Republic of Iraq
Ministry of Higher Education & Scientific Research
Scientifie Supervision and Scientific Evaluation apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation department

Academic Program and Course Description Guide

Department of Chemical Industries Technology

2025

Introduction:

The department was established in 1975. The duration of study is two calendar years, equivalent to three academic years, including a two-month summer internship in government departments and institutions in the field of specialization therfor Graduates of the department thus have a technical diploma in chemical industry technology/industrial unit operation, capable of designing and developing production units and working to improve production quality with Specialized technical personnel, having chemical analysis and physical tests,also supervision managing quality control and laboratory systems, collecting technical information and using it to determine the necessary specifications for machine efficiency and productivity, in addition to Industrial plans, writing technical reports, diagnosing technical .preparing drawings and maps problems, and developing solutions. The department includes a group of laboratories that help students develop a realistic and realistic understanding of the scientific topics they cover theoretically in classrooms.

Academic program description form

University Name: Southern Technical University (STU)
Institute Name: basra Technological institute
Scientific Department: chemical industries techniques
Certification Name: Diploma in Industrial Unit Operation
Academic System: Semester based

File Completion Date: **May 31, 2025**

Dean 's Name :
Dr. Diyah K. shary
Date : 19/7/2025
Signature 9/7/2025

scientific associate name :
Dr. Abdul Nasser A. Abboud
Date : 9/7/2025
Signature

Head of Department
Maitham.Y.Atshan
Date : 9/7/2025
Signature

Quality Assurance And University Performance Manager : Anwar Abdul Khaliq Abboud

Date : 9-7-2025
Signature

1-Educational Institution:	Southern Technical University/Basra Technical Institute
2- Scientific Department / Center:	Department of Chemical Industries Technologies
3. Name of the academic or professional program:	Chemical Industry Technologies
4. Name of the final certificate:	Diploma in Industrial Unit Operation
5-The academic system :	Semester
6-Accredited Certification Program	
7-Other external influences:	training courses, field visits, summer training, practical part, scientific consultations.
8-Description preparation date:	31/5/2025

9. Academic program objectives:
1-Achieving the goals of the university and the institute within the field of chemical industry technologies.
2-Provides education in the basics of chemical industries.
3-Developing skills in the practical aspect of operating thermal and mechanical units in industrial laboratories.
4-Continue to find graduates with high training capacity.
5-Providing education that is compatible with the needs of the labor market and serving the community.

1-Required program outcomes, teaching, learning and assessment methods

A- Cognitive Objectives:

1- Essential facts, concepts, and principles of chemical industry technologies.
2- Understanding the constraints facing technicians during work.
3- Basic mathematics and science.
4-Techniques used

B - Program Skill Objectives:

1 - Professional ethics and professionalism.

2-Impact of training and operational activities on society.

Teaching and learning methods

Traditional, modern and electronic teaching methods

Evaluation methods:

Daily and monthly exams, reports, homework, and adherence to lecture time.

C- Affective and Value-Based Objectives:

1- Solve industrial problems that may be determined by known or unknown conditions.

2- Operate mechanical, thermal, and process units.

3-The ability to apply new technologies to industrial problems, taking into account cost, safety, quality, and environmental impacts, and the ability to assess and manage risks.

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

1- Skills in oral and written communication, using information, and communicating effectively.

2-Controlling time and resources and working within a team.

1. Program Vision

Building a technical education system with an applied and practical academic framework, taking into account scientific developments and progress in the chemical industry, relying on a quality system and performance improvement based on labor market needs.

2-Program Mission

Students are awarded a diploma in Chemical Industries Technology / Industrial Unit Operations, after being provided with all the scientific information (theoretical, applied, and practical) in the field of industrial unit operation and control of operational conditions and Information on the maintenance of these units and their safety and that of workers, as well as information on laboratory testing of raw materials and products, is provided by giving lectures using modern methods, taking into account scientific developments in this specialty.

3-Program Objectives

The major aims to graduate qualified technical personnel to operate equipment and machinery in chemical and petrochemical plants and Oil refineries and conducting chemical and physical laboratory tests on raw materials and products to ensure they conform to international standard specifications. They are also qualified to perform preventive and periodic maintenance on industrial units and control their operation, while ensuring occupational safety, in order to achieve the best production at the lowest costs.

4-Program Accreditation

None

5-Other external influences

None

1-Program Structure				
Program Structure	Number of Courses	Unit steading	Percentage	*Notes
Institutional Requirements	118	118		Baisc course
College Requirements	Yes			
Department Requirements	Yes			
Summer Training Available	Existing			
Other				

Program Structure:

year 1- semester 1

No.	Subject Name (English)	Subject Name (Arabic)	Number of hours			No. units	Subject Type	Notes
			TH	P	E			
1	Fluid flow	جريان موائع	4	3	7	7	Specialization	English language
2	Physical chemistry	كيمياء فيزيائية	2	3	5	5	Specialization	
3	General chemistry/1	كيمياء عامة/١	2	2	4	4	Assistant	English language
4	Mathematics /1	رياضيات /١	2	-	2	2	Assistant	
5	Computer applications	تطبيقات الحاسب	1	1	-	2	Assistant	
6	Engineering drawing	رسم هندسي	-	3	3	3	Assistant	
7	Human rights and democracy	حقوق الانسان والديمقراطية	2	-	2	2	General	
8	Workshop	معامل		4	4	4	Assistant	Annual
			13	16	29	29		the total

year 1- semester 2

No.	Subject Name (English)	Subject Name (Arabic)	Number of hours			No. units	Subject Type	Notes
			Th	P	E			
1	Industrial units operation	تشغيل وحدات صناعية	4	3	7	7	Specialization	English language
2	Thermodynamic	ديناميكا الحرارة	2	3	5	5	Assistant	
3	General chemistry	كيمياء عامة /٢	2	2	4	4	Assistant	English language
4	Mathematics 2	رياضيات /٢	2	-	2	2	Assistant	
5	Engineering drawing	رسم هندسي	-	3	3	3	Assistant	
6	Occupational safety	سلامة مهنية	1	1	2	2	Assistant	
7	English language 1	لغة انكليزية ١	2	-		2	Assistant	
8	Workshop	معامل	-	4	4	4	Assistant	Annual
9	Summer training	التدريب الصيفي	-	-	-			
			13	16	29	29		the total

First academic year:

No. hours	Semester 1	Semester 2	The total
No. theoretical	13	13	26
No. practical	16	16	32
No. academic units	29	29	58

year 2- semester 1

No.	Subject Name (English)	Subject Name (Arabic)	Number of hours			No. units	Subject Type	Notes
			Th	P	E			
1	Physical of Crude oil	فيزياء النفط الخام	2	3	5	5	Specialization	
2	Heat transfer	انتقال الحرارة	4	3	7	7	Specialization	English lang.
3	Measurement technique	تقنية قياس	2	2	4	4	Specialization	English lang.
4	Materials properties	خواص مواد	2	2	4	4	Specialization	English lang.
5	Chemical industries/ 1	صناعات كيمياوية	3	3	6	6	Specialization	
6	Computer applications/ 2	تطبيقات الحاسب	-	2	2	2	Assistant	
7	Project	مشروع	-	2	2	4	Specialization	Annual
			13	17	30	32		the total

year 2- semester 1

No.	Subject Name (English)	Subject Name (Arabic)	Number of hours			No. units	Subject Type	Notes
			Th	P	E			
1	Petroleum refining	تكرير نفط	2	3	5	5	Specialization	second semester
2	Mass transfer	انتقال كتله	4	3	7	7	Specialization	second semester
3	Principles of control	مبادئ السيطرة	2	2	4	4	Specialization	second semester
4	Building devise	بناء اجهزة	2	2	4	4	Specialization	second semester
5	Chemical industries 2	صناعات كيمياوية ٢	3	3	6	6	Specialization	second semester
6	English language 2	لغة انكليزية (تخصصية)	2	-	2	2	Assistant	second semester
7	Project	مشروع	-	--	-	-	Specialization	Annual
			15	13	28	28		the total

Second academic year:

No. hours	Semester 1	Semester 2	The total
No. theoretical	13	17	32
No. practical	15	13	28
No. academic units	28	32	60

COURSE SPECIFICATION

In fluid flow, the movement of liquids and gases from one place to another is studied. It has wide engineering applications, including laminar (or steady) flow and turbulent flow. It also covers the properties of flow such as viscosity, density, pressure, and velocity. The subject includes fundamental laws related to fluid flow, such as Bernoulli's equation and the continuity equation.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	fluid flow
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	105 hours-"7 hours weekly, the curriculum is annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1. To identify the properties of fluids such as density, viscosity, pressure, and temperature.
2. To understand fluid behavior in pipes and distinguish between ideal and real fluids.
3. To understand the laws of conservation of momentum, mass, and energy.

B. Subject-specific skills

1. Focus on developing practical application skills such as conducting experiments, plotting data, and performing hands-on analysis.
2. Operate systems related to fluid flow and understand how fluid behavior changes under different conditions.
3. Apply mathematical equations in practical scenarios.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

1. Continuous evaluation of student behavior during class hours.
2. Direct discussions with students during lectures.
3. Monitoring behavioral changes in some students and following up with them.
4. Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	7 hours		Unit – SI unit – other unit system, conversion from on system to another, examples	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments
2	7 hours		Fluid definition – fluid properties(density – specific gravity – surface tension – compressibility – Viscosity)	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
3	7 hours		Static pressure and head	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
4	7 hours		Buoyancy and stability of floating bodies	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
5	7 hours		Fluid flow – types of flow	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted

					experiments.
6	7 hours		Continuity equation	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
7	7 hours		Energy of flowing fluid – Bernoulli's theorem	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
8	7 hours		Practical application for Bernoulli's equation	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
9	7 hours		Bernoulli's equation correction	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
10	7 hours		Energy loss in pipes – fittings and valves	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
11	7 hours		Pumps : pump types	theoretical + practical	• Oral assessment • Written

					examination • Preparation of reports for the conducted experiments.
١٢	٧ hours		Pipe line problems	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
13	7 hours		Motion of particles in fluids	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
14	7 hours		Fluid flow through packed – bed	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
15	7 hours		Fluid flow between tanks	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.

