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

Academic Program Description Form for Colleges and Institutes

University Name: Northern Technical University

College/Institute: Kirkuk Technical Institute

Scientific Department: Department of chemical industry Technologies

Name of academic or professional program: Technical Diploma

Name of final certificate: Technical Diploma

Study system: Courses

Description preparation date: / /2025

File filling date: / /2025

Signature:

Name of Head of Department: Azhar Ahmed Abd

Date:

Signature:

Scientific Assistant Name: الدكتور صواش شاهين ابراهيم معاون العميد للشؤون العلمية

Date:

File checked by
Quality Assurance and University Performance Division
Quality Assurance and University Performance Division Head: Assist.Lecturer.. Alaa Abdulwahhab Azeez Baker
Date:
Signature:

Approval of the Dean
Prof. Dr. Ashti Mahdi Aref

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

Academic Program and Course Description Guide

2024-2025

1. Program Vision

The department was built on a solid scientific foundation in order to prepare and graduate highly skilled and efficient technical staff, in addition to providing scientific consultations within the specialization.

2. Program Mission

Preparing scientifically qualified technical cadres based on modern curricula and advanced training techniques to prepare and train students and provide them with high-level technical skills that qualify them to work in chemical and petrochemical factories and laboratories.

3. Program Objectives

a) Graduating qualified technical personnel to undertake operations, maintenance, and control of various chemical industrial unit operating equipment.

b) Conducting laboratory tests on raw materials used in production processes and resulting materials.

c) Determining the extent to which results conform to standard specifications.

4. Program Accreditation

None: Only one department has been selected to apply for software accreditation.

5. Other external influences

1- There is a close relationship between the department's outputs and the labor market, and the labor market's input is taken into account regarding the curricula.

2- The curricula of industrial preparatory schools are continuously monitored to ensure that their outputs are consistent with the department's curriculum.

3- Facilitating cooperation between departments to train department students during the summer vacation.

4- Conducting awareness courses and seminars for students to explain the importance of the department's outputs and the labor market.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	5	12		(10 compulsory units) (2 optional units)
College Requirements	3	7		(7 compulsory units)
Department Requirements	9	43		(7 compulsory units)
	13	56		(50 compulsory units) (6 optional units) (second stage)
Summer Training	Fulfillment only			
Other				non

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours

First level for the academic year (2024–2025)	NTU 100	Human Rights and Democracy (Compulsory)	2	–
	NTU 101	English Language 1 (Compulsory)	2	–
	NTU 102	Computer Science 1 (Compulsory)	1	1
	NTU 103	Arabic Language (Optional)	2	–
	NTU 104	Sports (Optional)	1	1
	NTU 107	French Language (Optional)	2	–
	TIKI 110	Mathematics 1 (Compulsory)	2	–
	TIKI 111	Mathematics 2 (Compulsory)	2	–
	TIKI 113	Mechanical Laboratories (Compulsory)	–	3
	ICTI 120	Fluid Flow	3	3
	ICTI 121	Operation of Mechanical Units	3	3
	ICTI 122	Physical Chemistry	3	3
	ICTI 123	Thermodynamics	3	
	ICTI 124	General Chemistry	2	3
	ICTI 125	Organic Chemistry	2	3
	ICTI 128	Engineering Drawing	3	–
	ICTI 126	Food Industries (Optional)	1	2
	ICTI 127	Pharmaceutical Industries (Optional)	1	2
Total units (theoretical + practical)				70

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
First level for the academic year (2024–2025)	NTU 200	English 2 (Compulsory)	2	–
	NTU 201	Computer 2	1	1
	NTU 202	Arabic Language	2	–
	NTU 203	Crimes of the Ba'ath Regime in Iraq	2	–
	NTU 204	Professional Ethics (Compulsory)	2	–
	TIKI 207	Principles of Occupational Safety (Optional)	2	–
	TIKI 208	Industrial Management (Optional)	2	–
	ICT 210	Petroleum Technology	2	3
	ICT 211	Crude Oil Improvement Techniques	2	3
	ICT 212	Heat Transfer	2	3
	ICT 213	Matter Transfer	2	3
	ICT 214	Measurement and Control Techniques	2	2

	ICT 215	Electrical Principles	2	2
	ICT 216	Properties of Materials	2	2
	ICT 217	Instrument Construction	2	2
	ICT 218	Water Treatment	2	3
	ICT 219	Chemical Industries	2	3
	TIKI 220	Project Management (Compulsory)	–	4
	ICT 221	Environmental Pollution (Optional)	1	2
	ICT 222	Quality Control (Optional)	1	2
Total units (theoretical + practical)				**70**

8. Expected learning outcomes of the program

Knowledge

1- Understand the chemical and physical fundamentals of industrial processes.

2- Know the various chemical industrial processes.

3- Know the types of chemicals and their properties.

4- The student will be able to explain the chemical and physical phenomena that occur during industrial processes.

5- The student will be able to perform the thermal calculations necessary for building design.

6- The student will be able to evaluate the validity of the results obtained in scientific laboratories by conducting the necessary experiments.

Skills

1- Clear Definition: The student will have the ability to perform novel chemical analysis.

2- Engineering Design: The student will be able to design chemical industrial processes.

3- Operation and Maintenance: The ability to operate and maintain industrial processes.

4- Use artificial intelligence and internet technologies within unique fields.

5- The ability to be creative and think critically.

6- The ability to adapt to different situations and circumstances.

7- The ability to design and direct work.

