Ministry of higher education & scientific research
AL-Furat Al-Awsat technical university
AL-Samawa technical institute
Petroleum refinery and gas department

وزارة التعليم العالي والبحث الجامعي
الفرات الأوسط التقنية الجامعة
المعهد التقني سماوة
قسم تقنيات تكرير النفط والغاز

Academic Program

University: Al-Furat Al-Awsat Technical University

College / Institute: Al-Samawa Technical Institute

Scientific Department: Petroleum Refinery and Gas Technologies

Date of File Submission: / / 2024

Signature:
Name of Department Head:

Lec. Idrees Mahmoud Ahmed
Date: / / 2024

Signature:
Name of Scientific Assistant:

Assist. Prof. Dr. Alaa Abd Ali
Date: / / 2024

The file has been reviewed by the Quality Assurance and University Performance Division.

Name of the Head of Quality Assurance and University Performance Division:

Signature: 9/16

Assist.Lec. Izdihar yasser Mohsen

Date: 16 / 9 / 2024

Dean's Approval

Academic Program Description

This academic program description provides a brief summary of the most important characteristics of the program and the learning outcomes expected of the student to achieve, proving whether he has made the most of the available opportunities.

It is accompanied by a description of each course within the program.

1	**Educational institution**	**Middle Euphrates Technical University**
2	**Scientific Department Center**	**Technical Institute/Samawa Oil & Gas Refining Technologies**
3	**Name of academic or vocational program**	**Oil & Gas Technologies Operation of Industrial Units and Oil Refining**
4	**Final Certificate Name**	**Technical Diploma in the Operation of Industrial and Oil Units**
5	**School System**	**Decisions for the first and second phases of the two branches**
6	**Accredited Accreditation Program**	**Modular System**
7	**Other external influences**	**Training Courses + Field Visits**
8	**Date of preparation of the description**	**2024/ /**

9- Objectives of the academic program:

The Department of Chemical Industries aims to graduate qualified technical staff to carry out the operation, maintenance and control of the operating devices of oil and gas industrial units in oil factories, including conducting laboratory tests on the final raw and manufactured materials and conforming to their standard specifications.

10 - Program Outcomes Required and Methods of Teaching, Learning and Evaluation :

A- Cognitive Objectives /

1- **Introducing the student to the methods of operating and controlling the various petroleum industrial devices and units and carrying out chemical and oil production work produced in factories .**

2- The student compares the chemical, physical and laboratory tests of chemical and oil raw materials and contributes with specialized cadres in making modifications and improvements to industrial units
3- The student uses drawings, maps and industrial plans related to chemical laboratories .
4- Implementation of quality control work for the purpose of conformity . of the product to international and Iraqi standard specifications
5- Introducing the student to the use of the electronic calculator to apply . the vocabulary of the curriculum

B - Skills objectives of the program /

1- The student acquires the skill of conducting laboratory and oil analyzes.
2- Using laboratory tools and oil workshops with quality and keenness on the safety and accuracy of the results.
3- Implementation of graphs and diagrams for the practical lesson .

Teaching and learning methods

Book Theoretical lecture practical training in laboratories, Power point seminars and seminars Discussion page, scientific developments, summer training, educational videos, scientific trips, graduation research.

Evaluation methods

Daily evaluation, oral tests, pre-tests, weekly reports, semester exam, including the first semester and the second semester (practical + theoretical).

C- Emotional and value goals /

1- The student learns about the work of industrial operating units and their role in building the country .
2- Encourage the student to gain practical experience and link it to theoretical principles .
3- Learn accuracy and discipline in receiving science and knowledge 4- Learn to communicate and interact during the lecture .

Teaching and learning methods

Practical and theoretical lectures, listening to professors and scientists within the specialization in the scientific department, through methodological and external books, through websites on the Internet, and the presentation of scientific films, videos and field visits.

Evaluation methods

Quarterly and daily written and oral student tests and scientific reports .

d. General and qualifying skills transferred (other skills related to employability and personal development).

1- **Communication and conversation skills such as English, computer, presentation skill and introducing the student to his rights and duties (a basic standard for human rights).**
2- **Teamwork skills and encouraging the policy of discussions so that the student has the scientific creative ability.**
3- **Self-learning skills, self-reliance and teaching the student to link the mathematical formulas of scientific laws to petroleum chemistry .**
4- **Training the student on the use of websites and modern scientific programs.**

Teaching and learning methods

1- **. Daily exams with home questions to solve them self-practical tests**
2- **. Oral tests during lectures**
3- **C - Competitive tests among groups of students for the same division.**
4- **D- Tests to encourage scientific competition between the student people and stages .**

Evaluation methods

Commitment to assignments (such as making reports in the field of specialization and then discussing reports) and setting scores on written and oral tests and weekly and annual reports.