Learning and teaching resources	
Ref.	1. Principles of Fluid Mechanics - Part One by Jamil Al-Malaika 2. Fluid Mechanics by Dr. Ne'ma Hamad Amara - University of Technology 3-Fluid Mechanics - Translated by Nabil Zaki Mortada and Dr. Fawzi Ibrahim Abdel Sadak. 4-Unit. Operation of chemical Eng. By maccade, Published by maccraw-hill, 3ed edition 1967. 5-Unit operation by Brown, published by willy London 1965. 6-Priciples of unit operation by A. S . Faust published by Toppan and Willy 2nd edition 1961 Tokyo. Japan 1960. 7 - Chemical Eng Vol 1 and 2nd Coulson and Richardason by preutice- Hill 1960.

COURSE SPECIFICATION

This course introduces the fundamental principles of physical chemistry. It emphasizes the understanding of the relationship between the physical and chemical properties of matter through the application of mathematical and physical concepts."

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Physical chemistry
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	75 hours-"5 hours weekly, the curriculum is annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding

1. To understand the fundamental principles of physical chemistry, such as thermodynamics and chemical equilibrium.

2- To connect physical and chemical concepts in order to understand the molecular and atomic behavior of matter.

3- To explain chemical phenomena from a physical perspective and analyze the influence of various factors.

B. Subject-specific skills

1. Apply mathematical laws and equations to solve problems in physical chemistry.
2. Use software tools or analytical methods such as tables and graphs to represent chemical and physical relationships.
3. Analyze the relationship between physical properties and chemical characteristics.

Teaching and Learning Methods

"In-person and online lectures, quizzes, assignments, practical work in the laboratory, and workshop sessions."

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Continuous evaluation of student behavior during attendance.

1-Direct discussions with students during lectures.

2-Monitoring behavioral changes in some students and providing follow-up.

3-Mini-projects conducted within the lecture sessions. Thinking Skills

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10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	5 hours		Properties of liquids include vapor pressure, viscosity, surface tension, refractive index, and phases.	theoretical + practical	Practical and written tests and report writing.
2	5hours		"Gibbs Phase Rule – One-Component System (Water)".	theoretical + practical	Practical and written tests and report writing.
3	5 hours		Gibbs Phase Rule – Multi-Component Systems	theoretical + practical	Practical and written tests and report writing.
4	٥ hours		Surface Chemistry and Catalysis – Catalysts – General Principles of Catalysts – Adsorption and Explanation of the Adsorption Phenomenon – Gas Adsorption on Solid Surfaces – Factors Affecting Adsorption – Types of Adsorption (Chemical and Physical) and Their Properties.	theoretical + practical	Practical and written tests and report writing.
5	5 hours		Chemical Reaction Kinetics – Introduction – Factors Affecting Reaction Rate – Calculation of Reaction Rate – First-Order Reactions	theoretical + practical	Practical and written tests and report writing.
6	٥ hours		Second-Order Reactions – Third-Order Reactions – Zero-Order Reactions – The Relationship Between the Rate Constant and Temperature (Arrhenius Equation)	theoretical + practical	Practical and written tests and report writing.

7	5 hours		Problems and Exercises	theoretical + practical	Practical and written tests and report writing.
8	5 hours		Electrochemistry:Units used - Ohm's Law - Electrolytic conduction (solids – liquids) - Faraday's First and Second Laws - Resistivity - Conductivity - Molar conductivity - Molar conductivity at infinite dilution (Kohlrausch's Law) - Degree and constant of ionization	theoretical + practical	Practical and written tests and report writing.
9	5 hours		conductivity cell, ion migration, and the determination of transport numbers using the Hittorf method. It also covers voltaic cells, both reversible and irreversible, and the measurement of electromotive force (EMF).	theoretical + practical	Practical and written tests and report writing.
10	5 hours		Spectroscopic Methods	theoretical + practical	Practical and written tests and report writing.
11	5 hours		wave–particle duality of electromagnetic radiation-electromagnetic spectrum	theoretical + practical	Practical and written tests and report writing.
12	5 hours		radiation, wavelength selection, spectral dispersion curves, and the mathematical theory of absorption, including the Beer–Lambert	theoretical + practical	Practical and written tests and report writing.

			Law and the causes of deviation from Beer–Lambert Law.		
13	5 hours		chromatography -definition, importance, and the classification of chromatographic methods.	theoretical + practical	Practical and written tests and report writing.
14	5 hours		Gas Chromatography (GC)- Main parts of the instrument	theoretical + practical	Practical and written tests and report writing.
15	5 hours		Problems and Exercises	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref.	1Physical Chemistry – Translated by Daniel Alberty Arabic Edition by: Dr. Maurice Wahba, Issa Mustafa Issa, Dr. Tahani Mahmoud Salem, and Dr. Ahmed Mohamed Azzam Publisher: Aalam Al-Kutub, Cairo, 1968 Available on Al-Qarii 2- F. Danials. R. A. AL berty . Physical Chemistry 4th edition john wiley and sons . inc 1975 3-- Samaul classton and David Lewis . 4- Elements of physical chemistry , second edition Macmillon . Ltd 1965

COURSE SPECIFICATION

To provide the student with fundamental concepts such as heat, energy, work, efficiency, and the basic laws of thermodynamics.

1. Teaching Institution	**Technological institute of Basra**
2. University Department/Centre	**Department of chemical industries techniques**
3. Course title/code	**Thermodynamics**
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	**2024-2025**
7. Number of hours tuition (total)	75 hours-"5 hours weekly, the curriculum is annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1. Focus on developing theoretical understanding and analytical ability to comprehend the fundamental principles governing energy transfer and transformations.

2-Analyze thermal processes such as pressure, volume, temperature, and thermal energy.

3-Understand the properties of substances, including ideal and non-ideal gases.

B. Subject-specific skills

1. Linking theoretical concepts with industrial and engineering applications.
2. Performing engineering estimations for thermal systems in real-world applications.
3. Drawing and analyzing thermodynamic cycles both mathematically and graphically.

Teaching and Learning Methods

"In-person and online lectures, quizzes, assignments, practical work in the laboratory, and workshop sessions."

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Continuous evaluation of student behavior during attendance.

1-Continuous assessment of student behavior during class time.

2-Direct discussion with students during lectures.

3-Monitoring behavioral changes in some students and following up with them.

4-Mini-projects conducted within the lecture.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	**Assessment Method**
1	5hours		Gases: This topic includes the properties of gases, the kinetic molecular theory of gases along with an explanation of gas behavior based on this theory, the effect of gas volume on its pressure (Boyle's Law), and the effect of temperature on gas volume and pressure (Charles's Law).	theoretical + practical	**Practical and written tests and report writing.**
2	5hours		derivation of the ideal gas law, the calculation of the gas constant (R), the density and molecular weight of gases, and gas mixtures, including Dalton's Law of Partial Pressures.	theoretical + practical	**Practical and written tests and report writing.**
3-4	10 hours		gas diffusion described by Graham's Law, Avogadro's Hypothesis, the behavior of real gases, and the van der Waals equation.	theoretical + practical	**Practical and written tests and report writing.**
5-6	10 hours		Definition of thermodynamics – Work – Definition of the surroundings and the system (homogeneous and heterogeneous – open and isolated) – Isothermal process – Adiabatic process – Thermodynamic equilibrium – Energy – Internal energy – The First Law of Thermodynamics.	theoretical + practical	**Practical and written tests and report writing.**
7	5 hours		reversible process, the maximum work in a reversible isothermal expansion, enthalpy (heat content), heat capacity at constant volume, and heat capacity at constant pressure.	theoretical + practical	**Practical and written tests and report writing.**
8-9	10 hours		relationship between $C\ v$ and $C\ p$, the temperature dependence of heat capacity, the calculation of heat absorbed at constant pressure, and adiabatic processes, including: The relationship between pressure and volume during adiabatic change The relationship between pressure and temperature during adiabatic change The relationship between	theoretical + practical	**Practical and written tests and report writing.**

			volume and temperature during adiabatic change The work done in an adiabatic process		
10-11	10 hours		Thermochemistry – Definitions Exothermic and Endothermic Reactions Heat of Reaction at Constant Pressure and Constant Volume,Heat of Formation,Heat of Solution,Heat of Dissolution,Heat of Combustion,Calculation of Standard Enthalpy of Reaction at 25°C,Calculation of Standard Enthalpy of Reaction Above 25°C Bond Energy (Bond Enthalpy)	theoretical + practical	**Practical and written tests and report writing.**
12	5 hours		"Problems and Exercises	theoretical + practical	**Practical and written tests and report writing.**
13-14	10 hours		Second Law of Thermodynamics Spontaneous and non-spontaneous changes,Definition of the Second Law ofThermodynamics,EntropyCalculation of entropy change for different processes,Entropy change when heat capacity is a function of temperature,Conversion of heat into work (Carnot cycle)Calculation of the efficiency of the Carnot cycle.	theoretical + practical	**Practical and written tests and report writing.**
15	5hours		Entropy change in irreversible processe Entropy of a gas mixture,Free energy Work function,Problems and exercises	theoretical + practical	**Practical and written tests and report writing.**

Learning and teaching resources	
Ref.	1- F. Danials. R. A. AL berty . Physical Chemistry 4th edition john wiley and sons . inc 1975 2-Samaul classton and David Lewis . Elements of physical chemistry , second edition Macmillon . Ltd 1965

COURSE SPECIFICATION

The course aims to provide the student with the basic foundations and concepts of chemistry, including the composition of matter, chemical reactions, and the properties of gases, liquids, and solids. The course also aims to enable the student to understand chemical applications in the industrial field

1. Teaching Institution	Basra Technical Institute
2. University Department/Centre	Chemical Industries Technologies
3. Course title/code	General Chemistry 1
4. Program(s) to which it contributes	In-class and online as necessary
5. Modes of Attendance offered	2024-2025
6. Semester/Year	60 hours - 4 hours per week
7. Number of hours tuition (total)	Teacher Dr. Najat Luaibi Ghali
8. Date of production/revision of this Specification	May 31, 2025

Course outcomes, teaching, learning and assessment methods:
A- Cognitive Objectives 1- Identify and understand the basic principles of analytical chemistry **.** 2-Define the most important concepts related to expressing the concentrations of substances and how to calculate them using specific mathematical laws. 3-Distinguish between the different types of qualitative and quantitative chemical analysis methods. 4-Link theoretical concepts with practical observations in the laboratory. 5-Apply problems to enhance the ability to deal with chemical compounds and unknowns**.**
B - Program Objectives and Skills: 1. Perform simple organic reactions in the laboratory using safe techniques and scientific methodology. 2. Employ analytical methods (such as distillation, extraction, filtration, and crystallization) to purify compounds. 3-Interpret the results of laboratory experiments and compare them with theoretical concepts. 4- Draw structural formulas and organic chemical reactions accurately and accurately. 5- Solve chemical problems related to concentration and structure.
Teaching and Learning Methods
In-person and online lectures, quizzes, assignments, and practical laboratory and workshop sessions.
Assessment Methods
Oral and written tests, midterm and final exams, daily assessments, and online tests.
General and transferable skills (other skills related to employability and personal development).
١-Continuous assessment of student behavior during class. 2- Direct discussion with students during lectures. 3- Behavior changes in some students and follow-up. 4-Mini-projects with in lectures.

