provide students with knowledge of the nature of academic and professional work.

A2. Introduce students to the types of engineering measurements and how they are applied in the field of specialization.

A3. Equip students with the knowledge tools required in petroleum refining and gas engineering.

A4. Develop students' engineering awareness and their ability to benefit from its applications.

A5. Familiarize students with scientific and applied advances in engineering, particularly petroleum refining and gas engineering.

B. Course-Specific Skills Objectives

B1. Understand the nature of engineering work and its applications.

B2. Benefit from engineering applications in professional employment after graduation and understand how to use them effectively.

B3. Contribute to scientific research, organize seminars and conferences, and participate in conferences.

Teaching and Learning Methods

1. Deliver lectures using a structured presentation approach.
2. Conduct applied seminar and tutorial sessions.
3. Assign practical exercises and discuss them among students and with the course instructor.
4. Use laboratories and benefit from electronic software applications.
5. Use learning platforms, e-learning, and blended learning when required.

Assessment Methods

1. Assess students through their participation in lectures, based on prior preparation of the course material.
2. Assign exercises as homework, require solutions on separate sheets, and collect them in the following lecture.
3. Broaden students' understanding by asking a simple question related to their previous studies and relevant to their departmental courses, including Heat Transfer; students are asked to research the answer online and discuss it in class.

C. Affective and Value-Based Objectives

C1. Instil values and principles by emphasizing the examiner's independence when expressing an impartial opinion.

C2. Emphasize personal qualities of the examiner, including integrity, honesty, confidentiality, and ethics.

C3. Explain the importance of professional codes of conduct and the legal penalties that may result from violations.

C4. Emphasize the importance of combating financial and administrative corruption through the competent authorities.

D. General and Transferable Skills (Other Skills Related to Employability and Personal Development)

D1. Encourage creativity, perseverance, selflessness, and effective cooperation among students so they can complete their academic requirements.

D2. Provide students with the university website relating to future appointment and employment opportunities.

D3. Develop students' awareness of the importance of improving their capabilities through self-education and exposure to diverse fields of knowledge.

11. Course Structure					
Week	Hours	Required Learning Outcomes	Unit / Course / Topic	Teaching Method	Assessment Method
1	3	Review: Ordinary Differential Equations	First-order, second-order, and higher-order ordinary differential equations.	Blackboard lecture + discussion	Class discussion + quiz
2–3	6			Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
4–5	6			Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
6–7	6	Partial Differential Equations	Direct integration; separation of variables (Fourier transforms); combination of variables (variation of parameters); Laplace transforms.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
8	3	Mid-Semester Examinations			
9–10	6	Laplace Transforms	Definitions and rules of Laplace transforms; the first shifting theorem; multiplication by x or x^n; inverse Laplace transforms.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
11	3			Blackboard lecture + discussion + problem solving	Discussion + homework
12–13	6	Formulation of Chemical Engineering Problems (Modeling)			
14–15	6		Storage tanks; mixing tanks; chemical reactors; heat-transfer, mass-transfer, and momentum-transfer problems; process-control systems.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework

12. Infrastructure	
1. Required Textbooks	Course Texts 1. V. G. Jenson and G. V. Jeffreys, Mathematical Methods in Chemical Engineering, 2nd edition, Academic Press, New York, 1977. 2. R. G. Rice and D. D. Do, Applied Mathematics and Modeling for Chemical Engineers, John Wiley & Sons, New York, 1995.
2. Main References (Sources)	Various books on applied mathematics in chemical engineering.
A. Recommended Books and References (Scientific Journals, Reports, etc.)	Norman W. Loney, Applied Mathematical Methods for Chemical Engineers, 2nd edition, CRC Press—Taylor & Francis Group, Boca Raton, 2007.
B. Electronic References and Internet Resources	

COURSE DESCRIPTION FORM

Course Description

This course description provides a concise summary of the principal characteristics of the course (Statistics & Numerical Analysis) and the learning outcomes that students are expected to achieve, demonstrating whether they have made full use of the available learning opportunities. It must be linked to the programme description.

1. Educational Institution	Al-Turath University
2. Scientific Department / Centre	Petroleum Refining and Gas Engineering
3. Course Name / Code	Statistics & Numerical Analysis / CES.R.321
4. Available Attendance Modes	Classroom attendance
5. Semester / Year	Course-based system
6. Total Study Hours	30 theoretical hours
7. Date of Preparation	2025–2026

8. Course Objectives

1. Provide students with knowledge of the nature of engineering, academic, and professional work.
2. Introduce students to the different types of engineering measurements and their application in the field of specialization.
3. Equip students with the knowledge tools required in engineering laboratories.
4. Develop students' engineering awareness and their ability to benefit from its applications.
5. Familiarize students with scientific and applied advances in engineering, particularly petroleum refining and gas engineering.