10- Program Structure (Study Plan):

Vocabulary and study units (Department of Oil and Gas Refining Technologies / for the academic year 2024/2025

Second stage

Observations	Material Type	Number of Units	Number of hours per week			Material	t
			M	on	nun		
English	Specialized	10	5	3	2	Oil Refining	1
English	Specialized	10	5	3	2	Heavy oils	2
English	Specialized	12	6	3	3	Heat transfer	3
English	Specialized	10	5	3	2	Petrochemicals	4
English	Specialized	8	4	2	2	Measurement and control techniques	5
Arabic	Specialized	8	4	2	2	Industrial Equipment	6
Arabic	Support	3	3	2	1	Computer Technologies2	7
Arabic	year	2	-	-	1	English Language	8
Arabic	Support	4	2	2	-	Graduation Project	9
		67	35	20	15	Total	

Course Description

This course description provides a summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, proving whether he has made the most of learning opportunities, and must be linked to the program description.

Course Description Form Table

1- Educational Institution	Ministry of Higher Education and Scientific Research - Middle Euphrates Technical University / Samawa Technical Institute
2- Scientific Department / Center	Oil & Gas Refining Technologies / Operation Industrial & Oil Units
3- Course Name/Code	Mandatory operation of industrial and oil units
5-Available attendance forms	Mandatory
5. Semester/Year	Quarterly
6- Total number of hours	71 hours
7- Date of preparation of this description	/ /2024
8. Course Objectives	- Graduating qualified technical staff to carry out operatic maintenance and control of Devices for operating oil industrial units in the oil plant, including And conducting laboratory tests on the final raw and manufactured materials And conforming to its standard specifications and linking theoretical information to the process. - Familiarize the student with the techniques used . - Understand and use scientific materials . - Familiarity with industrial drawings and maps . - Carrying out maintenance work for industrial units .

9 -Course Outcomes and Methods of Teaching, Learning and Evaluation:

1- For cognitive purposes /

1. Introducing the student to the methods of operating and controlling the various oil industrial devices and units and carrying out oil production work .
2. The student compares between laboratory tests for raw and resulting materials .
3. The student uses drawings, maps and industrial plans related to mechanical or oil plants .

4. Implementation of quality control work for the purpose of conformity of the product to international and Iraqi standards.
5. Linking theoretical and practical information to benefit from improving industrial reality .

2- Course Skills Objectives/

1. The student acquires the skill of conducting laboratory analyzes .
2. Using laboratory tools and chemical workshops with quality and a lesson on the safety and language of the results .
3. Implementation of diagrams and diagrams for the practical lesson.
4. The student acquires the skills of dealing with the calculator.

Teaching and learning methods

Using the theoretical and practical lecture system, electronic calculator and electronic presentation
(DATASHOW) to learn the basics of oil and gas engineering.

Evaluation methods

Testing students to see the extent of their interaction with the lecture and conducting weekly, quarterly and annual tests

C- Emotional and value goals/

1- The student learns about the work of industrial and practical operating units and their role in building the country.
2- Encourage the student to gain practical experience and link it to theoretical principles.
3- Learn accuracy and discipline in receiving science and knowledge
4- Learn to communicate and interact during lecturers.

Teaching and learning methods

High lectures, theory, visual observations and listening scientific forces in courses of professors and the Internet.

Evaluation methods

.Periodic oral tests and scientific discussions

d. General and qualifying skills transferred (other skills related to employability and personal development) /

1- Focus on those who have great mental aptitude and comprehension.
2- Encourage the policy of discussions so that the student enjoys a creative scientific family.
3- Developing students' mental and scientific abilities.
4- Raising the level of students and following up on students.

Learning outcomes required from the program

	Course Name	Basic or optional	Cognitive goals				Skills Objectives				Emotional goals				General and Transferable Qualification Skills) Other skills related to employability and personal development			
Second stage			1a	2 A	3 A	4 A	1b	2b	3b	4b	1 C	2c	3 C	4 C	1 D	2d	3 D	4D
	Oil Refining	**basic**	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Heavy oils	**basic**	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Petrochemicals	**basic**	√	√	√	√	√	√	√	√	√	√		√	√	√	√	√
	Heat transfer	**basic**	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Measurement and control techniques	**basic**	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Industrial Equipment	**basic**	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Computer Technologies 2	**Support**	√	√	√	√	√		√		√	√	√		√	√	√	√
	English language	**Support**	√	√	√		√	√	√	√	√			√	√	√	√	√
	Graduation Project	**Support**	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Course Description – Petrochemical Industries

1. Course Name	Petrochemical Industries
2. Course Code	—
3. Semester / Academic Year	Academic Year 2025/2026
4. Date of Preparation	/ / 2025
5. Attendance Type	Daily Mandatory Attendance
6. Total Study Hours / Total Units	(Theoretical) 1.5 hours per week × 30 weeks = 45 annual hours.

	In addition, there are practical (laboratory) study hours.
7. Course Instructor(s)	Name: Asst. Lecturer Thabit Fadhil Hassoni Email: thabitfadhil77@gmail.com
8. Course Objectives	Students will learn about the main petrochemical industrial processes, their primary raw materials, and the technological methods used for preparing raw materials involved in the production of final products.
9. Teaching and Learning Strategies	The strategy consists of two parts: • Theoretical part: Explains industrial processes and encourages student discussion. • Practical part: Includes laboratory experiments related to tests and industrial operations.