10-Course structure:

Week	Hours	Required learning outcomes	Name of unit/course or topic	Learning Method	Evaluation method
First	4		Principles of analytical chemistry , Qualitative analysis , Quantitation analysis	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Second	4		Principles of analytical chemistry , Qualitative analysis , Quantitation analysis	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Third	4		Volumetric analysis Titration process standard solution , suitable indicator	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Fourth	4		Volumetric analysis Titration process standard solution , suitable indicator	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Fifth	4		The method of expression of concentration , Molarities , Normality , molality the percentage weight the anole traction , Examples .	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Sixth + Seventh	8		The method of expression of concentration , Molarities , Normality , molality the percentage weight the anole traction , Examples .	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Eighth	4		Acids , Basic and salts empirical formation chemical reaction	Theoretical + Practical	Oral assessment, written examination, preparation of

					reports on the conducted experiments
Ninth	4		Principle of instrumental analysis ,general discussion , Infra-red spectrophotometers	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Tenth	4		Ultra – violet and visible spectrophotometers	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Eleventh	4		Principle of chromatography , Gas chromatography	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Twelfth	4		Column chromatography , liquid chromatography .	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Thirteenth	4		Atomic Absorption spectrophotometers	Learning Method	Oral assessment, written examination, preparation of reports on the conducted experiments
Fourteenth	4		Acids , Basic and salts empirical formation chemical reaction	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the conducted experiments
Fifteenth	4		Principle of instrumental analysis ,general discussion , Infra-red spectrophotometers	Theoretical + Practical	Oral assessment, written examination, preparation of reports on the

					conducted experiments

References	
Required course books	1-Element of heat transfer by Mjackob & A. hawk 3rd edition 1995. John willy. London . New York 2-Batch Distillation Design and Operation, I.M.Mujtaba, Imperial college Press, 2004 3-Chemical Eng ineering, Vol 1 & Vol 2, j.M.Coulson & j.f . Rishardson. 2nd edition 2001 . Perhaman Press . oxford . 4-Fundamentals of general chemistry. by C.H-Sorum , Second edition . 5-Elementary practical organic chemistry .by Arthur I. Vogel, 2001 6-Text-book of quantitative inorganic analysis. by Arthur I. Vogel, 2000 7-Physical chemistry .by Moore , fifth edition 8-Advanced Inorganic chemistry . by cotton and Wilkinson ,third edition
Main References	
Books and magazines	Some references available in the library
Electronic references	Scientific websites specialized in general chemistry

COURSE SPECIFICATION

This course is a basic introduction to general mathematics concepts. It aims to provide students with the knowledge and skills necessary to understand and apply mathematical principles in academic and practical contexts. The course covers selected topics from algebra and matrices, .with an emphasis on analytical skills and problem-solving

Educational Institution	Technical Institute of Technology/Basra
Department/Center	Chemical industries techniques
Course Name/Code	Mathematics /1
Available Attendance Formats	My presence in the halls and electronically when necessary
Semester/Year	2025-2024
Number of Class Hours (Total)	30 hours - 2 hours per week
Course Supervisor Name	Assistant Teacher. Fitna. H.younis
Date this Description Prepared	31/5/2025

Course Outcomes,Teaching, learning and Assessment Methods
A- Cognitive objectives: 1-Interpreting mathematical relationships and using symbols and equations to represent problems. 2-.Applying mathematical laws and theories to solve various problems 3-Analyzing mathematical problems and choosing the most appropriate method to solve them.
B - Program objectives and skills: 1-Employ mathematical skills to solve real-life or practical problems in fields such as economics, physics, and engineering. 2- Organize mathematical solutions in a systematic and organized manner 3-.Solve first- and second-degree equations
Teaching and learning methods
In-person and online lectures, short tests, assignments, and practical application in the laboratory and workshop.
Assessmentmethod
.Oral and written tests, semester exams, final exams, daily assessment and electronic tests
General and transferable skills (other skills related to employability and personal development)
1- Continuous assessment of student behavior during class 2- Direct discussion with students during lectures 3- Behavior changes in some students and follow-up 4- Mini-projects within lectures

Course structure :

week	houres	I L O S	Name of unit/course or topic	Teaching method	Assessment Method
1	2h		Matrices - Determinants - Their Properties	theoretical	Written exams and homework
2	2h		Solving linear equations - Cramer's method - Applications (ideal gas law - Bernoulli's equation - continuity equation - energy conservation equation - force analysis - Newton's laws of motion - Kirchhoff's laws - Ohm's law)	theoretical	Written exams and homework
3	2h		Vectors - Vector Analysis - Vector Quantities and Measurements	theoretical	Written exams and homework
4	2h		Vector Algebra - Vector Arithmetic Operations	theoretical	Written exams and homework
5	2h		Orthogonal vector unit - vector scale - scalar and vector product	theoretical	Written exams and homework
6	2h		Applications (velocity - displacement - acceleration)	theoretical	Written exams and homework
7	2h		Function - Trigonometric Function - Logarithmic Functions	theoretical	Written exams and homework
8	2h		Exponential function - Hyperbolic functions - Fluid flow - Tension forces	theoretical	Written exams and homework
9	2h		Goals - Goal of algebraic and trigonometric functions - Finding the area under a curve - Adiabatic and isothermal work	theoretical	Written exams and homework
10	2h		Differentiation - Derivative - Derivative of algebraic functions - Chain rule	theoretical	Written exams and homework
11	2h		Implicit functions - Scalar functions - Higher-order derivatives	theoretical	Written exams and homework
12	2h		Derivative of trigonometric functions - Derivative of logarithmic functions - Derivative of exponential functions - Derivative of hyperbolic functions	theoretical	Written exams and homework
13	2h		Derivative of an exponential function - Derivative of hyperbolic functions	theoretical	Written exams and homework
14	2h		Applications of isothermal work - adiabatic work - laws of heat transfer - velocity in the equation	theoretical	Written exams and homework

15	2h		Major and minor endings	theoretical	Written exams and homework

L earning andTeaching Resources	
Ref.	1-Calculus and Analytical Geometry, Thomas 1968 2-Applied calcalus by L. J . adams New York , London 1963 3-Introductory to the college Mathematic by William E. Milne 4-Basics of Statistics in Arabic, prepared by Dr. Sabri Al-Ani. 5-Introduction to differential equation by S.L. Green 1945 . 6-Applied calcalus by L. J . adams New York , London 1963 . 7-Introductory to the college Mathematic by William E. Milne .

Main References (Sources)	
Some references available in the library	books and magazines
All books available online related to the subject	Electronic references

:

COURSE SPECIFICATION

The course aims to introduce the student to the concepts of definite and indefinite integration, its basic rules, and its applications in engineering and scientific fields, in addition to linking integration to the derivative as a tool for solving scientific problems

Educational Institution	**Technical Institute of Technology/Basra**
Department/Center	**Chemical industries techniques**
Course Name/Code	**Mathematics /2**
Available Attendance Formats	**My presence in the halls and electronically when necessary**
Semester/Year	**2025-2024**
Number of Class Hours (Total)	**30 hours - 2 hours per week**
Course Supervisor Name	**Assistant Teacher. Fitna. H.younis**
Date this Description Prepared	**31/5/2025**

Course outcomes, teaching, Learning and assessment methods
A- Cognitive objectives: 1-Understand the concept of integration as the inverse process of . .differentiation 2-Know the basic rules of integration and the techniques of integration by . .parts and substitution 3-Understand the relationship between integration and engineering and .physical applications
B - Program objectives and skills: 1-Employ mathematical and logical thinking skills in dealing with real-life . .problems 2-.Draw graphs of functions and estimate values using integration . 3-Use integration to solve physics problems such as calculating work, distance, and .energy
Teaching andL earning methods
In-person and online lectures, short tests, assignments, and practical application in the .laboratory and workshop
Assessment method
.Oral and written tests, semester exams, final exams, daily assessment and electronic tests
General and transferable skills (other skills related to employability and personal development)
1-Continuous assessment of student behavior during class 2-Direct discussion with students during lectures 3-Behavior changes in some students and follow-up 4-Mini-projects within lectures

Course structure:

week	houres	I L O S	Name of unit/course or topic	Teaching method	Assessment method
1	2h		Inflection Points - Graphing Functions	theoretical	Written exams and homework
2	2h		Physical applications (speed - acceleration - rate of change in volume with time in a chemical reaction)	theoretical	Written exams and homework
3	2h		Integration - Indefinite Integration	theoretical	Written exams and homework
4	2h		Integration of algebraic functions	theoretical	Written exams and homework
5	2h		Integration of exponential and trigonometric functions	theoretical	Written exams and homework
6	2h		definite integration	theoretical	Written exams and homework
7	2h		Applications (work - heat of reaction - area under the curve - area between two curves)	theoretical	Written exams and homework
8	2h		General methods of integration: substitution and partitioning methods	theoretical	Written exams and homework
9	2h		Integration using partial fractions	theoretical	Written exams and homework
10	2h		Exponential and logarithmic methods of integration	theoretical	Written exams and homework
11	2h		Numerical methods in integration - Trapezoidal rule - Simpson's rule	theoretical	Written exams and homework
12	2h		Solving differential and homogeneous equations	theoretical	Written exams and homework
13	2h		Applications (Calories - Real Gases - Adiabatic Processes))	theoretical	Written exams and homework
14	2h		Statistical operations -frequency distribution - frequency histogram - frequency curve	theoretical	Written exams and homework
15	2h		Arithmetic mean - range - standard deviation – variance	theoretical	Written exams and homework

Learning andTeaching Resources	
Ref.	1-Calculus and Analytical Geometry, Thomas 1968. 2-Applied calcalus by L. J . adams New York , London 1963. 3-Introductory to the college Mathematic by William E. Milne 4-Basics of Statistics in Arabic, prepared by Dr. Sabri Al-Ani. 5-Introduction to differential equation by S.L. Green 1945. 6-Applied calcalus by L. J . adams New York , London 1963.