10. Course Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives

A1. Provide students with knowledge of the nature of academic and professional work.

A2. Introduce students to the types of engineering measurements and how they are applied in the field of specialization.

A3. Equip students with the knowledge tools required in petroleum refining and gas engineering.

A4. Develop students' engineering awareness and their ability to benefit from its applications.

A5. Familiarize students with scientific and applied advances in engineering, particularly petroleum refining and gas engineering.

B. Course-Specific Skills Objectives

B1. Understand the nature of engineering work and its applications.

B2. Benefit from engineering applications in professional employment after graduation and understand how to use them effectively.

B3. Contribute to scientific research, organize seminars and conferences, and participate in conferences.

Teaching and Learning Methods

1. Deliver lectures using a structured presentation approach.
2. Conduct applied seminar and tutorial sessions.
3. Assign practical exercises and discuss them among students and with the course instructor.
4. Use laboratories and benefit from electronic software applications.
5. Use learning platforms, e-learning, and blended learning when required.

Assessment Methods

1. Assess students through their participation in lectures, based on prior preparation of the course material.
2. Assign exercises as homework, require solutions on separate sheets, and collect them in the following lecture.
3. Broaden students' understanding by asking a simple question related to their previous studies and relevant to their departmental courses, including Heat Transfer; students are asked to research the answer online and discuss it in class.

C. Affective and Value-Based Objectives

C1. Instil values and principles by emphasizing the examiner's independence when expressing an impartial opinion.

C2. Emphasize personal qualities of the examiner, including integrity, honesty, confidentiality, and ethics.

C3. Explain the importance of professional codes of conduct and the legal penalties that may result from violations.

C4. Emphasize the importance of combating financial and administrative corruption through the competent authorities.

D. General and Transferable Skills (Other Skills Related to Employability and Personal Development)

D1. Encourage creativity, perseverance, selflessness, and effective cooperation among students so they can complete their academic requirements.

D2. Provide students with the university website relating to future appointment and employment opportunities.

D3. Develop students' awareness of the importance of improving their capabilities through self-education and exposure to diverse fields of knowledge.

11. Course Structure					
Week	Hours	Required Learning Outcomes	Unit / Course / Topic	Teaching Method	Assessment Method
1	3	Introduction to Numerical Analysis	Numerical solutions; types of errors; relative and absolute errors.	Blackboard lecture + discussion	Class discussion + quiz
2–3	6	Interpolation and Polynomial Approximation	Lagrange interpolating polynomials; Newton's divided differences.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
4–5	6	Curve Fitting and Root Finding	Linear regression; polynomial models; nonlinear data.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
6–7	6	Numerical Differentiation and Numerical Integration	Forward, backward, and central-difference approximations; trapezoidal and Simpson's 1/3 and 3/8 rules; double integrals using trapezoidal and Simpson's rules.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
8	3	Mid-Semester Examinations			
9–10	6	Solution of Ordinary Differential Equations	Initial-value problems; Taylor-series, Euler, Runge–Kutta, and predictor–corrector methods for first-order and simultaneous ordinary differential equations.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
11 12–13 14–15	10	1. Role of Statistics in Engineering 2. Data Summary and Presentation 3. Probability 4. Discrete Probability Distributions 5. Continuous Probability Distributions 6. Joint Probability Distributions	Descriptive statistics; probability rules and combinatorial analysis; discrete, continuous, joint, marginal, and bivariate normal distributions.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework

12. Infrastructure	
1. Required Textbooks	Course Texts 1. Steven C. Chapra and Raymond P. Canale, Numerical Methods for Engineers, 6th edition, McGraw-Hill, 2010. 2. Joe D. Hoffman, Numerical Methods for Engineers and Scientists, McGraw-Hill, 1993. 3. C. F. Gerald and P. O. Wheatley, Applied Numerical Analysis, 6th edition, Pearson Education, 2006.
2. Main References (Sources)	Various books covering numerical analysis and statistics.
A. Recommended Books and References (Scientific Journals, Reports, etc.)	Alkis Constantinides and Navid Mostoufi, Numerical Methods for Chemical Engineers with MATLAB Applications, Prentice Hall, 1999.
B. Electronic References and Internet Resources	

Course Description Form

This academic program description provides a concise summary of the most important characteristics of the program and the learning outcomes expected of the student to achieve and demonstrate whether they have made the most of the available opportunities. It is accompanied by a description of each course within the program.