10. Course Structure – Theoretical Part

Week	Hours	Intended Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
1	1.5	Definition of petrochemical industries	Introduction to petrochemical industries	Theoretical lectures	Oral
2	1.5	Understanding sections of petrochemical industries	Sections of petrochemical industries	Theoretical lectures	Oral
3	1.5	Knowledge of primary raw materials	Natural gas	Theoretical lectures	Oral
4	1.5	Knowledge of primary raw materials	Coal	Theoretical lectures	Oral
5	1.5	Knowledge of primary raw materials	Petroleum	Theoretical lectures	Oral
6	1.5	Understanding synthesis gas	Synthesis gas and its derivatives	Theoretical lectures	Oral + Report
7	1.5	Understanding synthesis gas	Manufactured gas and production methods	Theoretical lectures	Oral
8	1.5	Understanding synthesis gas	Main applications of manufactured gas	Theoretical lectures	Oral
9	1.5	Recognize thermal cracking processes for producing	Ethylene and production methods	Theoretical lectures	Oral + Presentation

		alkenes and alkynes			
10	1.5	Recognize thermal cracking processes for producing alkenes and alkynes	Ethylene derivatives	Theoretical lectures	Oral + Presentation
11	1.5	Recognize thermal cracking processes for producing alkenes and alkynes	Propylene and production methods	Theoretical lectures	Oral + Presentation
12	1.5	Recognize thermal cracking processes for producing alkenes and alkynes	Propylene derivatives	Theoretical + Practical lectures	Oral + Presentation
13	1.5	Quiz	Quiz	Quiz	Quiz
14	1.5	Recognize thermal cracking processes for producing alkenes and alkynes	Butadiene and production methods	Theoretical lectures	Oral + Presentation
15	1.5	Recognize thermal cracking processes for producing alkenes and alkynes	Uses of Butadiene	Theoretical lectures	Oral + Presentation
16	1.5	Recognize thermal cracking processes for producing alkenes and alkynes	Acetylene	Theoretical lectures	Oral + Presentation
17	1.5	Recognize thermal cracking processes for producing alkenes and alkynes	Uses of Acetylene	Theoretical lectures	Oral + Presentation
18	1.5	Oxidation processes in	Phenol	Theoretical lectures	Oral + Report

		petrochemical industries			
19	1.5	Oxidation processes in petrochemical industries	Acetic acid	Theoretical lectures	Oral
20	1.5	Oxidation processes in petrochemical industries	Cyclohexanone	Theoretical lectures	Oral
21	1.5	Oxidation processes in petrochemical industries	Cyclohexanol	Theoretical lectures	Oral
22	1.5	Aromatic materials	Benzene	Theoretical lectures	Oral + Report
23	1.5	Aromatic materials	Toluene	Theoretical lectures	Oral
24	1.5	Aromatic materials	Detergents	Theoretical lectures	Oral
25	1.5	Quiz	Quiz	Quiz	Quiz
26	1.5	Polymers	Polymerization reactions / processes	Theoretical lectures	Oral
27	1.5	Thermoplastic materials	Polyethylene	Theoretical lectures	Oral
28	1.5	Thermoplastic materials	Polypropylene / Course review	Theoretical lectures	Oral
29	1.5	Thermoplastic materials	Polyvinyl chloride / Course review	Theoretical lectures	Oral
30	1.5	Thermoplastic materials	Polystyrene / Course review	Theoretical lectures	Oral

Course Description – Petroleum Refinery

1. Course Name	Petroleum Refinery
2. Course Code	—
3. Semester / Academic Year	Academic Year 2025/2026
4. Date of Preparation	/ / 2025
5. Attendance Type	Daily Mandatory Attendance
6. Total Study Hours / Total Units	2 Theoretical + 2 Practical = 4 × 30 weeks = 120 annual hours
7. Course Instructor(s)	Name: Asawer Mahdi Subhi Email: AsawerMahdi@gmial.com
8. Course Objectives	A. Cognitive Objectives: 1. Understanding chemical processes: recognizing chemical and physical operations in petroleum refining such as distillation, cracking, and hydrogenation. 2. Improving efficiency: studying methods to enhance refining efficiency and minimize material loss.

	3. Producing high-quality products. B. Skill-based Objectives: 1. Modern techniques: exploring modern technologies in refining such as catalysts and clean refining. 2. Equipment handling: learning to operate and maintain refining equipment such as reactors and heat exchangers. 3. Technical reporting: acquiring skills to write technical reports and effectively present results. C. Affective and Value-based Objectives: 1. Environmental awareness: developing deep understanding of environmental impacts of oil industry to promote sustainability. 2. Motivation for innovation: fostering curiosity and passion for technological advances in refining. 3. Leadership development: enhancing leadership skills through project management and decision-making.
9. Teaching and Learning Strategies	- Goal Setting: Defining clear objectives such as understanding different processes or improving analytical and problem-solving skills. - Active Learning: Conducting practical experiments and workshops to enhance understanding through application. - Continuous Development: Encouraging students to pursue self-development beyond graduation. - Technology Integration: Using simulation software and computer models for better understanding of refining operations. - Case Studies: Analyzing real refinery case studies to identify challenges and proposed solutions. - Industry Engagement: Connecting with professionals via workshops, seminars, or online platforms for additional insights.