COURSE SPECIFICATION

This course introduces students to the fundamentals of computers and their various applications, with a focus on using Microsoft Office suite programs or their equivalents, such as word processing, spreadsheets, presentations, and databases. It also includes an introduction to the basics of operating systems and the internet.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Computer applications
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	30 hours-"2 hours weekly, the curriculum is annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding

1- Understanding the basic components of a computer (hardware and software).

2- Identifying the types of operating systems and their functions.

3- Distinguishing between types of application software and their uses.

B. Subject-specific skills

1- Using the operating system to efficiently manage files and folders.

2- Creating and formatting professional documents using word processing programs such as Word.

3- Analyzing data and creating tables and charts using spreadsheet software such as Excel.

4- Preparing effective presentations using PowerPoint.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

- Continuous evaluation of the student's behavior during attendance.
- Direct discussion with students during lectures.
- Monitoring behavioral changes in some students and following up with them.
- Mini-projects within the lecture

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2 hours		Introduction to computers, their generations, their hardware components, and software components (hardware and software), including system software and application software.	theoretical + practical	Practical and written tests and report writing.
2	2 hours		Operating System Windows Concept of the Windows system Advantages of Windows Basic Windows requirements Running the Windows operating system	theoretical + practical	Practical and written tests and report writing.
3	2 hours		Components of the Desktop Main Screen Concept of an Icon How to interact with mouse events	theoretical + practical	Practical and written tests and report writing.
4	2 hours		Importance of the Taskbar components, using the Start menu to access programs, understanding running tasks, logging out of the system, and shutting down the computer (Shutdown).	theoretical + practical	Practical and written tests and report writing.
5	2 hours		The concept of a program window and getting to know its main components, interacting with desktop icons such as Recycle Bin, My Documents, and My	theoretical + practical	Practical and written tests and report writing.

			Computer.		
6	2 hours		Understanding the computer in terms of disks, folders, and files, and how to handle formatting floppy disks, copying files and folders, utilizing cut and paste, knowing the properties of disks, folders, and files, managing the Recycle Bin, and how to delete and restore files using the features provided by the Recycle Bin.	theoretical + practical	Practical and written tests and report writing.
7	2 hours		Utilizing the features provided by the Control Panel, how to change the desktop background and control the appearance and colors of windows, how to install and uninstall programs, using the Run command to execute programs directly, as well as switching to the MS-DOS system.	theoretical + practical	Practical and written tests and report writing.
8	2 hours		Introduction to Word 2007, launching Word 2007, getting to know the program environment (components of the Word 2007 screen), setting page margins, setting paper size, and working with the contents and commands of the Microsoft Office button.	theoretical + practical	Practical and written tests and report writing.
9+10	4 hours		Converting documents to all versions of Word Working with the Home tab	theoretical + practical	Practical and written tests and report writing.

11	2 hours		Working with the Insert tab Working with the Page Layout tab and its settings Working with the View tab	theoretical + practical	Practical and written tests and report writing.
12	2 hours		Working with the Design tab Working with the Layout tab	theoretical + practical	Practical and written tests and report writing.
13	2 hours		Introduction to the MS-DOS system Executing MS-DOS system commands	theoretical + practical	Practical and written tests and report writing.
14	2 hours		The concept of computer viruses, how infection occurs, their types, and how to deal with them.	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref.	Book: Fundamentals of Computers and Their Office Applications

COURSE SPECIFICATION

The course covers the fundamentals of engineering drawing in both 2D and 3D, as well as the principles of geometric projection, sections, dimensions, and the technical representation of mechanical parts and components. Additionally, it includes reading and interpreting various engineering drawings — all using the AutoCAD software.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Engineering drawing
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	90 hours-"3 hours weekly, the curriculum is annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1- Understanding the basic principles of engineering drawing as a means of artistic communication.
2- Knowing the types of engineering projections and their uses in representation.
3- Distinguishing between two-dimensional and three-dimensional drawings.
4- Familiarizing with the standard symbols and terminology used in technical drawings.

B. Subject-specific skills

1. Drawing basic and complex geometric shapes using orthogonal projection.
2. Representing three-dimensional solids in a correct two-dimensional form.
3. Applying dimensions and technical labels according to engineering standards such as (ISO) or (ASME).

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

- Continuous evaluation of the student's behavior during attendance.
- Direct discussion with students during lectures.
- Monitoring behavioral changes in some students and following up with them.
- Mini-projects within the lecture.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3 hours		Importance of engineering drawing-Applying AutoCAD in engineering drawing – Overview of AutoCAD widow.	theoretical + practical	Practical and written tests and report writing.
2-3	6 hours		Types of lines in engineering drawing- Use of pull-down menus for lines and texts. Use of drawing tools.	theoretical + practical	Practical and written tests and report writing.
4-5	6 hours		Modifying of drawings	theoretical + practical	Practical and written tests and report writing.
6-7	6 hours		Drawing of basic objects.	theoretical + practical	Practical and written tests and report writing.
8	3 hours		Use of status bar	theoretical + practical	Practical and written tests and report writing.
9-10	6 hours		Applications of recent subjects	theoretical + practical	Practical and written tests and report writing.
11	3 hours		Dimensioning – Text – Applications.	theoretical + practical	Practical and written tests and report writing.
12-13-14-15	12 hours		Isometric drawing – Drawing a shape containing a square ,rectangle, circle , Exercises.	theoretical + practical	Practical and written tests and report writing.
16	3 hours		Dimensioning on 3D drawings.	theoretical + practical	Practical and written tests and report writing.
17-18-19	9 hours		Theory of projection – Orthographic projection for simple shapes.	theoretical + practical	Practical and written tests and report writing.

20-21	6 hours		Drawing of third view by use of other two views.	theoretical + practical	Practical and written tests and report writing.
22-23-24	9 hours		Sectioning of objects – Hatching – Types of hatching lines – Drawing of sectioned views.	theoretical + practical	Practical and written tests and report writing.
25-26	6 hours		Blocks (draw , modify , insert).	theoretical + practical	Practical and written tests and report writing.
27-28	6 hours		Drawing of equipment and units in chemical industries.	theoretical + practical	Practical and written tests and report writing.
29-30	6 hours		Drawing of flow charts for some chemical industries with marking and text	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref.	1-Engineering Drawing and Graphic Technology by french and vierk published by MC Graw – Hill book Co. 1972 11th edition . 2.Beginning Autocad, 2004, Bob Mc Farlane, 2004. 3.Applying Autocad 2000, Astep –By- Step Approach, Terry T. Wohlers, 2000. 4.Applying Autocad 2002, Advanced, Terry T. Wohlers, Mc Graw Hill, 2002 5.Project – Based Autocad, Darren J. Manning, Mc Graw Hill, 2004.

COURSE SPECIFICATION

Understanding the basic rules of the English language as well as expanding the vocabulary related to daily life and the academic or specialized field.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	English language
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	30 hours-"2 hours weekly, the curriculum is annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding

1□ Recognizing different text patterns: narrative, descriptive, persuasive, academic.

2□ Understanding the cultural basics of the English language to enhance effective communication.

3□ Using grammar and vocabulary in real sentences and writing sentences correctly and properly.

B. Subject-specific skills

1□ Developing oral communication skills.

2□ Helping the student acquire pronunciation skills and speaking fluently.

3□ Helping the student acquire the skill to grasp the main idea and details from audio clips.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

- Continuous evaluation of the student's behavior during attendance.
- Direct discussion with students during lectures.
- Monitoring behavioral changes in some students and following up with them.
- Mini-projects within the lecture.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1+2	4 hours		- Introduce Yourself (Holle) - Conversation - Vocabulary: objects, and food - Every day English (numbers) - Exercises	theoretical + practical	Practical and written tests and report writing.
3+4	4 hours		- Your world(Where are you from) - Pronunciation(conutries and cities) - Reading (They´re), Listening (This is Carmen) - Every day English (singularand Plural) - Exercises	theoretical + practical	Practical and written tests and report writing.
5+6+7	6 hours		- Personal Information (Your Address, phone number) - Jobs(What is your job?) - Grammar (Negative) - Reading and Speaking (An international team) - Listening (A conversation with Kirsty) - Pronunciation (World Stress) - Translation - Every day English(Social expressions) - Exercises	theoretical + practical	Practical and written tests and report writing.

8+9	2 hours		- Family and Friends - Vocabulary: Jobs, conutries, families - Grammar (has/have) - Reading (My friend Andy), Speaking (My best friend) - Every day English (on the phone) - Exercises	theoretical + practical	Practical and written tests and report writing.
10+11	4 hours		- Life (it´s my life) - Grammar (Present Simple, questions) - Preference (Things I like) - Vocabulary: Food, Sport, drinks - Pronunciation: Languages and nationalities - Reading (Gordon Wilson), Listening (At the party) - Every day English(prices and currencies) - Exercises	theoretical + practical	Practical and written tests and report writing.
10+11	4 hours		- Activities (We can do it) - Listening (Anna´s Day), negatives - Grammar (Question, negatives) - Every day English (Days of the weeks) - Exercises	theoretical + practical	Practical and written tests and report writing.
12	2 hours		- Traveling	theoretical +	Practical and written tests and

			- Speaking (PlacesI like), Listening (An interview with Dan) - Grammar(Object prononus, why/because, this/that) - Reading (A post card from San Francisco) - Question words - Translation - Vocabulary: Adjectives - Every day English (can I?) - Exercises	practical	report writing.
13+14+15	6 hours		- Traveling - Speaking (PlacesI like), Listening (An interview with Dan) - Grammar(Object prononus, why/because, this/that) - Reading (A post card from San Francisco) - Question words - Translation - Vocabulary: Adjectives - Every day English (can I?) - Exercises	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref.	Book: headway

COURSE SPECIFICATION

Acquiring the necessary knowledge related to the operation of mechanical units in scientific topics relevant to the field of specialization and other related sciences, as well as enhancing the student's ability to think logically when solving problems and strengthening their ability to connect given data with their knowledge to find solutions to technical issues.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	operation of mechanical units
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	105 hours-"7 hours weekly, the curriculum is annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1. Develop the ability to diagnose and troubleshoot malfunctions.
2. Understand the functioning of mechanical components and equipment.
3. Acquire the ability to perform basic engineering calculations.