Al-Turath University	. Educational Institution
Oil & Gas Refining Engineering	Scientific Department/Center
Unit Operation II/ CES.R.431	Name of the academic or professional program
Bachelor of Engineering/Oil & Gas Refining	Name of Final Certificate
Courses	Academic System : Annual/Courses/Other
Study plans approved by the sectoral committee	Accredited Accreditation Program
Related Laws and Guidelines	Other External Influences
2027/2026	Description Preparation Date

1. OObjectives of the Academic Program

1 - Graduation of qualified scientific and professional faculty in the disciplines of oil and gas refining engineering.

2. Prepare the academic, financial, and human requirements for the morning preliminary studies in the department.

3 - Keeping pace with the scientific development of the educational process and the state of its elaborate implementation.

4. Opening knowledge channels in research, professional and consultative communication with public and private counterparts.

5. Producing and disseminating professional knowledge in the fields of oil and gas

refining engineering through the organization of
Seminars, workshops, scientific lectures and scientific courses, conferences and seminars and others.
6- Contributing to solving institutional problems in the field of engineering .specialization

1. Required Program Outcomes and Teaching, Learning and Assessment Methods

1. Cognitive Objectives
   1. Numbers of scientifically qualified graduates in oil and gas refining engineering.
   2. Preparing academically qualified cadres for admission to postgraduate studies.
   3- Keeping pace with the scientific development of the educational process.
   4. Scientific cooperation with the ministries of state and the private sector.
   5 - Contributing to scientific research, holding seminars and conferences, and participating in conferences.

. 6- Contributing to solving institutional problems in scientific ways

B. Program Skills Objectives

1- Professional skills in the aspects of oil and gas refining engineering.
2- Data analysis skills in oil and gas refining engineering.

. 3. Acquire the necessary skills in the field of specialization

C. Teaching and Learning Methods

1. Adopting the method of giving lectures.
2- Giving applied study opportunities.
3- Practical exercises and discussion by students among themselves and with the professor of the subject.
4- Laboratories and benefiting from electronic programs.
.5- Adoption of platforms and e-learning and blended learning when needed

D. Evaluation Methods

1- Adopting smart means such as smart boards and displays.
2- Participation of students in the lecture.
3-Prepare the material in advance and approve the exercises as homework.
4- Broaden their perceptions by asking questions about their previous studies.
5- Research the solution of the subject based on scientific sources and the .Internet.

C. Emotional and Values Goals

1. Instilling values and principles in the student
2. Emphasizing the personal characteristics of workers in the oil and gas refining engineering sector and the oil industries in general.Such as integrity, honesty, confidentiality, ethics, and the health of the citizen.
3. Demonstrate the importance of the Code of Professional Conduct.
4- Combating financial and administrative corruption by the competent .agencies

Teaching and Learning Methods

1- Giving lectures that encourage emotional values.
2. Holding seminars and workshops for students during the academic year.
3- Field visits to ministries and health institutions related to engineering .specialization.

Evaluation Methods

1 Follow up on students' behavior.
2. Formation of academic and educational advising committees.
3- The educational supervisor for each class.
4. Student Discipline Committees.

d. Transferable general and qualifying skills (other skills related to employability and personal development)

1- Encouraging students to be creative and creating a spirit of perseverance and selflessness by encouraging the necessity of
Collaborate with each other to accomplish the requirements of understanding the study.
2- Activating the activities of the graduates' follow-up workshops.
3- Volunteer work for students.
4- Providing students through self-education and self-talents such as sports and arts, especially since the university has a Department of Physical .Education and Sport Sciences.

8. Program Structure

Credit Hours	Course or course	Course or course code	Stage of

Practical	Theoretical	**name**		**study**
2	2	Unit Operations II		Fourth Level First Course

1. Personal Development Planning

Encouraging students to achieve the highest grades in the final stages of their studies at the college in order to be the first in order to Achieving their future dreams of completing their postgraduate studies and encouraging them to work in vocational institutes Specialized in Oil & Gas Refining Engineering

1. Admission Criteria (Setting Regulations for Admission to a College or Institute)

First: The Ministry's instructions for central admission.
Second: Admission to the department is specific to specific criteria from the Ministry.
Third: Graduates of the scientific branch exclusively.
Fourth:Absorptive capacity.
.Fifth: The sequence of the department within the departments of the college

1. Key sources of information about the program

1 - Methodological and auxiliary books.