10. Course Structure – Theoretical Part (Petroleum Refinery)

Week	Hours	Intended Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
1	2	Introduction of crude oil	Evaluation of crude oil	Theoretical + Practical Lectures	Written + Practical
2	2	Evaluation of crude oil methods &		Theoretical + Practical Lectures	Written + Practical

		Classification of Petroleum			
3	2	Calculation methods and drawing curves of status		Theoretical + Practical Lectures	Written + Practical
4	2	Analysis of Crude Petroleum		Theoretical + Practical Lectures	Written + Practical
5	2	Introduction of heating crude oil	Heating of crude oil	Theoretical + Practical Lectures	Written + Practical
6	2	Condition, convection & radiation		Theoretical + Practical Lectures	Written + Practical
7	2	Pipe Still Heater		Theoretical + Practical Lectures	Written + Practical
8	2	Calculation of furnace		Theoretical + Practical Lectures	Written + Practical
9	2	Distillation introduction	Crude distillation	Theoretical + Practical Lectures	Written + Practical
10	2	Heat and Material Balances		Theoretical + Practical Lectures	Written + Practical
11	2	Kind of reflux (hot, cold, circulating)		Theoretical + Practical Lectures	Written + Practical
12	2	Quantity of Reflux		Theoretical + Practical Lectures	Written + Practical
13	2	Side-Draw Temperature		Theoretical + Practical Lectures	Written + Practical
14	2	Calculation of Side Temperature		Theoretical + Practical Lectures	Written + Practical
15	2	Calculation distillation problem		Theoretical + Practical Lectures	Written + Practical
16	2	Requirements and Advantages of Thermal cracking	Thermal cracking and coking	Theoretical + Practical Lectures	Written + Practical
17	2	Coking definition and Feed stock of coking process		Theoretical + Practical Lectures	Written + Practical

18	2	The major coking processes (Delayed Coking, Fluid Coking or Flexi Coking)		Theoretical + Practical Lectures	Written + Practical
19	2	Visbreaking introduction, Principal reactions during visbreaking	Visbreaking	Theoretical + Practical Lectures	Written + Practical
20	2	Introduction, FCC, Moving-Bed Catalytic Cracking, Catalyst	Catalytic cracking	Theoretical + Practical Lectures	Written + Practical
21	2	Liquefied petroleum gas production	Liquefied petroleum gas (LPG)	Theoretical + Practical Lectures	Written + Practical
22	2	Liquefied petroleum gas sweeting		Theoretical + Practical Lectures	Written + Practical
23	2	Liquefied petroleum gas separation and packing		Theoretical + Practical Lectures	Written + Practical
24	2	Introduction, Role of Reformer in Refinery, Feed Preparation, Reforming Reactions	Catalytic Reforming	Theoretical + Practical Lectures	Written + Practical
25	2	Alkylation process	Alkylation	Theoretical + Practical Lectures	Written + Practical
26	2	Isomerization process	Isomerization	Theoretical + Practical Lectures	Written + Practical
27	2	Hydrogen product processing	Hydrogen product and purification	Theoretical + Practical Lectures	Written + Practical
28	2	Octane Blending and properties	Product Blending	Theoretical + Practical Lectures	Written + Practical
29	2	Manufacturing of Lubricating Oils	Supporting Processes	Theoretical + Practical Lectures	Written + Practical
30	2	Dewaxing process, Solvent dewaxing	Dewaxing	Theoretical + Practical Lectures	Written + Practical

Course Description – Heavy Oils Technology

1. Course Name	Heavy Oils Technology
2. Course Code	—
3. Semester / Academic Year	2025–2026
4. Date of Preparation	/ / 2025
5. Attendance Type	Daily Mandatory Attendance
6. Total Study Hours / Total Units	2 Theoretical × 30 weeks = 60 annual hours
7. Course Instructor(s)	Name: Asst. Lecturer Muhammad Aiyd Jasim Email: Muhammad_aiyd@yahoo.com
8. Course Objectives	This course deals with the operation and functioning of process units in refineries used in petroleum industries. Heavy Oils Technology occupies an important position among engineering and technological sciences due to its significance in various industrial, conversion, and extraction processes. Basic knowledge of petroleum refining operations and production of different fuel products requires an overview of these processes, especially those related to determining fuel characteristics.
9. Teaching and Learning Strategies	Students will be enabled to understand the operational units and equipment used in these processes and how each petroleum derivative is produced.

10. Course Structure – Theoretical Part (Heavy Oils Technology)

Week	Hours	Intended Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
1	2	Introduction to heavy oils industry	Heavy oils	Theoretical lectures	Oral + Presentation
2	2	Functions, properties, and composition of lubricating oils	Lubricating oils	Theoretical lectures	Oral + Presentation
3	2	Vacuum distillation unit	Lubricating oil production processes	Theoretical lectures	Oral + Presentation
4	2	Variables of vacuum distillation process	Lubricating oil production processes	Theoretical lectures	Oral + Presentation
5	2	Propane de-asphalting unit	Lubricating oil production processes	Theoretical lectures	Oral + Presentation
6	2	Operating conditions and general	Lubricating oil	Theoretical lectures	Oral + Presentation