B. Subject-specific skills

1. Enable the student to acquire skills in engineering inspection.
2. Develop proficiency in operating equipment and devices.
3. Gain skills in the maintenance of mechanical devices and equipment.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

1. Continuous assessment of student behavior during attendance.
2. Direct discussions with students during lectures.
3. Monitoring behavioral changes in some students and providing follow-up.
4. Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	7 hours		Fluidization	theoretical + practical	Theoretical exams, practical exams, and report writing.
2	7 hours		Mechanical separation	theoretical + practical	Theoretical exams, practical exams, and report writing.
3	7 hours		Screen analysis	theoretical + practical	Theoretical exams, practical exams, and report writing.
4	7 hours		Sedimentation and thickening	theoretical + practical	Theoretical exams, practical exams, and report writing.
5	7 hours		Centrifuge	theoretical + practical	Theoretical exams, practical exams, and report writing.
6	7 hours		Cyclone	theoretical + practical	Theoretical exams, practical exams, and report writing.
7	7 hours		Flotation	theoretical + practical	Theoretical exams, practical exams, and report writing.
8	7 hours		Filtration	theoretical + practical	Theoretical exams, practical exams, and report writing.
9	7 hours		Filtration equipment	theoretical + practical	Theoretical exams, practical exams, and report writing.
10	7 hours		Size reduction	theoretical + practical	Theoretical exams, practical exams, and report writing.
11	7 hours		Size reduction equipment	theoretical + practical	Theoretical exams, practical exams, and report writing.
12	7 hours		Size reduction equipment operation (Feed control, energy consumption ,	theoretical + practical	Theoretical exams, practical exams, and report writing.

			removal of heat)		
13	7 hours		Mixing of solids and pastes	theoretical + practical	Theoretical exams, practical exams, and report writing.
14	7 hours		Materials handling	theoretical + practical	Theoretical exams, practical exams, and report writing.
15	7 hours		Storage	theoretical + practical	Theoretical exams, practical exams, and report writing.

earning and teaching resources	
Ref.	Unit operation of chemical Eng. By Maccabe , 4th edition 1993 1- 2- Chemical Engineering Fluid Mechanics, 2nd edition, Ron Derby, Marcel Dekker Ind., 2001. 3-Mechanics of Solids, William B. Bickford, Concepts of Applications, Homewood, Boston, 1993. 4-Fluid flow for chemical engineers , By F. A. Holland 2nd edition, 1995. 5- Solution of problems in fluid mechanics , part 1 by JF Douglas, 1974. 6- Chemical Eng vol. (1) and (2) by coulson and Richardason, 2001 7-Perry′s Chemical Engineers′ Hand book, James O. Maloney, 8th ed., 2008.
Electronic references	All available books on the internet related to the subject.

COURSE SPECIFICATION

The course explains the basic principles of safety and health at work. It also aims to give students the knowledge they need to recognize possible workplace hazards and how to prevent them. In addition, it helps them understand the rules and regulations related to safety and health at work.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Workplace safety
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	30 hours-"2 hours weekly, the curriculum is annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1. Understand the importance of safety in workplaces and its affects people and companies.
2. Identify the common causes of work accidents.
3. Understand the legal responsibilities of the worker and the employer.

B. Subject-specific skills

1. Gain the skill to assess, analyze, and identify hazards in the workplace.
2. Know emergency procedures and first aid.
3. Know the correct steps to take when an accident happens at work.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

- Continuous evaluation of the student's behavior during attendance.
- Direct discussion with students during lectures.
- Monitoring behavioral changes in some students and following up with them.
- Mini-projects within the lecture.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2 hours		The meaning of occupational safety, The goals of occupational safety, The importance of occupational safety, The authority responsible for occupational	theoretical + practical	Practical and written tests and report writing.
2	2 hours		Accidents, Possibility of accidents happening, Causes of accidents, types of accidents, Death, Total disability, permanent disability, minor injuries, Moderate injuries, Occupational injuries, Occupational diseases, Measuring industrial safety.	theoretical + practical	Practical and written tests and report writing.
3	2 hours		1. Mechanical causes of 2. Accidents Ways to prevent accidents.	theoretical + practical	Practical and written tests and report writing.
4&5	4 hours		Chemical hazards: Classification and categorization of chemicals based on their danger levels Physiological effects of chemicals on living organisms –Symptoms and types of chemical poisoning –Harmful effects of chemicals on human body organs and systems and related diseases (nervous system, digestive system, respiratory system, urinary	theoretical + practical	Practical and written tests and report writing.

			system, circulatory system, skin).		
6&7	4hours		Environmental pollution risks, Air pollution by solid and gaseous materials, Industrial dust Pollution in river water, Recommendations and precautions when handling chemicals first aid for chemical poisoning.	theoretical + practical	Practical and written tests and report writing.
8	2 hours		Gas tanks and liquid gas containers, Moving by carts, Moving by trains and trucks, Moving gas and pressure containers, Injuries from moving, Safety tips when moving flammable materials and gas tank.	theoretical + practical	Practical and written tests and report writing.
9	2 hours		Electrical hazards, Electricity and its effects, Electrical devices and equipment, Protection from electricity and first aid for electric shock injuries.	theoretical + practical	Practical and written tests and report writing.
10	2 hours		Physical and natural factors in the work environment, Vibration, Noise and sound, Effects of strong vibrations and loud sounds on workers, Unusual atmospheric pressures.	theoretical + practical	Practical and written tests and report writing.
11	2 hours		Lighting and radiation: **Proper lighting rules :**Radiation hazards, Measuring radiation	theoretical + practical	Practical and written tests and report writing.

			levels, Regulation of human body temperature, Controlling temperature in the work environment, Ventilation, heating, and cooling issues, Methods for measuring thermal factors.		
12&13	4 hours		**Fires and types:** How fire starts and types of fires, Fire causes, How to stop fires from happening, Fire safety planning, How to put out fires, Materials used to put out fires, Explosions, Fire team duties, Firefighting tools, First aid for burns.	theoretical + practical	Practical and written tests and report writing.
14&15	4 hours		Training and awareness in occupational safety: Courses and training for different staff, Awareness tools in occupational safety: posters, films, exhibitions, articles, seminars, Occupational Safety Week, Personal protective equipment (PPE) used in industry and its types, Using personal protective equipment.	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref.	1. Chemical Safety and Security, Dr. Mohammed Hamed Saeed 2. Chemical Safety and Security, Dr. Hamsa Manam, Dr. Sarah Salman & Dr. Nawar Jamal 3. Safety Guide in Chemical and Biological Laboratories and Stores, University of Anbar

COURSE SPECIFICATION

Introducing the student to the origins of crude oil and the theories used to explain the phenomenon of oil existence, as well as understanding the specifications and composition of crude oil and the laboratory tests conducted on it. The course also aims to familiarize students with the production units of light petroleum derivatives and distillation towers..

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Physics of Crude Oil
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	90 hours-"6 hours weekly, the curriculum is annual."
8-Course Coordinator Name	Assistant Lecturer Ali Kamil Mohsin
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1. Understanding the physical composition of crude oil and its basic components (hydrocarbons, impurities, associated gases).

2. Identifying important physical properties such as density, viscosity, pour point, vapor pressure, and flash point.

3. Understanding methods of classifying oil based on its specific gravity and sulfur content (light/heavy, sweet/sour).

4. Understanding the impact of these properties on production, transportation, and processing operations.

B. Subject-specific skills

1. Measuring and analyzing the physical properties of crude oil using laboratory instruments.
2. Interpreting the results of physical analyses and linking them to crude oil quality and its applications.
3. Preparing accurate technical reports that include descriptions and analyses of crude oil data.
4. Using software and computational tools to analyze properties and predict crude oil behavior under various conditions.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

5. Continuous evaluation of student behavior during class hours.
6. Direct discussions with students during lectures.
7. Monitoring behavioral changes in some students and following up with them.
8. Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-٢	١٢ hours		Introductory Overview – Crude Oil and Theories of Crude Oil Formation.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments
٣	٦ hours		Major Oil Fields	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
4-5	12 hours		Crude Oil Composition: Hydrocarbon Compounds, including Paraffins, Naphthenes, and Aromatics.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
6-7	12 hours		Dissolved Impurities, including: Sulfur, nitrogen, and oxygen compounds, as well as naphthenic acids.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
٨	٦ hours		Water, salts, and sediments	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted

					experiments.
9-10	12 hours		Classification of Crude Oil Based on: Its Main Components, Specific Gravity, Sulfur Content, and Characterization Factor (K Factor).	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
11-12	12hours		**Laboratory Tests of Crude Oil** *(Density and Specific Gravity, API, Pour Point, Ash Content, Calorific Value, Vapor Pressure)*	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
13	6hours		Questions and Tests	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
14-15	12hours		Methods of Removing Water and Salts in Refineries, Effects of Water and Salts Presence in Crude Oil, Emulsification and Its Types, Emulsification Catalysts.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.

Learning and teaching resources	
Ref.	1- Properties, Classification, and Evaluation of Petroleum and its Products, Dr. Hamid Nasser bin Harhara, 2011. 2- World Wide Web 3- Petroleum Refining Technology and Economics, 4th ed,J. H. Gary, G. E. Handwerk, 2001 4- Thermal and Catalytic Processes in Petroleum Refining,Serge Raseev, 2003. 5- Petroleum Refinery Engineering, W.L. Nelson,. 4thed, 1956. 6-Refining Process Handbook, Surinder Parakash, 2003. 7- Drilling Well Completion,Carl Gatlin, 2006.
Electronic references	All available books on the internet related to the subject.