Ethics

1- The student acquires a deep understanding of chemical principles and industrial processes, enabling them to apply theoretical knowledge to solve practical problems in the chemical industry.
2- The student possesses practical skills in using chemical equipment, machinery, and laboratories, enabling them to effectively conduct experiments and industrial processes.
3- The student learns how to analyze complex chemical data and problems and develop effective solutions, enabling them to address challenges in the workplace.
4- The student gains awareness of the importance of safety and the environment in the chemical industry, enabling them to implement safe and environmentally friendly practices in their work.
5- The student develops communication and teamwork skills, enabling them to work effectively with multidisciplinary teams in a work environment.
6- The student acquires the ability to keep pace with developments in the chemical industry and seek opportunities for continuous development, enabling them to improve their performance and provide innovative solutions.
7- The student learns the importance of ethical and professional commitment in their work practices, enabling them to apply high standards of integrity and responsibility in their work.

9. Teaching and Learning Strategies

1- Theoretical Education: Through theoretical lectures with various visual aids and the use of modern methods of explanation, including smart screens, data shows, and film screenings of relevant films.
2- Practical Education: Through practical experiments conducted by students in laboratories.
3- Educational workshops and mechanical laboratories, where students train and acquire skills in various workshops, including carpentry, welding, blacksmithing, plumbing, lathe, etc.
4- Student Projects: Encouraging students to work on practical projects to improve their practical skills.
5- Student Research: Encouraging students to engage in self-learning through research and exploration.
6- Using technology to enhance the learning process, such as using simulation programs and electronic resources.

7- Submitting scientific reports after completing laboratory experiments.

8- Scientific visits.

9- Student seminars, symposia, and workshops.

10. Festivals, exhibitions, cultural and sports competitions within the educational institution.

10. Evaluation methods

1- Theoretical Assessment:

A- Conducting written tests to assess the student's understanding of theoretical concepts.

B- Submitting homework.

C- Submitting scientific research.

D- Oral tests.

2- Practical Tests:

A- Conducting practical experiments and discussing the results.

B- Submitting practical projects to determine the student's ability to confront and solve problems and apply practical concepts.

C- Conducting field training in an actual work environment.

3- Continuous Assessment During the Semester:

A- Daily Exams.

B- Weekly Exams.

C- Monthly Exams.

D- Feedback.

C- Semester Exam.

D- Final Course Exam.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof.	0	0	–	–	–	–
Assoc. Prof.	0	0	–	–	–	–
Asst. Prof.	0	0	–	–	–	–
Lect.	Fuel and Energy Technology Engineering	Thermal Engineering	–	–	(2) Staff	–
Lect.	Chemical Engineering	Chemical Engineering	–	–	(1) Staff	–
Lect.	Horticulture and Landscape Architecture	Horticulture and Fruit	–	–	(1) Staff	–
Lect.	Food Sciences	probiotics	–	–	(1) Staff	–
Lect.	Horticulture and Landscape Architecture	Seed Technology	–	–	(1) Staff	–
Lect.	Chemical Sciences	Physical Chemistry	–	–	(1) Staff	–

Professional Development
Mentoring new faculty members
1. Providing an orientation program for new faculty members to familiarize them with academic policies and procedures. 2. Providing individual guidance to new faculty members to help them adapt to their new work environment. 3. Providing training courses for new faculty members to improve their teaching and research skills. 4. Organizing workshops for new faculty members to discuss academic and research issues. 5. Providing training on modern technology used in teaching and research. 6. Encouraging new faculty members to engage in continuous professional development through participation in conferences and seminars. 7. Encouraging research collaboration between new faculty members and senior colleagues. 8. Encouraging new faculty members to conduct scientific research and publish their research in peer-reviewed scientific journals. 9. Providing constructive feedback to new faculty members to improve their performance.
Professional development of faculty members
1- Providing training courses for faculty members in the field of chemical industries. 2- Participating in scientific conferences and seminars in the field of chemical industries. 3- Encouraging research cooperation between faculty members and other researchers in the field of chemical industries. 4- Strengthening partnerships with chemical industries to provide training and research opportunities for faculty members. 5- Strengthening research partnerships with other universities and research centers in the field of chemical industries.

12. **Acceptance Criterion**
1- The student's overall GPA after passing the sixth-grade exam in both the science and vocational streams. **2- The student must be majoring in petrochemicals for the vocational stream.** **3- The student must have a medical examination and be fit for study.**

4- The student's grades in science subjects such as chemistry, physics, and mathematics.

5- A personal interview will be conducted to assess the student's communication and personality skills.

13. The most important sources of information about the program

1- Scientific books covering specialized topics in the chemical industry.

2- Official websites of scientific organizations and bodies in the chemical industry.

3- The American ABET academic accreditation program.

4- Research laboratories that provide a research environment for students and researchers in the field of specialization.

5- Simulation programs used in the design and analysis of chemical processes.

6- Scientific databases that provide access to scientific articles and e-books in the chemical industry.

14. Program Development Plan

1. Develop curricula to include modern topics and concepts in the chemical industry.

2. Update curricula periodically to keep pace with developments in the field of specialization and to suit the labor market.

3. Use technology in teaching to improve the quality of education and increase the effectiveness of curricula.

4. Use electronic resources such as e-books and e-journals.

5. Develop student skills through curricula and scientific activities.

6. Improve curricula based on evaluation results and student and faculty feedback.

7. Periodically evaluate curricula to identify strengths and weaknesses.

8. Collaborate with experts in the chemical industry to develop curricula.

9. Analyze labor market and industry needs to determine required skills and knowledge.

10. Analyze student needs and expectations of the program.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B 1	B2	B3	B4	C1	C2	C3	C4
	NTU 100	Democracy and human rights	Basic	√	√	√	√	√	√			√	√		
	NTU 101	English language / 1	Basic	√	√	√	√	√	√			√	√	√	√
	NTU 102	Computer Principles / 1	Basic	√	√	√	√	√	√			√	√	√	√
	NTU 103	Arabic	optional	√	√	√	√	√	√			√	√	√	√
	NTU 104	Sports	optional	√	√	√	√	√	√	√	√	√	√	√	√
	NTU 107	French	optional	√	√	√	√	√	√			√	√		
	TIKI 110	Mathematics /1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	TIKI 111	Mathematics /2	Basic	√	√	√	√	√	√	√	√	√	√	√	√