2. The Ministry's controls and instructions.

3. Sectoral Committee.

4 – Review the experiences of the corresponding departments in local, Arab and .international universities

Curriculum Skills Chart																			
Please indicate the boxes corresponding to the individual learning outcomes from the program being evaluated																			
Learning Outcomes Required from the Program																			
Transferable general and qualifying skills (other skills related to employability and personal development)				Emotional and Values Goals				Program Skills Objectives				Cognitive Goals				Basic Or optional	Course Name	Course Code	Year/Level
4D	D 3	D 2	D 1	4C	3C	2C	1C	4B	3B	2B	1B	4A	3A	2A	1A				
*	*	*	*	*	*	*	*	*	*	*	*	*			*	basic	UNIT OPERATIONS II		Fourth Level

A. Knowledge and Understanding

A1: The mathematics, science, and engineering behind the practice of chemical engineering.

A2: Operating units that are used in chemical engineering systems and analytical and computer tools to deal with them.

A3 : The range of chemical engineering from the molecular to the broad range.

. **A4 : Economic, administrative, and legal requirements that go into the practice of chemical engineering**

b. Program-specific skills

B1: Use mathematics, science, and engineering to support the theoretical and practical analysis of process processes.
B2: Employing concepts from applied and engineering sciences in a creative way to design industrial processes and equipment.
B3: Demonstrate awareness of the importance of scaling technologies in the design of heat transfer devices and heat exchangers.

c.- Thinking skills

A1: The use of existing computers and software in quantitative and analytical work, as well as general information technology for communication and data processing.
A2: Evaluate designs, systems, processes, and products to identify areas of potential hazard and environmental threat, and propose improvements.

A3: Use laboratory, engineering and measurement equipment to provide data to support theoretical understanding.

A4: Analyze and solve engineering problems, often on the basis of limited and contradictory information.

General and transferable skills (other skills relevant to employability and personal development)

D1: Manipulate, sort, and present data into useful forms for understanding. Selection, interpretation, and validation of data, identifying potential errors and inconsistencies

D2: Clearly communicate the results of experiments, projects, and other tasks using written reports and oral and visual presentations.

D3: Work effectively in a team, acknowledging the roles played by different team members.

D4: Development takes place in theexperimental work of the brainand design tasks; for example, students obtain data from manuals and computer databases and use it in calculations, graphical solutions, and computer applications.

Course Description Form

Course Description

Theory, Applications and Design of Module Processes Mainly Used in Chemical Industry, Solids Drying, Humidification, Dehumidification, Cooling Tower, Liquid Evaporation and Crystallization

University Of TURATH	.15 Educational Institution
Oil & Gas Refining Engineering	.16 Scientific Department/Center
Unit operations II	.17 Course Name/Code
Classrooms	.18 Available Forms of Attendance
Courses	.19 Semester/Year
My watch 30	.20 Number of Hours (Total)
2027/2026	.21 Date this description was prepared

1. Course Objectives

1-Providing students with knowledge of the nature of engineering, academic, and professional work.

2- Learn the types of engineering standards and how to apply them in the field of specialization.

3. Providing them with the necessary knowledge tools in engineering laboratories.

4. Developing engineering awareness among students and benefiting from their applications.

5. To be informed of the scientific and applied progress of the Eng. field, .especially oil and gas refining engineering.

1. Course Outcomes, Teaching, Learning and Assessment Methods

A. Cognitive Objectives

A1-1 - Providing students with knowledge of the nature of academic and professional work.

2 – Learn the types of engineering standards and how to apply them in the field of specialization.

3 – Providing them with the necessary knowledge tools in oil and gas refining engineering.

4 – Developing the student's engineering awareness and benefiting from its applications.

5 – Reviewing the scientific and applied progress of the engineering field ,
. especially oil and gas refining engineering.

b. Skill objectives of the course.

1. 1. Understanding the nature of engineering work and its applications.

B2 - Benefiting from engineering applications in the field of employment upon graduation and knowing how to employ them.

B3 - Contributing to scientific research, holding seminars and conferences, .and participating in conferences.

Teaching and Learning Methods

1. Adopting the method of giving lectures.
2. Giving practical seminars.
3. 3 – Practical exercises and their discussion by the students among themselves and with the professor of the subject.
4. 4- Laboratories and benefiting from electronic programs.

5- Adoption of platforms and e-learning and blended learning when .5 .needed

Evaluation Methods

1- Through the participation of students in the lecture based on their prior preparation of the subject.

2- Give them exercises as a homework and ask for their solution with independent papers to be taken from them in the next lecture.

3- Broadening their perceptions by asking a simple question related to their previous studies and on which their studies in the department depend.

They are used in the heat transfer material (and they are asked to search the Internet to find out the answer and discuss it in the hall).

C. Emotional and Values Goals

A1- Instilling values and principles in the student by emphasizing the independence of the examiner when expressing his neutral opinion.

A2- Emphasizing the examiner's personal characteristics such as integrity,honesty, confidentiality and ethics.

A3- Explaining the importance of the examiner's rules of professional conduct and exposing him to legal penalties in case of violation.