COURSE SPECIFICATION

The purpose of studying petroleum refining is to:
Understand the processes and technologies used to convert crude oil into useful petroleum products such as gasoline, diesel, kerosene, liquefied gas, lubricants, and other chemical derivatives.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of Chemical Industries techniques
3. Course title/code	Crude oil refining
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	75 hours-"5 hours weekly, the curriculum is annual."
8-Course Coordinator Name	Assistant Lecturer Hamzah Noori Hamzah
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

- Understanding the properties and classification of crude oil.
- Studying physical separation techniques such as atmospheric and vacuum distillation.
- Understanding chemical processing operations like thermal and catalytic cracking, hydrotreating, desulfurization, etc.
- Improving the quality of final products to meet environmental and economic standards.
- Achieving maximum economic benefit from each barrel of crude oil.
- Reducing the environmental impact of refining operations.
- Learning the design and operation of various refining units.

B. Subject-specific skills

5. **Studying the design and operation of refining units in accordance with global standards.**
6. **Studying producing different types of petroleum products and studying its use.**

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

9. Continuous evaluation of student behavior during class hours.
10. Direct discussions with students during lectures.
11. Monitoring behavioral changes in some students and following up with them.
12. Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1-2	10 hours		**Introduction and petroleum refining products including LPG, Naphtha and gasoline**	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments
3-4	10 hours		Aviation gasoline, Kerosene, jet fuel, gas oil and diesel	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
4-5	10 hours		**Introduction to lubricating oil, chemical and physical properties of lubricant oil and types of lubricant oil**	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
6-7	10 hours		**Petroleum derivatives processing, chemical treatment and hydrogenation treatment**	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
8-9	10 hours		Thermal cracking treatment of petroleum derivatives	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted

					experiments.
10-11	10 hours		**Catalyst cracking treatment of petroleum derivatives**	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
12	5 hours		Questions and Tests	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.

COURSE SPECIFICATION

Heat transfer is the science that seeks to predict the energy transfer that may take place between material bodies as a result of a temperature difference. Thermodynamics teaches that this energy transfer is defined as heat. The science of heat transfer seeks not merely to explain how heat energy may be transferred, but also to predict the rate at which the exchange will take place under certain specified conditions. The fact that a heat-transfer rate is the desired objective of an analysis points out the difference between heat transfer and thermodynamics.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Heat transfer
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	105 hours-"7 hours weekly, the curriculum is semi-annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

4. To predict the energy transfer that may take place between material bodies as a result of a temperature difference.
5. To explain how heat energy may be transferred.
6. To predict the rate at which the exchange will take place under certain specified conditions.

B. Subject-specific skills

4. Focus on developing practical application skills such as conducting experiments, plotting data, and performing hands-on analysis.
5. Heat transfer supplements the first and second principles of thermodynamics by providing additional experimental rules that may be used to establish energy-transfer rates. As in the science of thermodynamics, the experimental rules used as a basis of the subject of heat transfer are rather simple and easily expanded to encompass a variety of practical situations.
6. Apply mathematical equations in practical scenarios.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

13. Continuous evaluation of student behavior during class hours.
14. Direct discussions with students during lectures.
15. Monitoring behavioral changes in some students and following up with them.
16. Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	Intended Learning Outcomes	Unit / Course Topic	Teaching Method	Assessment Method
First	7	Units: Unit systems, conversion, thermal units, methods of heat transfer	Introduction to Heat Transfer	Presentation & Explanation	In-class and Homework
Second	7	Basics of heat transfer equations by conduction, thermal conductivity, conduction through a single plane wall	Heat Transfer by Conduction	Presentation & Explanation	In-class and Homework
Third	7	Conduction through a composite plane wall, thermal resistance, conduction through a single cylindrical wall	Heat Transfer by Conduction	Presentation, Explanation, Drawing	In-class and Homework
Fourth–Fifth	7	Conduction through composite cylindrical wall, spherical wall, heat transfer by convection, free and forced convection, heat transfer coefficient, forced convection inside and outside a tube	Heat Transfer by Convection	Presentation, Explanation, Drawing	In-class and Homework
Sixth–Seventh	7	Heat transfer by combined conduction and convection between two fluids through plane and cylindrical walls	Heat Transfer by Convection	Presentation, Explanation, Drawing	In-class and Homework
Eighth	7	Overall heat transfer coefficient, types of heat exchangers, energy balance for double pipe heat exchangers, LMTD	Heat Transfer by Convection	Presentation, Explanation, Drawing	In-class and Homework
Ninth–Tenth	7	Shell and tube heat exchangers, types of tube arrangements, correction factors: Uc, Ud, Rf	Heat Transfer by Convection	Presentation, Explanation, Drawing	In-class and Homework
Eleventh	7	Heat transfer with phase change, condensation of vapors, film and dropwise condensation, heat transfer to boiling liquids	Heat Transfer by Conduction & Convection	Presentation, Explanation, Drawing	In-class and Homework
Twelfth	7	Heat transfer by radiation: absorptivity, reflectivity, transmissivity, Kirchhoff's law, Stefan-Boltzmann law, radiation between real surfaces	Heat Transfer by Radiation	Presentation, Explanation, Drawing	In-class and Homework
Thirteenth	7	Evaporation, types of evaporators, performance of evaporators, economy, Duhring's rule	Heat Transfer Applications	Presentation, Explanation, Drawing	In-class and Homework
Fourteenth	7	Mass and energy balance for a single evaporator	Heat Transfer Applications	Presentation, Explanation, Drawing	In-class and Homework
Fifteenth	7	Multi-effect evaporators, methods of feeding, capacity and economy, energy balance, vapor recompression	Heat Transfer Applications	Presentation, Explanation, Drawing	In-class and Homework

Learning and teaching resources	
Ref.	1-Heat Transfer, Tenth Edition J. P. Holman Department of Mechanical Engineering Southern Methodist University. 2-Heat and Mass Transfer: A Textbook for Students Preparing for B.E. and B.Tech., B.Sc. Engg., and gate examination in SI units Er. R.K. RAJPUT. 3-Process Heat Transfer, principles and applications, ROBERT W. SERTH Department of Chemical and Natural Gas Engineering 4-Volume 4 Petroleum Refining Design and Applications Handbook A.KAYODE COKER. 5-Fundamentals of Heat and Mass Transfer, sixth edition by: Incropera/Dewitt/Bergman/Lavine. 6- Chemical Engineering Coulson and Richardson's volume 1, Fluid Flow, Heat Transfer, and Mass Transfer, sixth edition.

COURSE SPECIFICATION

The term mass transfer is used to denote the transference of a component in a mixture from a region where its concentration is high to a region where the concentration is lower Mass transfer process can take place in a gas or vapour or in a liquid, and it can result from the random velocities of the molecules (molecular diffusion) or from the circulating or eddy currents present in a turbulent fluid (eddy diffusion .

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	mass transfer
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	105 hours-"7 hours weekly, the curriculum is semi-annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

7. It is frequently necessary to separate a mixture into its components and, in a physical process, differences in a particular property are exploited as the basis for the separation process. To explain how heat energy may be transferred.
8. Consideration will be given to the basic principles underlying mass transfer both with and without chemical reaction, and to the models which have been proposed to enable the rates of transfer to be calculated .
9. Mass transfer takes place across a phase boundary where the concentrations on either side of the interface are related by the phase equilibrium relationship.

B. Subject-specific skills

- **Understanding Separation Processes**
  - Analyze and design separation techniques such as distillation, absorption, extraction, leaching, and drying.
- **Application of Mass Transfer Principles**
  - Apply laws like **Fick's Law** to model and solve diffusion problems in gases, liquids, and solids.
- **Design and Analysis of Equipment**
  - Calculate and optimize parameters for mass transfer equipment (e.g., packed columns, tray towers, evaporators, dryers).
- **Equilibrium Analysis**
  - Interpret phase equilibrium data (e.g., vapor-liquid, liquid-liquid, solid-liquid) for process development and simulation.
- **Mass Balance Calculations**
  - Perform mass and component balances for steady-state and unsteady-state systems.
- **Rate-Based Modeling**
  - Develop and use rate-based models to predict mass transfer rates and process efficiency.
- **Problem-Solving and Critical Thinking**
  - Solve complex engineering problems involving multiple phases, non-ideal behavior, and

coupled heat and mass transfer.

- **Use of Graphical and Analytical Methods**
  - Employ tools like McCabe-Thiele and Ponchon-Savarit diagrams for stage calculations in distillation and absorption.
- **Equipment Selection and Scale-Up**
  - Choose appropriate separation techniques and scale them up from lab to industrial scale.
- **Safety and Environmental Considerations**
  - Understand the implications of mass transfer operations on safety, emissions, and sustainability.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

17. Continuous evaluation of student behavior during class hours.
18. Direct discussions with students during lectures.
19. Monitoring behavioral changes in some students and following up with them.
20. Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	Intended Learning Outcomes	Teaching Method	Assessment Method
First	4	Distillation, vapor–liquid equilibrium, relative volatility, methods of obtaining equilibrium curve	Lecture	Quizzes and Assignments
Second	4	Methods of distillation: Differential, Flash, and Rectification	Lecture	Quizzes and Assignments
Third	4	Fractionating columns, calculation of the number of theoretical plates, operating lines	Lecture	Quizzes and Assignments
Fourth	4	Lewis-Sorel and McCabe-Thiele methods for calculating the number of theoretical plates	Lecture	Quizzes and Assignments
Fifth	4	Reflux ratio: importance and minimum value. Batch Distillation: operation at constant product composition	Lecture	Quizzes and Assignments
Sixth	4	Operation at constant reflux ratio, isotropic, extractive, and steam distillation. Mass transfer by diffusion: Fick's law, methods, types of diffusion, and diffusion theories	Lecture	Quizzes and Assignments
Seventh	4	Gas absorption: equilibrium, relation to film theory, solvent selection, operating line equation, column height calculation, absorption in plate towers, theoretical stages	Lecture	Quizzes and Assignments
Eighth	4	Mass transfer equipment: tray towers, tray types, factors affecting tray efficiency, packed columns	Lecture	Quizzes and Assignments
Ninth	4	Liquid–liquid extraction: solvent selection, equilibrium systems, solubility curves, temperature effect on solubility	Lecture	Quizzes and Assignments
Tenth	4	Stage-wise contact: single-stage and multi-stage	Lecture	Quizzes and Assignments
Eleventh	4	Continuous extraction towers, types of extraction equipment	Lecture	Quizzes and Assignments
Twelfth	4	Leaching: influencing factors, theoretical principles, leaching equipment	Lecture	Quizzes and Assignments
Thirteenth–Fourteenth	4	Heat and mass balance for continuous dryers, drying equipment	Lecture	Quizzes and Assignments
Fifteenth	4	Crystallization: theories, crystallization rate, equipment, Drying: equilibrium, drying rate, drying rate curve, drying time, batch and Drying: equilibrium, drying rate, drying rate curve, drying time, batch and continuous drying mechanisms continuous drying mechanisms	Lecture	Quizzes and Assignments

Learning and teaching resources	
Ref.	1-Separation Process Engineering Includes Mass Transfer Analysis Fifth Edition, PHILIP C. Wankat. 2-Heat and Mass Transfer: A Textbook for Students Preparing for B.E. and B.Tech., B.Sc. Engg., and gate examination in SI units Er. R.K. RAJPUT. 3-Mass transfer in chemical engineering Processes edited by Jozef Markos. 4-Volume 4 Petroleum Refining Design and Applications Handbook A.KAYODE COKER. 5-Fundamentals of Heat and Mass Transfer, sixth edition by: Incropera/Dewitt/Bergman/Lavine. 6- Chemical Engineering Coulson and Richardson's volume 1, Fluid Flow, Heat Transfer and Mass Transfer, sixth edition. 7- Principles of Mass transfer and Separation processes Binay k. Dutta.