		problems of PDA unit	production processes		
7	2	Furfural solvent extraction unit	Lubricating oil production processes	Theoretical lectures	Oral + Presentation
8	2	Furfural solvent specifications and operating conditions	Lubricating oil production processes	Theoretical lectures	Oral + Presentation
9	2	Wax separation unit	Lubricating oil production processes	Theoretical lectures	Oral + Presentation
10	2	Solvent specifications and operating conditions for wax separation unit	Lubricating oil production processes	Theoretical lectures	Oral + Presentation
11	2	Hydrotreating unit (oil and wax)	Lubricating oil production processes	Theoretical lectures	Oral + Presentation
12	2	Hydrogenation reactions for sulfur, nitrogen, and olefinic compounds; operating conditions	Lubricating oil production processes	Theoretical + Practical lectures	Oral + Presentation
13	2	Quiz	Quiz	Quiz	Quiz
14	2	Detergents and dispersants	Lubricant additives	Theoretical lectures	Oral + Presentation
15	2	Antioxidants and extreme pressure additives	Lubricant additives	Theoretical lectures	Oral + Presentation
16	2	Rust inhibitors and viscosity index improvers	Lubricant additives	Theoretical lectures	Oral + Report
17	2	Pour-point and foam inhibitors	Lubricant additives	Theoretical lectures	Oral + Presentation
18	2	Metal deactivators and anti-corrosion agents	Lubricant additives	Theoretical lectures	Oral + Presentation

19	2	Viscosity and viscosity index	Laboratory tests for lubricating oils	Theoretical lectures	Oral + Presentation
20	2	Sulfur content	Laboratory tests for lubricating oils	Theoretical lectures	Oral + Report
21	2	Pour point and carbon residue	Laboratory tests for lubricating oils	Theoretical lectures	Oral + Presentation
22	2	Freezing point and auto-ignition temperature	Laboratory tests for lubricating oils	Theoretical lectures	Oral + Presentation
23	2	Pour point and flash point	Laboratory tests for lubricating oils	Theoretical lectures	Oral + Report
24	2	Cloud point and color grade	Laboratory tests for lubricating oils	Theoretical lectures	Oral + Presentation
25	2	Quiz	Quiz	Quiz	Quiz
26	2	Base oil classification	Lubricant classification	Theoretical lectures	Oral + Presentation
27	2	Finished oil classification	Lubricant classification	Theoretical lectures	Oral + Presentation
28	2	Energy-conserving oils	Lubricant classification	Theoretical lectures	Oral + Presentation
29	2	Final lubricant types and properties	Lubricant classification	Theoretical lectures	Oral + Presentation
30	2	Multigrade engine oil	Lubricant classification	Theoretical lectures	Oral + Presentation

Course Description – Industrial Equipment

1. Course Name	Industrial Equipment
2. Course Code	—
3. Semester / Academic Year	Academic Year 2025/2026
4. Date of Preparation	/ / 2025
5. Attendance Type	Daily Mandatory Attendance
6. Total Study Hours / Total Units	2 Theoretical × 30 weeks = 60 annual hours
7. Course Instructor(s)	Name: Ghufran Jalil Ali Email: ghufranjalel@gmail.com
8. Course Objectives	Students learn about the most important industrial equipment in petroleum and industrial plants, their components, principles of operation, common malfunctions, and maintenance methods.

9. Teaching and Learning Strategies	- Enable students to understand industrial equipment components, the types of failures they face, and how to perform maintenance.

10. Course Structure – Theoretical Part (Industrial Equipment)

Week	Hours	Intended Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
1	2	Definition and importance of pumps	Pumps	Theoretical lectures	Oral
2	2	Pump parts, working principles, and types	Pump parts and types	Theoretical lectures	Oral + Presentation
3	2	Pump failures and maintenance methods	Pump malfunctions	Theoretical lectures	Oral + Report
4	2	Introduction to compressors	Compressors	Theoretical lectures	Oral
5	2	Positive displacement compressors – principles and types	Positive displacement compressors	Theoretical lectures	Oral
6	2	Failures and maintenance of positive displacement compressors	Positive displacement compressors	Theoretical lectures	Oral + Report
7	2	Centrifugal compressors – principles and types	Centrifugal compressors	Theoretical lectures	Oral
8	2	Motors	Motors	Theoretical lectures	Oral
9	2	Turbine motors	Turbine motors	Theoretical lectures	Oral
10	2	Steam turbine motors	Steam turbine motors	Theoretical lectures	Oral
11	2	Gas turbine motors	Gas turbine motors	Theoretical lectures	Oral + Report
12	2	Diesel engines	Calculation circuits	Theoretical + Practical lectures	Written + Practical
13	2	Quiz	Quiz	Quiz	Quiz
14	2	Introduction to tanks	Tanks	Theoretical lectures	Oral

15	2	Atmospheric pressure tanks	Tanks	Theoretical lectures	Oral
16	2	Floating roof tanks	Tanks	Theoretical lectures	Oral + Report
17	2	High pressure tanks	Tanks	Theoretical lectures	Oral
18	2	Introduction to reactors	Reactors	Theoretical lectures	Oral
19	2	Reactor design	Reactors	Theoretical lectures	Oral
20	2	Types of reactors	Reactors	Theoretical lectures	Oral + Report
21	2	Industrial freezers	Industrial freezers	Theoretical lectures	Oral
22	2	Refrigeration media	Industrial freezers	Theoretical lectures	Oral
23	2	Main refrigerants	Industrial freezers	Theoretical lectures	Oral + Report
24	2	Secondary cooling means	Industrial freezers	Theoretical lectures	Oral
25	2	Quiz	Quiz	Quiz	Quiz
26	2	Pressure infiltration devices	Pressure infiltration devices	Theoretical lectures	Oral
27	2	Vacuum pumps and ejectors	Pressure infiltration devices	Theoretical lectures	Oral
28	2	Course review	Course review	Course review	Course review
29	2	Course review	Course review	Course review	Course review
30	2	Course review	Course review	Course review	Course review