A4- Emphasizing the importance of fighting financial and .administrative corruptionby the competent bodies.

d. Transferable general and qualifying skills (other skills related to employability and personal development).

D1. Transferable general and qualifying skills, other skills related to employability and personal development.

D1- Encouraging students to be creative and creating a spirit of perseverance and selflessness in them through continuous encouragement.

The necessity of joint and effective cooperation among them to achieve their study requirements.

D2- They were provided with the university's website related to the availability of future opportunities for recruitment and employment.

D3- Providing them with knowledge of the importance of developing their .abilities through self-education by learning about various knowledge.

11Course structure

Evaluation Method	Teaching Method	Module/Course or Subject Name	Required Learning Outcomes	Watches	The week
Participation in class discussion + test	Whiteboard Explanation + Discussion	Introduction: Drying of solids.... General Principles. Wet solids set. Terminology and definitions. Measure	Drying of Solids	6	1-3

		humidity. Humidity Data for the System Air and water. Temperature and humidity chart (psychometric chart). Uses of a hygro chart. Drying rate. Method of calculating the drying rate and time. Drying rate. Drying time. The mechanism of moisture movement in wet solids. Balancing materials and heat in continuous dryers. Drying rate in direct-heat continuous dryers. Horse drying. High temperature. Drying at low temperature. Drying .Equipment			
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Introduction. Moisturizing operations. Adibatical processes. Non-Adiatic Processes. Mixing moisture streams. Mixing two streams of wet gas. Add liquid or steam to a gas. The theory of hydration processes. Principles and Operations of Cooling Towers. Classification of cooling towers. Cooling Tower Design. Adiabatic hydration - cooling. Dehumidification .Tower	Humidification, dehumidification, :cooling towers	9	4-9
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Introduction, Types of Evaporation, Evaporation Equipment, Heat Transfer in the Evaporation Process, Single-Effect, Dual-Effect, and Multi-Effect Evaporators, Evaporator Design, Comparison of Front,	:A vaporization	9	9-11

		Back, and Parallel Effect Evaporators, .High Boiling Point			
			Midterm Exams		12
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	=: Crystallization Basics, Cryocrystallization, Evaporative Crystallization, Batch Crystallization and Continuous Crystallization, Crystallization Device Selection.	Crystallization	6	15

	.Infrastructure 12
1- Coulson, J.M and Richardson J.F. "Chemical Engineering , Volume 1, 3rd edition ,Robert Maxwell.M.C. 2- Coulson J.M, and Richardson J.F. "Chemical Engineering, Volume 2, 3rd edition, Robert Maxwell.M.C. Other support books :- 1- Perry,J.H, "Chemical engineering handbook ",Mc-Graw – Hill Bookcom.1975. 2- Binay.K.Dutta "Mass transfer and separation process" 2007. Trebal Robert E., "Mass transfer operation"2nd edition, -3 .Mc-Graw –Hill Book com.1975	Required Textbooks -1
Books on the transfer of materials of various types	Main References (Sources) -2
* Chemical Engineering Journal * Hydrocarbon Journal	Recommended Books and -ا References (Scientific Journals, Reports,....)
Heat and Mass Transfer for Chemical Engineering, principle and application,by Giorgio Carta CHEMICAL ENGINEERING by Coulson & Richardsons, v1	in References, Websites

COURSE DESCRIPTION FORM

Course Description

This course description provides a concise summary of the principal characteristics of the course (Process Dynamics) and the learning outcomes that students are expected to achieve, demonstrating whether they have made full use of the available learning opportunities. It must be linked to the programme description.

1. Educational Institution	Al-Turath University
2. Scientific Department / Centre	Petroleum Refining and Gas Engineering
3. Course Name / Code	Process Dynamics — CES.R.433
4. Available Attendance Modes	Classroom attendance
5. Semester / Year	Course-based system
6. Total Study Hours	30 theoretical hours
7. Date of Preparation	2025–2026

8. Course Objectives

1. Provide students with knowledge of the nature of engineering, academic, and professional work.
2. Introduce students to the different types of engineering measurements and their application in the field of specialization.
3. Equip students with the knowledge tools required in engineering laboratories.
4. Develop students' engineering awareness and their ability to benefit from its applications.
5. Familiarize students with scientific and applied advances in engineering, particularly petroleum refining and gas engineering.