	TIKI 113	Mechanical laboratories	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 120	fluid flow	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 121	Operation of mechanical units	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 122	Physical Chemistry	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 123	thermodynamics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 124	General Chemistry	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 125	Organic Chemistry	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 126	food industries	**optional**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 127	pharmaceutical industries	**optional**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 128	Engineering drawing	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 129	Summer training	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B 1	B2	B3	B4	C1	C2	C3	C4
	NTU 200	English 2	Basic	√	√	√	√	√	√			√	√	√	√
	NTU 201	Computer 2	Basic	√	√	√	√	√	√			√	√	√	√
	NTU 202	Arabic Language	Basic	√	√	√	√	√	√			√	√	√	√
	NTU 203	Crimes of the Ba'ath Regime in Iraq	Basic	√	√	√	√	√	√			√	√	√	√
	NTU 204	Professional Ethics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	TIKI 207	Principles of Occupational Safety	optional	√	√	√	√	√	√			√	√	√	√
	TIKI 208	Industrial Management	optional	√	√	√	√	√	√	√	√	√	√	√	√

	TIKI 210	Petroleum Technology	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	TIKI 211	Crude Oil Improvement Techniques	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 212	Heat Transfer	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 213	Matter Transfer	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 214	Measurement and Control Techniques	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 215	Electrical Principles	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 216	Properties of Materials	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 217	Instrument Construction	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 218	Water Treatment	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 219	Chemical Industries	optional	√	√	√	√	√	√	√	√	√	√	√	√
	ICTI 220	Project Management	Basic	√	√	√	√	√	√	√	√	√	√	√	√

	ICTI 221	Environmental Pollution	optional	√	√	√	√	√	√	√	√	√	√	√	√

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

Human Rights and Democracy Course Description (Level One)

1. Course Name:
Human rights and democracy
2. Course Code:
NTU 100
3. Semester / Year:
First semester of the academic year (2024-2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
Attendance in department halls
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Issam Salah El-Din Ali Email: isam975@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Understanding basic human rights and the principles upon which they are based. 2. Understanding the basic principles and concepts of democracy. 3. Developing critical and analytical thinking skills in the field of human rights and democracy. 4. Promoting the values of respect for human rights and human dignity. 5. Promoting the values of commitment to democratic values and field participation. 6. Enhancing social awareness of the importance of human rights and democracy in society. 7. Promoting personal and professional development through an understanding of human rights democracy.

9. Teaching and Learning Strategies

Strategy

1. Providing theoretical lectures covering basic human rights concepts.
2. Encouraging group discussions on human rights topics.
3. Organizing practical activities such as simulations and role-playing to enhance understanding human rights.
4. Collaborating with human rights and community organizations to enhance understanding of human rights.
5. Encouraging students to participate in community activities related to human rights.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting values of commitment to democratic values and civic participation	The historical development of human rights.	theoretical	Exams
2	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Human Rights in Divine Laws with a Focus on Human Rights in Islam	theoretical	Exams
3	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Human rights in the Middle Ages and the modern era.	theoretical	Exams
4	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights	Regional recognition of human rights at the European, American, African, Islamic, and Arab levels	theoretical	Exams

		• Promoting commitment to democratic values and civic participation.			
5	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting values of commitment to democratic values and civic participation	Non-governmental organizations and their role in human rights: the International Committee of the Red Cross, Amnesty International, Human Rights Watch, and the Arab Organization for Human Rights	theoretical	Exams
6	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Human rights in international and regional conventions and national legislation. Human rights in international conventions: The Universal Declaration of Human Rights	theoretical	Exams
7	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Human rights in regional conventions: the European Convention on Human Rights, the American Convention on Human Rights, and the African Charter on Human Rights.	theoretical	Exams
8	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Human rights in national legislation and the Iraqi constitution.	theoretical	Exams
9	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Forms of human rights: individual rights, collective rights, generations of human rights. The first generation: civil and political rights (the second generation: economic and social rights).	theoretical	Exams

10	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Human rights guarantees and protection at the national level: Constitutional, judicial, and political guarantees	theoretical	Exams
11	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Human rights guarantees and protection at the regional and international levels, the role of the United Nations, the role of regional organizations, and the crime of genocide.	theoretical	Exams
12	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Classification of public freedoms: Basic and individual freedoms: freedom of security and peace of mind, freedom of movement, personal freedom	theoretical	Exams
13	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Intellectual and cultural freedoms: freedom of opinion, freedom of belief, freedom of education	theoretical	Exams
14	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights • Promoting commitment to democratic values and civic participation.	Intellectual and cultural freedoms: freedom of opinion, freedom of belief, freedom of education	theoretical	Exams
15	2	• Understanding the basic principles of human rights • The ability to communicate effectively in the field of human rights	Economic and social freedoms (freedom of work, freedom of ownership, freedom of trade and industry)	theoretical	Exams

		• Promoting commitment to democratic values and civic participation.			

11. Course Evaluation
1- Written assessment (written tests for students) (10 marks). 2- Oral assessment (group discussions + presentations) (10 marks). 3- Daily assessment (daily participation + attendance) (10 marks). 4- Monthly exams + semester exams. 5- Final exams (100 marks).

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	The Comprehensive View of Human Rights Prof. Dr. Muhammad Uthman Shabir)
Main references (sources)	Human Rights, the New Vision (by Dr. Moncef Marzouki) The Book of Concepts and Foundations (by Salman Kazim Al-Bahdali, Dr. Samah Mahdi Alyawi)
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	• (Scientific Journals) (Human Rights Journal, Democracy Journal) • (E-books) (Project Gutenberg website).