Course Description – Heat Transfer

1. Course Name	Heat Transfer
2. Course Code	—
3. Semester / Academic Year	Academic Year 2025/2026
4. Date of Preparation	/ / 2025
5. Attendance Type	Daily Mandatory Attendance
6. Total Study Hours / Total Units	2 Theoretical × 30 weeks = 60 annual hours
7. Course Instructor(s)	Name: Mohammed Qasim Jalil Email: mohammed.jalil@atu.edu.iq
8. Course Objectives	1. Provide students with comprehensive knowledge of heat transfer processes and modes of heat transfer in different media. 2. Enable students to understand laboratory heat transfer devices. 3. Train students to execute graphical and

	schematic representations related to practical lessons.
9. Teaching and Learning Strategies	Strategies include theoretical lectures combined with practical demonstrations, active class participation, and illustrative examples to enhance conceptual understanding of heat transfer mechanisms.

10. Course Structure – Theoretical Part (Heat Transfer)

Week	Hours	Intended Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
1	2	Understand and apply the lecture concepts	Concepts and Mechanisms of Heat Flow	Theoretical lectures	Oral
2	2	Understand and apply the lecture concepts	Heat Transfer in Boiling and Condensation	Theoretical lectures	Oral + Presentation
3	2	Understand and apply the lecture concepts	Conduction — Basic Equations	Theoretical lectures	Oral + Report
4	2	Understand and apply the lecture concepts	Generalised One Dimensional Heat Conduction Equation	Theoretical lectures	Oral
5	2	Understand and apply the lecture concepts	Steady State Conduction without Heat Generation	Theoretical lectures	Oral
6	2	Understand and apply the lecture concepts	Plane Wall Conduction	Theoretical lectures	Oral + Report
7	2	Understand and apply the lecture concepts	Thermal Contact Resistance	Theoretical lectures	Oral
8	2	Understand and apply the lecture concepts	Steady State Conduction with Heat Generation	Theoretical lectures	Oral
9	2	Understand and apply the lecture concepts	Hollow Cylinder with Heat Generation and Specified Surface Temperatures	Theoretical lectures	Oral

10	2	Understand and apply the lecture concepts	Heat Transfer from Extended Surfaces	Theoretical lectures	Oral
11	2	Understand and apply the lecture concepts	Generalised One Dimensional Heat Conduction Equation	Theoretical lectures	Oral + Report
12	2	Understand and apply the lecture concepts	Principles of Convection	Theoretical + Practical lectures	Written + Practical
13	2	Understand and apply the lecture concepts	External Flow Convection	Quiz	Quiz
14	2	Understand and apply the lecture concepts	Natural Convection	Theoretical lectures	Oral
15	2	Understand and apply the lecture concepts	Condensation and Boiling	Theoretical lectures	Oral
16	2	Understand and apply the lecture concepts	Thermal Radiation: Properties and Processes	Theoretical lectures	Oral + Report
17	2	Understand and apply the lecture concepts	Thermal Radiation: Properties and Processes	Theoretical lectures	Oral
18	2	Understand and apply the lecture concepts	Thermal Radiation: Properties and Processes	Theoretical lectures	Oral
19	2	Understand and apply the lecture concepts	Heat Exchangers	Theoretical lectures	Oral
20	2	Understand and apply the lecture concepts	Heat Exchanger Design and Selection	Theoretical lectures	Oral + Report
21	2	Understand and apply the lecture concepts	Multipass and Cross Flow Heat Exchangers	Theoretical lectures	Oral
22	2	Understand and apply the lecture concepts	Requirements of Good Heat Exchanger	Theoretical lectures	Oral

23	2	Understand and apply the lecture concepts	Temperature Measurement of a Gas by Thermocouple: Combined Convective and Radiative Heat Transfer	Theoretical lectures	Oral + Report
24	2	Understand and apply the lecture concepts	Radiation Heat Transfer	Theoretical lectures	Oral
25	2	Understand and apply the lecture concepts	Mechanism of Nucleate Boiling	Quiz	Quiz
26	2	Understand and apply the lecture concepts	Solar Radiation	Theoretical lectures	Oral
27	2	Understand and apply the lecture concepts	Overall Heat Transfer Coefficient	Theoretical lectures	Oral
28	2	Understand and apply the lecture concepts	Log Mean Temperature Difference Method	Course Review	Course Review
29	2	Understand and apply the lecture concepts	Practical Applications of Heat Exchangers	Course Review	Course Review
30	2	Understand and apply the lecture concepts	Heat Pipes	Course Review	Course Review