10. Course Outcomes and Teaching, Learning, and Assessment Methods A. Cognitive Objectives A1. Provide students with knowledge of the nature of academic and professional work. A2. Introduce students to the types of engineering measurements and how they are applied in the field of specialization. A3. Equip students with the knowledge tools required in petroleum refining and gas engineering. A4. Develop students' engineering awareness and their ability to benefit from its applications. A5. Familiarize students with scientific and applied advances in engineering, particularly petroleum refining and gas engineering.
B. Course-Specific Skills Objectives B1. Understand the nature of engineering work and its applications. B2. Benefit from engineering applications in professional employment after graduation and understand how to use them effectively. B3. Contribute to scientific research, organize seminars and conferences, and participate in conferences.
Teaching and Learning Methods 1. Deliver lectures using a structured presentation approach. 2. Conduct applied seminar and tutorial sessions. 3. Assign practical exercises and discuss them among students and with the course instructor. 4. Use laboratories and benefit from electronic software applications. 5. Use learning platforms, e-learning, and blended learning when required.
Assessment Methods 1. Assess students through their participation in lectures, based on prior preparation of the course material. 2. Assign exercises as homework, require solutions on separate sheets, and collect them in the following lecture. 3. Broaden students' understanding by asking a simple question related to their previous studies and relevant to their departmental courses, including Heat Transfer; students are asked to research the answer online and discuss it in class.
C. Affective and Value-Based Objectives C1. Instil values and principles by emphasizing the examiner's independence when expressing an impartial opinion. C2. Emphasize personal qualities of the examiner, including integrity, honesty, confidentiality, and ethics. C3. Explain the importance of professional codes of conduct and the legal penalties that may result from violations. C4. Emphasize the importance of combating financial and administrative corruption through the competent authorities.
D. General and Transferable Skills (Other Skills Related to Employability and Personal Development) D1. Encourage creativity, perseverance, selflessness, and effective cooperation among students so they can complete their academic requirements. D2. Provide students with the university website relating to future appointment and employment opportunities. D3. Develop students' awareness of the importance of improving their capabilities through self-education and exposure to diverse fields of knowledge.

11. Course Structure					
Week	Hours	Required Learning Outcomes	Unit / Course / Topic	Teaching Method	Assessment Method
1	3	Linear Open-Loop Systems	Transfer functions; transient response; forcing functions: step, impulse, ramp, and sinusoidal responses.	Blackboard lecture + discussion	Class discussion + quiz
2–3	6			Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
4–5	6			Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
6–7	6	Applications of First-Order Systems	Liquid-level systems; heating systems; mass-transfer systems; reactors; absorbers; pressure vessels; linearization.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
8	3	Mid-Semester Examinations			
9–10	6	Response of First-Order Systems in Series	Noninteracting and interacting systems.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
11	3			Blackboard lecture + discussion + problem solving	Discussion + homework
12–13	6	Higher-Order Systems			
14–15	6		Second-order systems: underdamped, critically damped, and overdamped responses; transportation lag.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework

	12. Infrastructure
1. Required Textbooks	Course Texts 1. D. R. Coughanowr and S. LeBlanc, Process Systems Analysis and Control, McGraw-Hill, 3rd edition, 2008. 2. G. Stephanopoulos, Chemical Process Control: An Introduction to Theory and Practice, Prentice Hall, New Jersey, 1984.
2. Main References (Sources)	Various books covering the different fields of process dynamics and control.
A. Recommended Books and References (Scientific Journals, Reports, etc.)	• Process Dynamics and Control Journal • Chemical Engineering Journal • Hydrocarbon Journal
B. Electronic References and Internet Resources	Chemical Engineering, Vol. 1, by Coulson and Richardson Other reputable websites

Course Description

Comprehensive understanding of transport processes related to chemical engineering processes with a focus on the theory, design, and applications of solid-liquid filtration, sedimentation, liquid recovery, extraction and washing.

University OF AL-Turath	Educational Institution
Oil & Gas Refining Engineering	Scientific Department/Center
Unit operations III / CES.R.432	Course Name/Code
Classrooms	Available Forms of Attendance
Courses	Semester2/Year 4
45 hours of observation	Number of Hours (Total)
2027-2026	Date this description was prepared

1. Course Objectives

1. Providing students with knowledge of the nature of engineering, academic, and professional work.
2- Learn the types of engineering standards and how to apply them in the field of specialization.
3. Providing them with the necessary knowledge tools in engineering laboratories.
4. Developing engineering awareness among students and benefiting from their applications.
5. To be informed of the scientific and applied progress of the engineering field, especially oil and gas refining engineering.

1. Course Outcomes, Teaching, Learning and Assessment Methods

أ- Cognitive Goals

A1-1 - Providing students with knowledge of the nature of academic and professional work.

2 – Learn the types of engineering standards and how to apply them in the field of specialization.

3 – Providing them with the necessary knowledge tools in oil and gas refining engineering.

4 – Developing the student's engineering awareness and benefiting from its applications.