English Language Course Description 1 (First Level)

1. Course Name:
English Language
2. Course Code:
NTU 101
3. Semester / Year:
First semester of the academic year (2024-2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
Attendance in department halls
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Lect. Amjad Ahmed Jasim Email: amjedahmed@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Improve students' English language skills in reading, writing, speaking, and listening. 2. Enhance students' ability to communicate effectively in English in a variety of contexts. 3. Improve students' English writing skills. 4. Prepare students to work in international environments where English is the primary language. 5. Enhance students' understanding of and ability to communicate with different cultures in English. 6. Encourage students to continuously learn English. 7. Promote students' self-development through the study of English.
9. Teaching and Learning Strategies
Strategy 1- Encourage students to work on practical projects that require the use of English. 2- Use interactive methods such as discussions and practical activities. 3- Enhance English listening skills. 4- Enhance English speaking and reading skills.

5- Conduct ongoing assessment of students through tests, assignments, and projects.

5. Encouraging students to participate in community activities related to human rights.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Definition of the basics of the English language	theoretical	Exams
2	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Definition of sentence construction in English	theoretical	Exams
3	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Simple and continuous present tense	theoretical	Exams
4	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Present perfect and perfect continuous tenses	theoretical	Exams

5	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Simple and continuous past tense	theoretical	Exams
6	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Past perfect and perfect continuous tenses	theoretical	Exams
7	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Simple and future continuous tense	theoretical	Exams
8	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Future perfect and perfect continuous tenses	theoretical	Exams
9	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	What question tool	theoretical	Exams
10	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English.	Why question tool	theoretical	Exams

		• Ability to leverage available resources to improve English language skills.			
11	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	where question tool	theoretical	Exams
12	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	when question tool	theoretical	Exams
13	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	How to combine in English	theoretical	Exams
14	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Job and workplace	theoretical	Exams
15	2	• Ability to read and understand technical texts in English. • Ability to communicate effectively with colleagues and clients in English. • Ability to leverage available resources to improve English language skills.	Comprehensive review	theoretical	Exams

11. Course Evaluation

1- Written assessment (written tests for students) (10 marks).

2- Oral assessment (group discussions + presentations) (10 marks).

3- Daily assessment (daily participation + attendance) (10 marks). 4- Monthly exams + semester exams. 5- Final exams (100 marks).	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Headway Beginner Student's Book ,Liz and Jo Soars
Main references (sources)	Textbooks 1. English textbooks for diploma students: Book specifically designed for diploma students, such as "English for Specific Purposes" or "Technical English." 2. General English textbooks: Books cover general English language skills, such as "Headw or "English File."
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	1. English language websites: Websites such a BBC Learning English or English Central offer interactive learning materials. 2. English language apps: Apps such as Duolir or Babbel offer interactive English lessons.

Computer Principles 1 (First Level) Course Description

1. Course Name:
Computer Principles /1
2. Course Code:
NTU 102
3. Semester / Year:
First semester of the academic year (2024-2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
Attendance in department halls
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Aya Sami Ridha Email: aya_sami12@ntu.edu.iq
8. Course Objectives
Course Objectives 1- Learn to use various software programs such as word processors, spreadsheets, and presentations. 2- Learn the basics of programming using various programming languages. 3- Learn how to use the internet effectively for research and communication. 4- Understand basic computer concepts such as hardware and software components. 5- Understand cybersecurity principles and how to protect data. 6- Learn how to use computers in a technical work environment. 7- Prepare students to work in various technical environments. 8- Learn how to leverage technology to improve professional performance.
9. Teaching and Learning Strategies
Strategy 1- Using technology in the teaching and learning process, such as using educational software ar electronic resources. 2- Using practical methods such as laboratories and projects.

3- Explaining theoretical lectures using a data show.

4- Using interactive activities such as short quizzes via Google Forms.

5- Encouraging students to learn through practical activities and laboratories.

6- Scientific reports. Google Meet. Department YouTube.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Introduction to computers: their generations, components: hardware and software (software and application programs)	Practical + Theoretical	Exams
2	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Windows XP Operating System: Concept of Windows, Features, Basic Requirements, System Operation	Practical + Theoretical	Exams
3	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Desktop components, icon concept, mouse activity handling	Practical + Theoretical	Exams

4	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	The importance and components of the task bar, using Start to access programs, the concept of loaded tasks, exiting the system and turning off the computer.	Practical + Theoretical	Exams
5	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	The concept of a window for any program and identifying its main components, dealing with "My Computer", "My Documents", and "Recycle Bin"	Practical + Theoretical	Exams
6	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Understanding the window for any program and identifying its main components, and dealing with "My Computer," "My Documents," and "Recycle Bin."	Practical + Theoretical	Exams
7	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Learn about My Computer in terms of disks, folders, and files, and how to format floppy disks.	Practical + Theoretical	Exams
8	2	• Understanding how different operating systems work.	Copy folders and files, deal with the Recycle Bin, and how to delete and retrieve files through	Practical + Theoretical	Exams

		• Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	what the Recycle Bin provides in this aspect		
9	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Benefit from the "Control Panel" programs: such as the "Mouse" icon, the "Display" icon, how to change the desktop layout, control the screen saver, change the appearance and colors of the window menus, and the "Remove & Add program" icon for adding and deleting programs.	Practical + Theoretical	Exams
10	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Use the "Run" option to directly execute programs, as well as switch to the system (MS-Dos) command and handle its commands.	Practical + Theoretical	Exams
11	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Use the entertainment program "Window Media Player" to play movies.	Practical + Theoretical	Exams
12	2	• Understanding how different operating systems work.	Benefit from additional programs "Accessories" such as the "Calculator"	Practical + Theoretical	Exams

		• Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.			
13	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Working with Paint software to create, save, and retrieve drawings using the commands it provides	Practical + Theoretical	Exams
14	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Working with the Notepad and Wordpad windows for writing, saving, retrieving, and printing text, and changing the print style and formatting.	Practical + Theoretical	Exams
15	2	• Understanding how different operating systems work. • Understanding the basics of programming using different programming languages. • The ability to apply acquired technical skills to practical projects. • The ability to apply cybersecurity practices in the workplace.	Learn how to get help and its different methods	Practical + Theoretical	Exams

11. Course Evaluation

1- Written assessment (written tests for students) (10 marks).