Course Description – Measurement and Control Techniques

1. Course Name	Measurement and Control Techniques
2. Course Code	—
3. Semester / Academic Year	Academic Year 2025/2026
4. Date of Preparation	/ / 2025
5. Attendance Type	Attendance according to lecture schedule
6. Total Study Hours / Total Units	10 Theoretical + 5 Practical = 15 × 30 weeks = 450 annual hours
7. Course Instructor(s)	Name: Tabarak Qasim Abd Email: tabarkqasim660@gmal.com
8. Course Objectives	A. Cognitive Objectives: A1. Introduce students to electrical instruments used in technological and chemical industries. B. Skill-based Objectives:

	B1. Expand students' understanding of using and handling instruments. B2. Teach methods of measuring and controlling variables. B3. Provide practical insight into electrical and measurement devices. B4. Equip students with skills for controlling chemical variables. C. Affective and Value-based Objectives: C1. Enable students to think analytically about topics related to chemical processes. C2. Develop analytical thinking related to industrial control devices and real-world applications.
9. Teaching and Learning Strategies	- Enable students to connect theoretical concepts with practical applications in chemical industries. - Encourage continuous self-development beyond graduation.

10. Course Structure – Theoretical Part (Measurement and Control Techniques)

Week	Hours	Intended Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
1	2	Purposes of measurement and control technology, related terminology	Introduction to Measurement	Theoretical + Practical Lectures	Written + Practical
2	2	Errors, accuracy, and measurement principles	Measurement Errors	Theoretical + Practical Lectures	Written + Practical
3	2	Signal transmission, indication, and recording devices	Transmitters	Theoretical + Practical Lectures	Written + Practical
4	2	Electrical principles: power, Ohm's law, resistors, capacitors	Electrical Principles	Theoretical + Practical Lectures	Written + Practical
5	2	Magnetism, electromagnetism, DC/AC currents, inductance	Electromagnetism	Theoretical + Practical Lectures	Written + Practical
6	2	Electrical circuits, Kirchhoff's Law	Electrical Circuits	Theoretical + Practical Lectures	Written + Practical
7	2	Electrical measuring devices (V, A, AVO meters)	Electrical Measuring Devices	Theoretical + Practical Lectures	Written + Practical

8	2	Power measurement, Wheatstone Bridge	Power Measurement	Theoretical + Practical Lectures	Written + Practical
9	2	Transformers: structure, connection, and function	Transformers	Theoretical + Practical Lectures	Written + Practical
10	2	Electrical machines, generators, and motors	Electrical Machines	Theoretical + Practical Lectures	Written + Practical
11	2	Principles of operation and measurement	Operation Principles	Theoretical + Practical Lectures	Written + Practical
12	2	Mechanical pressure measurement methods	Mechanical Pressure Measurement	Theoretical + Practical Lectures	Written + Practical
13	2	Electrical pressure measurement methods	Electrical Pressure Measurement	Theoretical + Practical Lectures	Written + Practical
14	2	Temperature measurement, rotation methods	Temperature Measurement	Theoretical + Practical Lectures	Written + Practical
15	2	Temperature measurement, contact methods	Contact Methods	Theoretical + Practical Lectures	Written + Practical
16	2	Temperature measurement, rotation methods	Rotation Methods	Theoretical + Practical Lectures	Written + Practical
17	2	Measurement of volume, mass, and flow rates	Volume Measurement	Theoretical + Practical Lectures	Written + Practical
18	2	Liquid level measurement in tanks	Liquid Level Measurement	Theoretical + Practical Lectures	Written + Practical
19	2	Flow rate measurement: volumetric, impact, and electrical methods	Flow Rate Measurement	Theoretical + Practical Lectures	Written + Practical
20	2	Measurement of radiation, distances, angles, and dimensions	Radiation Measurement	Theoretical + Practical Lectures	Written + Practical
21	2	Mechanical methods	Mechanical Methods	Theoretical + Practical Lectures	Written + Practical
22	2	Angle measuring devices, micrometer	Angle Measuring Devices	Theoretical + Practical Lectures	Written + Practical

23	2	Humidity measurement using thermometers	Humidity Measurement	Theoretical + Practical Lectures	Written + Practical
24	2	Humidity measurement by electrical conduction, circuits, and components	Humidity Measurement Methods	Theoretical + Practical Lectures	Written + Practical
25	2	Practical examples of regulating pressure, temperature, and flow rate	Practical Regulation Examples	Theoretical + Practical Lectures	Written + Practical
26	2	Different types of controllers	Various Controllers	Theoretical + Practical Lectures	Written + Practical
27	2	Time and time constant	Time Constant	Theoretical + Practical Lectures	Written + Practical
28	2	Pneumatic controllers	Pneumatic Controllers	Theoretical + Practical Lectures	Written + Practical
29	2	Hydraulic and electrical controllers	Hydraulic Controllers	Theoretical + Practical Lectures	Written + Practical
30	2	Control circuit diagrams and symbols	Control Circuit Diagrams	Theoretical + Practical Lectures	Written + Practical

Course Description – Computer Applications /2

1. Course Name	Computer Applications /2
2. Course Code	Computer Applications / Second Stage
3. Semester / Academic Year	2025 / 2026
4. Date of Preparation	/ / 2025
5. Attendance Type	Daily Mandatory Attendance
6. Total Study Hours / Total Units	Theoretical + 3 Practical = 4 × 30 weeks = 120 annual hours
7. Course Instructor(s)	Name: Assistant Programmer Farah Mahmood Qasim Email: farah.qasim.isa2@atu.edu.iq
8. Course Objectives	The course aims to teach selected topics from the International Computer Driving License (ICDL) curriculum, which is adopted globally. It includes computer fundamentals, Microsoft Office applications, and Internet technologies such as networking and email systems.
9. Teaching and Learning Strategies	A. Cognitive Objectives: A1. Enable students to write, manage, and modify Excel, Access, and PowerPoint applications. A2. Encourage students to create various

	real-world applications using Microsoft software. A3. Help students integrate different computer programs and Microsoft applications across multiple disciplines.