5 – Reviewing the scientific and applied progress of the engineering field , .especially oil and gas refining engineering.

B - Course-specific skill objectives.

B1. Understanding the nature of engineering work and its applications.

B2 - Benefiting from engineering applications in the field of employment upon graduation and knowing how to employ them.

B3 - Contributing to scientific research, holding seminars and conferences, .and participating in conferences.

Teaching and Learning Methods

1. Adopting the method of giving lectures.
2. Giving practical seminars.

3 – Practical exercises and their discussion by the students among themselves and with the professor of the subject.

4- Laboratories and benefiting from electronic programs.

.5- Adoption of platforms and e-learning and blended learning when needed

Evaluation Methods

1- Through the participation of students in the lecture based on their prior preparation of the subject.

2- Give them exercises as a homework and ask for their solution with independent papers to be taken from them in the next lecture.

3- Broadening their perceptions by asking a simple question related to their previous studies and on which their studies in the department depend.

It is used in the operating units (and they are asked to search the Internet to

.find out the answer and discuss it in the hall).

C. Emotional and Values Goals

A1- Instilling values and principles in the student by emphasizing the independence of the examiner when expressing his neutral opinion.

A2- Emphasizing the examiner's personal characteristics such as integrity,honesty, confidentiality and ethics.

A3- Explaining the importance of the examiner's rules of professional conduct and exposing him to legal penalties in case of violation.

A4- Emphasizing the importance of fighting financial and .administrative corruption by the competent bodies.

Transferable general and qualifying skills (other skills - d related to employability and personal development).

D1. Transferable general and qualifying skills, other skills related to employability and personal development.

D1- Encouraging students to be creative and creating a spirit of perseverance and selflessness in them through continuous encouragement.

The necessity of joint and effective cooperation among them to achieve their study requirements.

D2- They were provided with the university's website related to the availability of future opportunities for recruitment and employment.

D3- Providing them with knowledge of the importance of developing their .abilities through self-education by learning about various knowledge.

Evaluation Method	Teaching Method	Module/Course or Subject Name	Required Learning Outcomes	Watche	The week
Participation in class discussion + test	Whiteboard Explanation + Discussion	Filter Types, Filtration Theory, Plate and Frame Filter Press, Sheet Filter, Filtration at Constant ΔP , Fixed Rate Filtration, .Washing Time	Nomination	12	1-4
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Introduction, Deposition and Deposition in Particulate Fluid Separation, Deposition and Condensation Design, Deposition and Deposition .Equipment	Sedimentation:	9	4-7
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Definition, extraction process, equilateral triangular coordinates (triangular diagram), system of three liquids - one pair of partially soluble, solvent selection, cross-current extraction equipment, multi-stage cross-current extraction of insoluble liquid, continuous countercurrent extraction, continuous reverse current in soluble liquid, inferior solvent. General Principles, Extraction Equipment	Liquid-liquid extraction Solid Liquid Extraction	18	7-13
			Exam	3	
Discussion + Quiz + Homework	Whiteboard Explanation + Conflict + Problem Solving	Introduction, Classification of Membrane Processes, General Membrane Equation, Fluid Permeability Membrane Processes, Gas Permeability Membrane Processes, Reverse Osmosis, Reverse Osmosis with Water Treatment Plant, Ultrafiltration Membrane	Membranes	6	13-15

		Processes, Microfiltration Membrane Processes			

	Infrastructure .12
Required Textbooks -1	• Coulson ,J.M and Richardson J.F. “Chemical Engineering” , Volume 1, 3rd edition, Robert Maxwell.M.C. • Coulson,J.M and Richardson J.F. “Chemical Engineering” , Volume 2, 3rd edition , Robert Maxwell.M.C. Other support books :- • De Sinha and Parameswar De “Mass Transfer: Principles and Operations”, ParameswarDe , New Delhi, 2012 • Binay.K.Dutta “Mass transfer and separation process” 2007. Trebal Robert E., “Mass transfer operation”2nd edition, Mc- • .Graw –Hill Book com.1975
2 Main References (Sources)	Other support books :- • De Sinha and Parameswar De “Mass Transfer: Principles and Operations”, ParameswarDe , New Delhi, 2012 • Binay.K.Dutta “Mass transfer and separation process” 2007. Trebal Robert E., “Mass transfer operation”2nd edition, Mc- • Graw –Hill Book com.1975
Recommended books and references (scientific journals, reports,....)	
in References, Websites	

Course Description

This course description provides a concise summary of the principal characteristics of the course (Process Control) and the learning outcomes that students are expected to achieve, demonstrating whether they have made full use of the available learning opportunities. It must be linked to the programme description.