2- Oral assessment (group discussions + presentations) (10 marks).

3- Daily assessment (daily participation + attendance) (10 marks).

4- Monthly exams + semester exams.

5- Final exams (100 marks).	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1- Computer Principles (by Dr. Fadhel Jawad A Dhalimi) 2- Computer Networks and Information Secu (by Dr. Adel Abdullah Muhammad)
Main references (sources)	Reference Books 1- Computer Dictionary (Robert C. Martin) 2. The Complete Programming Book (Stepl Jobs)
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	1- Repl.it: A website that allows users to write and run code in an interactive environment. 2- Stack Overflow: A website containing questi and answers about programming.

Course Description: Arabic Language / 1

1. Course Name:
Arabic Language
2. Course Code:
NTU 103
3. Semester / Year:
First semester of the academic year (2024-2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person, in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Lect. Amjad Ahmed Jassim Email: amjedahmed@ntu.edu.iq
8. Course Objectives
Course Objectives 1- Strengthening Arabic cultural identity and appreciation for the Arabic language. 2- Writing technical reports and scientific articles in Arabic. 3- Developing oral and written communication skills in Arabic. 4- Improving professional communication and teamwork skills. 5- Teaching students correct language usage and avoiding common mistakes. 6- Teaching proper use of punctuation marks.
9. Teaching and Learning Strategies
Strategy 1- Using interactive methods through discussions and scientific activities.

2- Utilizing electronic learning methods and online resources.

3- Continuous assessment through tests, assignments, and projects.

4- Enhancing student motivation by providing a stimulating learning environment.

5- Providing constructive feedback to improve student performance

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Introduction to linguistic errors	Theoretical with visual aids	Exams
2	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Rules for writing alif (long/short forms)	Theoretical with visual aids	Exams
3	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	الضاد والظاء	Theoretical with visual aids	Exams
4	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Writing Hamza (ء)	Theoretical with visual aids	Exams
5	2	• Effective oral communication in the workplace.	Punctuation marks	Theoretical with visual aids	Exams

		• Understanding technical and chemical language. • Writing technical reports and scientific articles.			
6	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Noun vs. Verb differentiation	Theoretical with visual aids	Exams
7	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Objects in sentences	Theoretical with visual aids	Exams
8	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Numbers	Theoretical with visual aids	Exams
9	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Applications of common language errors	Theoretical with visual aids	Exams
10	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Nūn and Tanwīn	Theoretical with visual aids	Exams

11	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Formal aspects of administrative writing	Theoretical with visual aids	Exams
12	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Meanings of prepositions	Theoretical with visual aids	Exams
13	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Solar and lunar letters	Theoretical with visual aids	Exams
14	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Tied and elongated Tā' (ة، ت)	Theoretical with visual aids	Exams
15	2	• Effective oral communication in the workplace. • Understanding technical and chemical language. • Writing technical reports and scientific articles.	Open Tā' (ت)	Theoretical with visual aids	Exams

11. Course Evaluation

1- Written assessment (written tests for students) (10 marks).

2- Oral assessment (group discussions + presentations) (10 marks).

3- Daily assessment (daily participation + attendance) (10 marks).

4- Monthly exams + semester exams.

5- Final exams (100 marks).	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	*Technical Writing in Arabic* – Dr. Abdullah Abdul Wahhab Al-Bataineh *Oral Communication in Arabic* – Dr. Mohammed bin Atiyah bin Issa
Main references (sources)	*Dictionary of Technical Terms in Arabic* – Prof. Dr. Abbas Hassan *Technical Lexicon* – Prof. Dr. Mohammed bin Abdulaziz bin Abdul Latif
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Virtual Library Arabic language websites on the internet

Description of the sports course (first level)

1. Course Name:
the sports course
2. Course Code:
NTU 104
3. Semester / Year:
First semester of the academic year (2024-2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person, in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Yordan Nijat Bahjat Email:
8. Course Objectives
Course Objectives 1- Strengthening Arabic cultural identity and appreciation for the Arabic language. 2- Writing technical reports and scientific articles in Arabic. 3- Developing oral and written communication skills in Arabic. 4- Improving professional communication and teamwork skills. 5- Teaching students correct language usage and avoiding common mistakes. 6- Teaching proper use of punctuation marks.
7- Teaching and Learning Strategies
Strategy 1- Introduce students to major sports laws and skills.

2- Promote sportsmanship, cooperation, and fair competition.

3- Develop physical and athletic skills.

4- Apply practical methods through training and exercises.

8- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Definition, importance, and types of sports	Theoretical + Practical	Exams
2	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Body movement mechanisms and common sports injuries	Theoretical + Practical	Exams
3	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Types of sports and societal benefits	Theoretical + Practical	Exams
4	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Muscle tests, joint ranges, basic emergency procedures, injury identification	Theoretical + Practical	Exams
5	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Basic skills and international rules of table tennis	Theoretical + Practical	Exams
6	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Basic swimming skills, Baghdad pool visit, video presentation	Theoretical + Practical	Exams
7	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Handball basics and international rules, athletics	Theoretical + Practical	Exams
8	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	International sports laws: individual & team skill application	Theoretical + Practical	Exams
9	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Continued: International sports laws and skills	Theoretical + Practical	Exams

10	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Rules and practical application of football	Theoretical + Practical	Exams
11	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Basic football skills, managing sports events and laws	Theoretical + Practical	Exams
12	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Practical applications in managing championships	Theoretical + Practical	Exams
13	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Cultural competitions and mind games like chess	Theoretical + Practical	Exams
14	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Continued: chess and similar activities	Theoretical + Practical	Exams
15	2	• Develop student skills in sports. • Apply concepts via diverse exercises. • Prepare to join institute/university teams.	Participation in sports festivals, painting, and exhibitions	Theoretical + Practical	Exams

9- Course Evaluation

1- Daily attendance with appropriate sportswear.