10. Course Structure – Theoretical Part (Computer Applications /2)

Weeks	Hours	Intended Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
1 - 9	2	- Create a project covering all syllabus topics for Microsoft Excel. - Conduct a practical test on Microsoft Excel.	Microsoft Excel	Theoretical Lectures + Practical Exercises	Practical Assessments
10 - 15	4	Develop practical skills using Microsoft PowerPoint.	Microsoft PowerPoint	Theoretical Lectures + Practical Exercises	Practical Assessments
16 - 22	4	Learn to design, manage, and query databases using Microsoft Access.	Microsoft Access	Theoretical Lectures + Practical Exercises	Practical Assessments
23 - 26	4	Understand the basics of computer networking.	Computer Networks	Theoretical Lectures + Practical Exercises	Practical Assessments
27 - 30	4	Learn the fundamentals of Internet browsing and email communication.	Internet & E-mail	Theoretical Lectures + Practical Exercises	Practical Assessments

Course Description – Crimes of the Baath

1. Course Name	Crimes of the Baath
2. Course Code	—
3. Semester / Academic Year	Academic Year 2025/2026
4. Date of Preparation	/ / 2025
5. Attendance Type	Attendance according to lecture schedule
6. Total Study Hours / Total Units	Units: 2 Total Hours: 1 × 30 weeks = 30 annual hours
7. Course Instructor(s)	Name: Abdul Hussein Mohammed
8. Course Objectives	Introduce students to the crimes committed by the Baath regime, analyze their political, social, and legal impacts on Iraq, and emphasize the importance of justice, human rights, and preserving national memory.

9. Teaching and Learning Strategies	Focus on analytical lectures, open discussions, and examination of historical and legal documentation to build awareness and understanding of the course topics.

10. Course Structure – Theoretical Part (Crimes of the Baath)

Week	Hours	Intended Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
1	1	Understanding and applying the lecture	Crimes of the Baath Regime under the Iraqi High Criminal Court Law (2005)	Theoretical Lectures	Written Exam
2	1	Understanding and applying the lecture	Concept and Types of Crimes	Theoretical Lectures	Written Exam
3	1	Understanding and applying the lecture	Definition of Crime: Linguistic and Terminological	Theoretical Lectures	Written Exam
4	1	Understanding and applying the lecture	Categories of Crimes	Theoretical Lectures	Written Exam
5	1	Understanding and applying the lecture	Crimes of the Baath Regime – Documentation According to the Iraqi High Criminal Court Law (2005)	Theoretical Lectures	Written Exam
6	1	Understanding and applying the lecture	Types of International Crimes	Theoretical Lectures	Written Exam
7	1	Understanding and applying the lecture	Psychological and Social Crimes, Their Impacts, and Major Violations by the Baath Regime in Iraq	Theoretical Lectures	Written Exam
8	1	Understanding and applying the lecture	Psychological Crimes	Theoretical Lectures	Written Exam
9	1	Understanding and applying the lecture	Mechanisms of Psychological Crimes	Theoretical Lectures	Written Exam
10	1	Understanding and applying the lecture	Effects of Psychological Crimes	Theoretical Lectures	Written Exam

11	1	Understanding and applying the lecture	Social Crimes	Theoretical Lectures	Written Exam
12	1	Understanding and applying the lecture	Militarization of Society	Theoretical Lectures	Written Exam
13	1	Understanding and applying the lecture	The Baath Regime's Position on Religion	Theoretical Lectures	Written Exam
14	1	Understanding and applying the lecture	Violations of Iraqi Laws	Theoretical Lectures	Written Exam
15	1	Understanding and applying the lecture	Forms of Human Rights Violations and Crimes of Authority	Theoretical Lectures	Written Exam
16	1	Understanding and applying the lecture	Environmental Crimes of the Baath Regime in Iraq	Theoretical Lectures	Written Exam
17	1	Understanding and applying the lecture	War Pollution, Radiation, and Landmine Explosions	Theoretical Lectures	Written Exam
18	1	Understanding and applying the lecture	Destruction of Cities and Villages (Scorched Earth Policy)	Theoretical Lectures	Written Exam
19	1	Understanding and applying the lecture	Draining of the Marshes	Theoretical Lectures	Written Exam
20	1	Understanding and applying the lecture	Bulldozing of Palm Groves, Trees, and Crops	Theoretical Lectures	Written Exam
21	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam
22	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam
23	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam
24	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam
25	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam

26	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam
27	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam
28	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam
29	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam
30	1	Understanding and applying the lecture	Mass Grave Crimes	Theoretical Lectures	Written Exam