COURSE SPECIFICATION

Introducing students to the electrical devices used in technological operations and chemical industries, as well as how to measure variables and control them. It aims to give a practical overview of electrical devices and measurement instruments, expand students' understanding of how to use and handle these devices, manage chemical variables, and develop their theoretical knowledge."

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Principles of control
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	60 hours-"4 hours weekly, the curriculum is semi-annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A-Knowledge and Understanding

- **Basic control system concepts** such as feedback (closed-loop) and open-loop configurations.

- **Identifying the components of control systems** – the controller, sensor, actuator, and the process/system itself.

- **Understanding time-response characteristics** of a system, including its stability, damping, and settling time.

B. Subject-specific skills

1. **Solving and analyzing first- and second-order linear control systems**.
2. **Using numerical and graphical analysis tools to evaluate system performance**.
3. **Designing simple controllers such as P, PI, and PID, and analyzing their effects**.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

21. Continuous evaluation of student behavior during class hours.
22. Direct discussions with students during lectures.
23. Monitoring behavioral changes in some students and following up with them.
24. Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2 hours		Principles of control in unit operation. Control systems open and closed	theoretical + practical	Practical and written tests and report writing.
2	2 hours		Practical examples for pressure regulation, Temperature level and flow rate regulation	theoretical + practical	Practical and written tests and report writing.
3	2 hours		Batch process control(on-off) and continues control modes Controllers: P,I,D,PI,PD,PID	theoretical + practical	Practical and written tests and report writing.
4&5	4 hours		Process Temperature Control	theoretical + practical	Practical and written tests and report writing.
6&7	4hours		Dead time, Time constant	theoretical + practical	Practical and written tests and report writing.
8	2 hours		Hydraulic Regulators, Electric Regulator, Pneumatic Regulators	theoretical + practical	Practical and written tests and report writing.
9	2 hours		Regulation circuit diagrams and symbols	theoretical + practical	Practical and written tests and report writing.
10	2 hours		Process control for Flow rate , level, heat exchanger, distillation and	theoretical + practical	Practical and written tests and report writing.

			Reactors		
11	2 hours		Principles of control in unit operation. Control systems open and closed	theoretical + practical	Practical and written tests and report writing.
12&13	4 hours		Practical examples for pressure regulation, Temperature level and flow rate regulation	theoretical + practical	Practical and written tests and report writing.
14&15	4 hours		Batch process control(on-off) and continues control modes Controllers: P,I,D,PI,PD,PID	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref. .١	1. 1- Industrial Instrumentation by E.Eck man New York, John wiley and sons .Inc London Cham an and Hall Limited 5th printing . July 1975. 2. 2-Process Instrumentation and controls Hand Book by Considine Douglas M. McGraw. Hill Book company copyright first edition 1957. Chemical Engineering hand book by -٣ .٣ .Perry fifth edition McGraw. Hill 1957

COURSE SPECIFICATION

It aims to introduce students to the fundamentals and types of measurements used in industrial and engineering fields, as well as emphasize core concepts such as accuracy, units, calibration, and measurement error.”

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Measurement technique
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	60 hours-"4 hours weekly, the curriculum is semi-annual."
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A-Knowledge and Understanding

- **Understand the fundamental principles of measurement processes and types of physical quantities** (length, mass, time, pressure, temperature, velocity, etc.).

- **Learn about types of measuring instruments and their operating principles** (mechanical, electrical, electronic, digital).

- **Know the concepts of accuracy, repeatability, standard error, and calibration verification**.

B. Subject-specific skills

- **Use various measuring instruments accurately and efficiently** in the laboratory or in the field.

- **Analyze measurement results and estimate sources of error**—including both systematic and random errors.

- **Write clear technical reports** that include measurement results, data analysis, and interpretation of findings.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

25. Continuous evaluation of student behavior during class hours.
26. Direct discussions with students during lectures.
27. Monitoring behavioral changes in some students and following up with them.
28. Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2 hours		Purposes of Measurements , Used terms Errors, Accuracy and Measurement principles	theoretical + practical	Practical and written tests and report writing.
2	2 hours		Signal transmitting, Pointing and Recording instruments, the Units	theoretical + practical	Practical and written tests and report writing.
3	2 hours		Principals of Electricity, Electrical energy and Electrical power, Ohm s Law, Resistors, Capacitors	theoretical + practical	Practical and written tests and report writing.
4	2 hours		Principals of Electricity, Electrical energy and Electrical power, Ohm s Law, Resistors, Capacitors	theoretical + practical	Practical and written tests and report writing.
5	2 hours		Magnetism, Electrical Magnetism, Direct current, Alternating current, Inductors	theoretical + practical	Practical and written tests and report writing.
6	2 hours		Electric circuits, Kirchhoff ´s Law Electrical measuring, Instruments ,The (V , A , AVO) meters	theoretical + practical	Practical and written tests and report writing.
7	2 hours		Whetstone Bridge, Power Measurement	theoretical + practical	Practical and written tests and report writing.

8	2 hours		Transformers, Structure, Connection, Function	theoretical + practical	Practical and written tests and report writing.
9	2 hours		Electrical Machines, Generators, Motors Principals of Operating and Measurement	theoretical + practical	Practical and written tests and report writing.
10	2 hours		Pressure measurement, Mechanical methods, Electrical methods	theoretical + practical	Practical and written tests and report writing.
11	2 hours		Temperature Measurement, touching methods Temperature ٤Measurement, Radiation methods	theoretical + practical	Practical and written tests and report writing.
12	2 hours		Measurement of Volumes, Mass and Flow Rates, Impact and Electric methods	theoretical + practical	Practical and written tests and report writing.
13	2 hours		Measuring instruments of liquids, Solids and gas levels(height)	theoretical + practical	Practical and written tests and report writing.
14	2 hours		Measurements of distances, angles and dimensions	theoretical + practical	Practical and written tests and report writing.
15	2 hours		Measurement of Humidity, thermometers method (thermometric)	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref.	1. Industrial Instrumentation by E.Eck man New York, John wiley and sons .Inc London Cham an and Hall Limited 5th printing . July 1975. 2. Process Instrumentation and controls Hand Book by Considine Douglas M. McGraw. Hill Book company copyright first edition 1957. 3. Chemical Engineering hand book by Perry fifth edition McGraw. Hill 1957.

COURSE SPECIFICATION

This course focuses on the study of the physical and mechanical properties of various engineering materials, including metals and composite materials. The aim is to provide the student with a fundamental understanding of the internal structure of materials and their behavior under exposure to forces or different temperature degrees.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Material Properties
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	60 hours – 4 hours per week
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1. Explain the relationship between material composition and their physical and mechanical properties.
2. Use concepts of material properties to analyze materials under various conditions and convert them into
   applicable engineering solutions.
3. Evaluate the validity of materials for specific engineering applications based on their properties.

B. Subject-specific skills

- Analyze the effect of defects, distortions, and heat treatment on material properties and their behavior under stress.
- Propose modifications to material properties through changes in composition or heat treatment to improve Program-Specific Objectives and Skills:
- Apply basic concepts to test mechanical properties such as fatigue, deformation, performance in specific applications

Teaching and Learning Methods

- Oral, written, and practical tests, final exams, daily evaluations, and electronic tests.

Assessment methods

- General and transferable skills (skills related to employability and personal development

C. Thinking Skills

1. Continuous assessment of student behavior during class time.
2. Direct discussion with students during lectures.
3. Monitoring and modifying the behavior of some students as needed.
4. Mini-projects within the lecture.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4hours		Introduction, definitions, forces, stresses, defects, mechanical properties	theoretical + practical	
2	4hours		Stress center and self-failure point	theoretical + practical	Practical and written tests and report writing.
3	4hours		Sports issues about the stress center and self-failure point	theoretical + practical	Practical and written tests and report writing.
4	4hours		Stress, planning law, stress map, stress relationship to heat treatments, sports issues	theoretical + practical	Practical and written tests and report writing.
5	4hours		Tension and mixed	theoretical + practical	Practical and written tests and report writing.
6	4hours		Tension and mixed stresses, sports issues Stress cycles, sports issues about cycles, cycle angle calculation	theoretical + practical	Practical and written tests and report writing.
7	4hours		Stress with diagrams planning for bending and tensile	theoretical + practical	Practical and written tests and report writing.

			strength		
8	8 hours		Stress in cylindrical vessels (cylindrical pressure vessels)	theoretical + practical	Practical and written tests and report writing.
9	4hours		Stress and pressure calculations in different parts, sports issues	theoretical + practical	Practical and written tests and report writing.
10	4hours		Introduction to metals: types of metals, atomic structure, crystalline and amorphous structures	theoretical + practical	Practical and written tests and report writing.
11	4hours		Iron and steel: properties,	theoretical + practical	Practical and written tests and report writing.
12	4hours		Pig iron extraction from ores: used furnaces and raw materials	theoretical + practical	Practical and written tests and report writing.
13	4hours		Non-ferrous metals: properties, uses	theoretical + practical	Practical and written tests and report writing.
14	4hours		Introduction to corrosion: types of corrosion	theoretical + practical	Practical and written tests and report writing.