1. Educational Institution	Al-Turath University
2. Scientific Department / Centre	Petroleum Refining and Gas Engineering
3. Course Name / Code	Process Control — CES.R.434
4. Available Attendance Modes	Classroom attendance
5. Semester / Year	Course-based system
6. Total Study Hours	30 theoretical hours
7. Date of Preparation	2025–2026

8. Course Objectives

1. Provide students with knowledge of the nature of engineering, academic, and professional work.
2. Introduce students to the different types of engineering measurements and their application in the field of specialization.
3. Equip students with the knowledge tools required in engineering laboratories.
4. Develop students' engineering awareness and their ability to benefit from its applications.
5. Familiarize students with scientific and applied advances in engineering, particularly petroleum refining and gas engineering.

10. Course Outcomes and Teaching, Learning, and Assessment Methods A. Cognitive Objectives A1. Provide students with knowledge of the nature of academic and professional work. A2. Introduce students to the types of engineering measurements and how they are applied in the field of specialization. A3. Equip students with the knowledge tools required in petroleum refining and gas engineering. A4. Develop students' engineering awareness and their ability to benefit from its applications. A5. Familiarize students with scientific and applied advances in engineering, particularly petroleum refining and gas engineering.
B. Course-Specific Skills Objectives B1. Understand the nature of engineering work and its applications. B2. Benefit from engineering applications in professional employment after graduation and understand how to use them effectively. B3. Contribute to scientific research, organize seminars and conferences, and participate in conferences.
Teaching and Learning Methods 1. Deliver lectures using a structured presentation approach. 2. Conduct applied seminar and tutorial sessions. 3. Assign practical exercises and discuss them among students and with the course instructor. 4. Use laboratories and benefit from electronic software applications. 5. Use learning platforms, e-learning, and blended learning when required.
Assessment Methods 1. Assess students through their participation in lectures, based on prior preparation of the course material. 2. Assign exercises as homework, require solutions on separate sheets, and collect them in the following lecture. 3. Broaden students' understanding by asking a simple question related to their previous studies and relevant to their departmental courses, including Heat Transfer; students are asked to research the answer online and discuss it in class.
C. Affective and Value-Based Objectives C1. Instil values and principles by emphasizing the examiner's independence when expressing an impartial opinion. C2. Emphasize personal qualities of the examiner, including integrity, honesty, confidentiality, and ethics. C3. Explain the importance of professional codes of conduct and the legal penalties that may result from violations. C4. Emphasize the importance of combating financial and administrative corruption through the competent authorities.
D. General and Transferable Skills (Other Skills Related to Employability and Personal Development) D1. Encourage creativity, perseverance, selflessness, and effective cooperation among students so they can complete their academic requirements. D2. Provide students with the university website relating to future appointment and employment opportunities. D3. Develop students' awareness of the importance of improving their capabilities through self-education and exposure to diverse fields of knowledge.

11. Course Structure					
Week	Hours	Required Learning Outcomes	Unit / Course / Topic	Teaching Method	Assessment Method
1	3	Instrumentation; Linear Closed-Loop Systems	Sensors: pressure, temperature, level, flow, and concentration; control valves; the control system; controllers and final control elements; block diagram of a controlled system; overall closed-loop transfer functions.	Blackboard lecture + discussion	Participation in classroom discussion + quiz
2–3	6			Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
4–5	6			Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
6–7	6	Characteristics of the Closed-Loop System	Transient response of simple control systems; stability.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
8	3	Mid-Semester Examinations			
9–10	6	Frequency-Response Methods	Introduction to frequency response; Bode diagrams; control-system design by frequency response; Ziegler–Nichols controller settings.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework
11	3			Blackboard lecture + discussion + problem solving	Discussion + homework
12–13	6	Computer Control of Chemical Processes; Control of Complex Processes			
14–15	6		Analog computers; digital computers; computer-control loops. Distillation columns; heat exchangers; catalytic reactors.	Blackboard lecture + discussion + problem solving	Discussion + quiz + homework

12. Infrastructure	
1. Required Textbooks	Course Texts 1. D. R. Coughanowr and S. LeBlanc, Process Systems Analysis and Control, McGraw-Hill, 3rd edition, 2008. 2. G. Stephanopoulos, Chemical Process Control: An Introduction to Theory and Practice, Prentice Hall, New Jersey, 1984.
2. Main References (Sources)	Various books covering the different fields of process control.
A. Recommended Books and References (Scientific Journals, Reports, etc.)	• Process Dynamics and Control Journal • Chemical Engineering Journal • Hydrocarbon Journal
B. Electronic References and Internet Resources	Chemical Engineering, Vol. 1, by Coulson and Richardson Other reputable websites