15	4hours		Corrosion prevention methods	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref.	Required Textbooks: 1. Strength of Materials, R.C. Stephens, 1974 2. Engineering Mechanics, by Singer, 3rd ed., 1972 3. Chemical Plant Technology, M.A. Ellison & Taylor, 1970 Electronic References: - All available books and materials on the network related to the subject.

COURSE SPECIFICATION

The student is introduced to a set of industrial devices and equipment necessary for availability in all industrial facilities, such as pumps, compressors, and piping systems, as well as some of the engineering calculations associated with them. This also includes other industrial equipment and machinery

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Industrial Equipment Construction
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	60 hours – 4 hours per week
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding

1- To understand the engineering calculations specific to selecting industrial equipment.

2- To learn the methods of establishing and constructing an industrial facility.

B. Subject-specific skills

1- Link engineering equipment together.

2- Read engineering drawings.

3- Select suitable equipment and tools for work.

Teaching and Learning Methods

In-person lectures, electronic lectures, short tests, assignments, practical applications in the lab and workshop.

Assessment methods

Oral and written tests, midterm exams, final exams, daily assessments, and electronic tests.

C. Thinking Skills

1- Continuous assessment of student behavior during attendance.

2- Direct discussion with students during lectures.

3- Monitoring and modifying some students' behavior.

4- Small projects within the lecture.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	4hours		Introduction to production processes in chemical industries and equipment types Understand processes and equipment used	theoretical + practical	
2	4hours		Importance of equipment in chemical factories, types, and applications Identify types and uses of equipment	theoretical + practical	Practical and written tests and report writing.
3	4hours		Types of casting equipment and applications Know casting equipment	theoretical + practical	Practical and written tests and report writing.
4	4hours		Valves: types, uses, maintenance Identify valves and maintenance	theoretical + practical	Practical and written tests and report writing.
5	4hours		Mixers: types, uses, maintenance Identify mixers and maintenance	theoretical + practical	Practical and written tests and report writing.
6	4hours		Automated equipment group Understand automated systems	theoretical + practical	Practical and written tests and report writing.
7	4hours		Hydromechanical group Identify hydromechanical systems	theoretical + practical	Practical and written tests and report writing.

8,9,10	8 hours		Pumps: types, uses, maintenance , Identify and maintain pumps Pump efficiency, issues, maintenance Diagnose pump problems	theoretical + practical	Practical and written tests and report writing.
11	4hours		Compressors: types, uses, maintenance Identify and maintain compressors	theoretical + practical	Practical and written tests and report writing.
12	4hours		Industrial compressors Understand industrial compressor systems	theoretical + practical	Practical and written tests and report writing.
13	4hours		Boilers: types, uses, fuel, maintenance Identify and maintain boilers	theoretical + practical	Practical and written tests and report writing.
14	4hours		Specialized boilers, inspection Understand boiler inspection and testing	theoretical + practical	Practical and written tests and report writing.
15	4hours		Heat exchangers: types, uses, maintenance Identify and maintain heat exchangers	theoretical + practical	Practical and written tests and report writing.

Learning and teaching resources	
Ref.	1- Chemical Plant Technology, Ellison & Taylor, 1970 2- Plant Design for Chemical Eng., Peter, 1973 3- Perry's Chemical Engineers' Handbook, James O. Maloney, 8th ed., 2008 Other references available in the library and electronic sources related to the topic.

COURSE SPECIFICATION

Providing students with comprehensive knowledge and understanding of industrial processes that rely on chemical reactions and transformations, and qualifying them to work in the fields of chemical manufacturing with awareness and efficiency.

1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Chemical industrial/1
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	75 hours-"5 hours weekly
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1-Understand the basic principles of chemical industries such as reactors, distillation, absorption, drying, and filtration.
2-Identify raw materials and methods for converting them into industrial products of economic value
3-Knowledge of the most important chemical industries such as fertilizers, acids, polymers, detergents, and solvents.

B. Subject-specific skills

1-Analyze chemical manufacturing steps and identify critical control points.

2-Estimating the quantities of materials and energy required for industrial reactions and processes.

3-Evaluate the efficiency of the industrial process and suggest ways to improve it.

Teaching and Learning Methods

In-person lectures, online lectures, quizzes, assignments, and practical work in the laboratory and workshop.

Assessment methods

Oral tests, Written tests, Midterm exams, Final exams, Daily assessment, Electronic (or online) tests.

C. Thinking Skills

1-Continuous evaluation of student behavior during class hours.
2-Direct discussions with students during lectures.
3-Monitoring behavioral changes in some students and following up with them.
4-Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	5 hours		Chemical industrial methods. Heat and pressure in reaction, catalyst, batch method, continuous method, chemical industrial methods units, units (physical processes, fluid flow, heat transfer).	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments
2	5 hours		International Organization for Standardization (ISO), Iraqi Standard Specifications, Chemical Industry Specifications, Product Quality Control	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
3-4	5 hours		Water conditioning, water conditioning methods for domestic use Water purification using reverse osmosis Water purification using electrodialysis Magnetic water production Water conditioning methods for industrial use	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
5	5 hours		Treatment of sewage and industrial wastewater	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.

6	5 hours		Industrial gases: natural gas, hydrogen, oxygen, nitrogen, acetylene.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
7	5 hours		Biogas production Inert gas production, methods for removing impurities from gases	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
8	5 hours		Ceramics industry, raw materials, porcelain industry, bricks, and fireclay bricks.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
9	5 hours		Glass, its types, raw materials, forming methods, methods of converting glass mixtures from laboratory to industrial and vice versa	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
10	5 hours		Cement industry, its types, specifications, raw materials, and manufacturing stages	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
11	5 hours		Table salt and its compounds industry (sodium carbonate, caustic soda industry)	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
12	5 hours		Sulfur and sulfuric acid. Extraction of sulfur from	theoretical +	• Oral assessment • Written

			mines. Extraction of sulfur from natural gas. Production of sulfuric acid by contact and industrial chamber methods	practical	examination • Preparation of reports for the conducted experiments.
13	5 hours		Chemical fertilizers, their types, and methods for manufacturing phosphate and potassium fertilizers .	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
14	5 hours		Nitric acid. Nitrogen fertilizer production (ammonium sulfate, ammonium nitrate).	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
15	5hours		Pharmaceutical industries, types (antibiotic industry)	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.

Learning and teaching resources	
Ref.	1. Chemical Industries, Dr. Mahmoud Shaker Abdul Hussein and Fadhel Bandar Issa 2. Chemistry of Adhesives, Dyes, and Polymer Coatings, Dr. Dhanoon Mohammed Aziz, College of Science, University of Baghdad, 2005 3. ASTM standards . published in 1980 by American society for testing Material 4. Chemical Process Industries , R.N shreve, Joseph Brink , 5th edition . McGraw. Hill 2006.

COURSE SPECIFICATION

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1. Teaching Institution	Technological institute of Basra
2. University Department/Centre	Department of chemical industries techniques
3. Course title/code	Chemical industrial/2
4. Program(s) to which it contributes	
5. Modes of Attendance offered	In-person in classrooms and online when necessary
6. Semester/Year	2024-2025
7. Number of hours tuition (total)	٧٥ hours-"٥ hours weekly
8. Date of production/revision of this Specification	31/5/2025

9· Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding/

1-Understand the basic principles of chemical industries such as reactors, distillation, absorption, drying, and filtration.
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3-Monitoring behavioral changes in some students and following up with them.
4-Implementing mini-projects within the lecture sessions.

10. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	5 hours		Manufacture of glossy oil paints and water-based paints	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments
2	5 hours		Vegetable oil industry, extraction, purification and hydrogenation	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
3	5 hours		Soap and detergent industry	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
4	5 hours		Soap and detergent industry	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
5	5 hours		Sugar and starch industry, sugar industry from beets and sugarcane	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted

					experiments.
6	5 hours		Brewing industry: pure alcohol, vinegar, and acetic acid.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
7	5 hours		Papermaking, Raw Materials, Pulp Manufacturing, Paper Manufacturing	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
8	5 hours		Kinetics of chemical processes, polymerization, polymerization methods, processes affecting chemical processes, chemical reactors and their types	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
9	5 hours		Fundamentals of the petrochemical industry, distinctive properties of the petrochemical industry.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
10	5 hours		Production of basic petrochemicals from natural gases and petroleum derivatives, petrochemical intermediates, and final products.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
11	5 hours		Synthetic fiber industry. Rayon, cellulose acetate,	theoretical + practical	• Oral assessment • Written

			polyester, nylon, acrylic.		examination • Preparation of reports for the conducted experiments.
12	5hours		Plastics, their properties, types, additives, manufacturing methods (PELD, PEHD), polypropylene, polystyrene, (PVC)	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
13	5 hours		Natural and synthetic resins work by removing contaminants and concentrating important elements.	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
14	5 hours		Rubber, Natural rubber, synthetic rubber, various examples	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.
15	5 hours		Composite Materials Manufacturing Nanotechnology Applications Environmental Pollution from Chemical Industries: Types, Treatment Methods	theoretical + practical	• Oral assessment • Written examination • Preparation of reports for the conducted experiments.

Learning and teaching resources	
Ref.	1. Chemical Industries, Dr. Mahmoud Shaker Abdul Hussein and Fadhel Bandar Issa 2. Chemistry of Adhesives, Dyes, and Polymer Coatings, Dr. Dhanoon Mohammed Aziz, College of Science, University of Baghdad, 20051. 3-ASTM standards . published in 1980 by American society for testing Material 4-.Chemical Process Industries , R.N shreve, Joseph Brink , 5th edition . McGraw. Hill 2006. 5-Text book of practical organic chemistry by , Vogel. 3rd edition 2001, published by Longman . London. 6.Encyclopedia of Chemical Technology, Kirck Othmer, 1st edition, 2003 7-Encyclopedia of Industrial Chemistry, Olimanns, 1st edition, 2007. 8-Iraqi Standards Organization, 1974, First Edition, Dar Al-Hurriya Printing House, Baghdad 9- Chemical Industries, Dr. Mahmoud Shaker Abdul-Hussein and Fadhel Bandar Issa 10. Chemistry of Adhesives, Dyes, and Polymer Coatings, Dr. Dhanoon Muhammad Aziz, College of Science, University of Baghdad, 2005