2- Practical exams aligned with lecture topics.

3- Oral, practical, and theoretical exams.

4- Final exams.

10- Learning and Teaching Resources

Required textbooks (curricular books, if any)	*Curriculum for the Physical Education Course* (in Arabic)
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description: Mathematics / 1

1. Course Name:
Mathematics /1
2. Course Code:
NTU 110
3. Semester / Year:
First semester of the academic year (2024-2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person in department classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours / 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Lect. Gasheen Ibraheem taeb Email: gasheen-ibraheem@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Encourage students to use logical thinking and analysis to solve problems and understand mathematical concepts through multiple approaches. 2. Provide a strong foundation in basic arithmetic, algebra, geometry, and calculus to enable students to apply these skills in various contexts. 3. Develop problem-solving skills using methods like estimation, modeling, and data analysis. 4. Equip students with fundamental knowledge of mathematical theories and concepts and how to apply them in new problems. 5. Enhance creativity and innovation in mathematical challenges through non-traditional problem-solving methods.

1- Teaching and Learning Strategies

Strategy

1. Strengthen students' ability to understand mathematical relationships and connect variables with their specialization.
2. Apply mathematical concepts in physics, engineering, economics, and computer science.
3. Improve students' analytical and design capabilities.
4. Focus on symbols and rules governing numerical and quantitative relationships, including basic and linear algebra.
5. Use logical reasoning and analytical tools to solve problems and understand the world around us.

2- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Matrices, determinants and properties, linear equations, Cramer's Rule, applications (Ideal Gas Law, Bernoulli Equation)	Explanation with examples	Exams
2	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Continuity equation, energy conservation, force analysis, Newton's laws, Kirchhoff's laws, Ohm's law	Explanation with examples	Exams
3	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Vectors, vector analysis, scalar vs. vector quantities, vector algebra in space	Explanation with examples	Exams
4	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering.	Orthogonal unit vectors, vector magnitude, scalar and cross product, applications (velocity, displacement, acceleration,	Explanation with examples	Exams

		• Develop interpersonal skills and sound judgment.	friction, force analysis)		
5	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Functions, trigonometric functions, trigonometric identities, logarithmic functions	Explanation with examples	Exams
6	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Exponential functions, hyperbolic functions, applications (Reynolds equation, fluid flow, tension forces)	Explanation with examples	Exams
7	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Limits of algebraic and trigonometric functions, applications (heat conduction laws), area under curve, isothermal and adiabatic work	Explanation with examples	Exams
8	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Differentiation, derivatives of algebraic functions, chain rule	Explanation with examples	Exams
9	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Implicit functions, standard functions, higher-order derivatives	Explanation with examples	Exams
10	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Derivatives of trigonometric and logarithmic functions	Explanation with examples	Exams
11	2	• Use modern teaching methods to enhance student curiosity and imagination.	Derivatives of exponential and hyperbolic functions	Explanation with examples	Exams

		• Express the role of math in engineering. • Develop interpersonal skills and sound judgment.			
12	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Applications: isothermal/adiabatic work, heat transfer laws, reaction rates, velocity in equations	Explanation with examples	Exams
13	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Increasing/decreasing functions, local maxima/minima, inflection points, graphing functions	Explanation with examples	Exams
14	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Increasing/decreasing functions, local maxima/minima, inflection points, graphing functions	Explanation with examples Explanation with examples	Exams
15	2	• Use modern teaching methods to enhance student curiosity and imagination. • Express the role of math in engineering. • Develop interpersonal skills and sound judgment.	Continued: increasing/decreasing functions, extrema, inflection points, function graphs	Explanation with examples	Exams

3- Course Evaluation

1. Daily exams
2. Monthly exams
3. Midterm exams
4. Final exams

4- Learning and Teaching Resources

Required textbooks (curricular books, if any)	*Calculus and Analytical Geometry* – Thomas, 1968

	Foundations of Statistics in Arabic – Dr. Sabri Al-Ani *Calculus and Analytical Geometry* – Thomas, 1968 (duplicate)
Main references (sources)	*Applied Calculus* – L.J. Adams, New York, London, 1963 *Introductory College Mathematics* – William E. Milne
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Noor-book.com *Introduction to Differential Equations* – S.L. Green, 1945

Course Description: Mathematics / 2

1. Course Name:
Mathematics /2
2. Course Code:
NTU 111
3. Semester / Year:
Second Semester, Academic Year (2024–2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person in department classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours / 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Sarah Rasheed Ghayeb Jumaa Email:
8. Course Objectives
Course Objectives 1. Develop mathematical and analytical thinking skills. 2. Learn both basic and advanced mathematical concepts relevant to technical diploma graduates. 3. Analyze the needs of the job market and industries where diploma graduates will work. 4. Focus on practical applications of mathematics within the graduate's field of specialization. 5. Equip students with skills to solve trigonometric functions and derivatives. 6. Introduce students to types of vectors and solution techniques.
5- Teaching and Learning Strategies
Strategy

1. Effectively plan lessons to cover all necessary mathematical concepts.
2. Encourage active learning through hands-on activities and projects.
3. Integrate technology in learning, such as math software and digital resources.
4. Use practical examples to clarify mathematical ideas.
5. Present concepts in a clear and simplified manner.

6- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Implicit Integration	Theoretical	Exams
2	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Applications of Integration	Theoretical	Exams
3	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Geometric applications: Areas and volumes	Theoretical	Exams
4	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Physical applications of integration	Theoretical	Exams
5	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	General methods of integration	Theoretical	Exams

6	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Substitution and partial methods	Theoretical	Exams
7	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Use of partial fractions, exponential and logarithmic functions	Theoretical	Exams
8	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Differential equations	Theoretical	Exams
9	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Separable, homogeneous, and linear equations	Theoretical	Exams
10	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Applications	Theoretical	Exams
11	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Applications	Theoretical	Exams
12	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Vectors	Theoretical	Exams

13	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Dot and cross product, angle calculation between vectors	Theoretical	Exams
14	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Statistics	Theoretical	Exams
15	2	• Apply mathematics in practical and industrial contexts. • Understand advanced concepts like calculus and differential equations. • Use software tools for problem-solving.	Probability theory	Theoretical	Exams

7- Course Evaluation

1. Daily quizzes at the beginning of the lecture covering previous topics
2. Monthly exams
3. Midterm exams
4. Final exams

8- Learning and Teaching Resources

Required textbooks (curricular books, if any)	*Calculus and Analytical Geometry* – Thomas, 1968 *Mathematics* – Saad Al-Jumaily
Main references (sources)	*Thomas' Calculus*, 7th Edition *Introductory College Mathematics* – William E. Milne
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Noor Book

	Virtual Library – Ministry of Higher Education and Scientific Research www.zweigmedia.com www.gigapedia.org

Course Description: Fluid Flow

1. Course Name:
Fluid Flow
2. Course Code:
ICTI 120
3. Semester / Year:
First Semester, Academic Year (2024–2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person in department classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
45 hours / 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Zahraa Haider Mohammed Ali Email: zahraa.h.m@ntu.edu.iq
8. Course Objectives

Course Objectives

1. Understand the fundamental principles of fluid mechanics such as density, pressure, viscosity, and the continuity, momentum, and energy equations.
2. Identify flow types (laminar, turbulent, internal, external, etc.) and transition conditions.
3. Understand and apply Bernoulli's equation and conservation equations to engineering systems.
4. Understand fluid properties and how they influence flow behavior (e.g., viscosity, pressure, temperature).
5. Design fluid flow systems across various engineering disciplines.
6. Use engineering software to analyze and design fluid flow systems.
7. Apply fluid flow principles in different engineering fields.
8. Design pumps and fans for use in fluid systems.

9- Teaching and Learning Strategies

Strategy

1. Explain and present fundamental concepts and mathematical laws.
2. Use blackboard or PowerPoint with diagrams and examples.
3. Encourage student questions to promote critical thinking and participation.
4. Foster interactive learning through student engagement.
5. Conduct theoretical assessments to gauge understanding.
6. Use real-life examples to make abstract concepts tangible.Use real-life examples to make abstract concepts tangible.

10- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Introduction to fluid properties (density, viscosity, pressure) and fluid types	Theoretical + Practical	In-person exams
2	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Units and fluid properties: density, viscosity, pressure	Theoretical + Practical	In-person exams
3	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Continuity equation, Bernoulli equation	Theoretical + Practical	In-person exams
4	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration.	Applying continuity and Bernoulli equations to flow systems	Theoretical + Practical	In-person exams

		• Understand properties like density, viscosity, pressure. • Understand types of flow.			
5	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Pumps: types and connection methods	Theoretical + Practical	In-person exams
6	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Pump classification, operation, and integration into flow systems	Theoretical + Practical	In-person exams
7	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Types of pressure and elevation calculations	Theoretical + Practical	In-person exams
8	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Heat exchanger calculations and connections	Theoretical + Practical	In-person exams
9	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Steam boilers, viscosity effect, types of viscosity	Theoretical + Practical	In-person exams

10	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Elevation measurements, fluid property calculations and efficiency impact	Theoretical + Practical	In-person exams
11	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Types of friction and its effect on efficiency calculations	Theoretical + Practical	In-person exams
12	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Navier-Stokes equation and continuity equation	Theoretical + Practical	In-person exams
13	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Mercury column height difference calculations	Theoretical + Practical	In-person exams
14	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure. • Understand types of flow.	Pressure differences on cylindrical surfaces	Theoretical + Practical	In-person exams
15	6	• Apply fluid mechanics principles in engineering fields. • Teamwork and collaboration. • Understand properties like density, viscosity, pressure.	Efficiency calculations and data analysis based on pipe types	Theoretical + Practical	In-person exams

		• Understand types of flow.			

11- Course Evaluation

1. Class participation and attendance
2. In-person tests
3. Lab reports
4. Practical exams
5. Final term exam

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	□ *Principles of Fluid Mechanics – Part I* by Jameel Al-Malaika □ *Fluid Mechanics* by Dr. Ne'ma Hamid Omara – University of Technology □ *Fluid Mechanics* translated by Nabeel Zaki Mortada and Dr. Fawzi Ibrahim Abdel-Sadiq □ *Introduction to Fluid Mechanics* by Robert W. Fox & Alan T. McDonald □ *Fluid Mechanics* by Dr. Abdul Hamid Bassiouni
Main references (sources)	□ Virtual Library – Ministry of Higher Education and Scientific Research
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	□ Virtual Library – Ministry of Higher Education and Scientific Research MIT OpenCourseWare – Free lectures and exercises for Fluid Mechanics

Course Description: Operation of Mechanical Units

1. Course Name:
Operation of Mechanical Units
2. Course Code:
ICTI 121
3. Semester / Year:
Second Semester, Academic Year (2024–2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person in department lecture halls
6. Number of Credit Hours (Total) / Number of Units (Total)
45 hours / 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Zahraa Haider Mohammed Ali Email: zahraa.h.m@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Introduce students to mechanical units, their scientific foundations, and operations such as separation, mixing, size reduction, fragmentation, and assembly. 2. Understand the principles of operating mechanical units. 3. Identify types of mechanical equipment used in industry. 4. Learn how to operate and maintain mechanical equipment. 5. Develop practical and technical skills required for the operation and maintenance of mechanical units.
13- Teaching and Learning Strategies
Strategy

1. Present fundamental concepts and mathematical laws.
2. Use blackboard or PowerPoint presentations with diagrams and illustrative examples.
3. Encourage students to ask questions to foster critical thinking and engagement.
4. Promote student interaction and participation.
5. Conduct theoretical evaluations to assess understanding of mechanical unit principles.
6. Use practical examples to clarify theoretical concepts.

14- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Introduction to unit operations and hydration and sedimentation processes	Theoretical + Practical	In-person exams
2	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Concept and importance of hydration; chemical vs. physical hydration	Theoretical + Practical	In-person exams
3	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Types and importance of sedimentation; industrial applications	Theoretical + Practical	In-person exams
4	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Equipment and machinery used in hydration and sedimentation	Theoretical + Practical	In-person exams

5	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Principles of filtration; filtration and separation devices	Theoretical + Practical	In-person exams
6	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Various separation techniques: mechanical and chemical	Theoretical + Practical	In-person exams
7	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Filtration applications; controlling filtration rate and quantity	Theoretical + Practical	In-person exams
8	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Improving efficiency in separation and filtration operations	Theoretical + Practical	In-person exams
9	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Storage in silos and warehouses; controlling material flow and stock	Theoretical + Practical	In-person exams
10	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries.	Storage types: dry (grains, chemicals), wet (liquids, foods)	Theoretical + Practical	In-person exams

		• Safely and effectively operate and maintain mechanical units.			
11	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Safety procedures for chemical storage; tools and equipment; cost-efficient storage	Theoretical + Practical	In-person exams
12	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Types of screens and sieves based on shape and size	Theoretical + Practical	In-person exams
13	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Dry sieves for grains, vibratory sieves for shape/size sorting, wet sieving	Theoretical + Practical	In-person exams
14	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Equipment and machinery used in sieving; regular maintenance	Theoretical + Practical	In-person exams
15	6	• Analyze the performance of mechanical units and identify potential problems. • Apply mechanical operation principles across industries. • Safely and effectively operate and maintain mechanical units.	Applications of sieving in food, chemical industries, sand/gravel separation	Theoretical + Practical	In-person exams

15- Course Evaluation

1. Participation and attendance
2. In-person exams

3. Laboratory reports 4. Practical exam 5. Final term exam

16- Learning and Teaching Resources

Required textbooks (curricular books, if any)	*Unit Operations of Chemical Engineering* by McCabe, 3rd Ed., McGraw-Hill, 1967 *Unit Operations* by Brown, Wiley, London, 1965 *Principles of Unit Operations* by A.S. Faust, Toppan & Wiley, 2nd Ed., 1961, Tokyo, Japan *Chemical Engineering Vol. 1 & 2* by Coulson and Richardson, Prentice-Hall, 1960 *Fundamentals of Mechanical Operations* – McCabe, Smith & Harriott (for core concepts in English)
Main references (sources)	Virtual Library – Ministry of Higher Education and Scientific Research
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Virtual Library – Ministry of Higher Education and Scientific Research MIT OpenCourseWare .

Course Description: Physical Chemistry

1. Course Name:
Physical Chemistry
2. Course Code:
ICTI 122
3. Semester / Year:
First Semester, Academic Year (2024–2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person in department lecture halls
6. Number of Credit Hours (Total) / Number of Units (Total)
45 hours / 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Tolin Salah Othman Email: tolin.s.othman@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Explain the philosophical and scientific foundations of physical chemistry, including thermodynamics, quantum mechanics, and chemical kinetics. 2. Understand energy analysis and equilibrium in chemical systems from a thermodynamic perspective. 3. Apply physical and chemical property concepts to pure substances and binary/ternary mixtures, and analyze influencing factors. 4. Interpret molecular interactions and their effects on physical and chemical properties based on composition, temperature, and pressure. 5. Perform thermodynamic calculations such as ΔH, ΔS, and ΔG, and apply basic analytical methods using differential equations.

6. Connect theoretical concepts (e.g., thermodynamics, kinetics, quantum chemistry) with real-world industrial chemical processes (e.g., reactions, spectroscopy, equilibrium).
7. Gain laboratory measurement skills, data analysis, and research process monitoring in accordance with scientific standards.

17- Teaching and Learning Strategies

Strategy

- Verbal explanations supported by visual tools (PowerPoint, diagrams, heat maps)
- Industrial examples to enhance understanding
- Emphasis on solving computational problems and comparing results
- Group discussion and collaborative problem-solving
- Brainstorming and peer-to-peer teaching methods
- Short in-class activities for critical thinking
- Physical models or virtual simulations to visualize thermal changes
- Use of educational software and thermodynamic charts (P-V, T-S)
- Educational videos and animations explaining gas/liquid properties
- Use of smart/regular boards, computers, PowerPoint, worksheets, and weekly exercises

18- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Introduction to Physical Chemistry: Matter, Energy, Laws of Thermodynamics	Lecture + Guided Discussion	Oral Q&A + Survey
2	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	First Law of Thermodynamics: Energy, Work, Heat	Theory + Lab	In-person exams
3	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Second Law of Thermodynamics – Entropy	Theory + Lab	In-person exams
4	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Third Law of Thermodynamics	Theory + Lab	In-person exams

5	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Thermodynamic Functions: U, H, G, A	Theory + Lab	In-person exams
6	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Molecular Kinetics of Gases and Properties	Theory + Lab	In-person exams
7	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Real Gases and Equations of State	Theory + Lab	In-person exams
8	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Thermochemistry and Equilibrium	Theory + Lab	In-person exams
9	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Electrochemical Equilibrium, Nernst Equation	Theory + Lab	In-person exams
10	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Heat Transfer: Conduction, Convection, Radiation	Theory + Lab	In-person exams
11	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Particle in a Box, Oscillations	Theory + Lab	In-person exams
12	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Types of screens and sieves based on shape and size	Theory + Lab	In-person exams
13	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Molecular Spectroscopy: Principles and Applications	Lecture + Data Analysis	In-person exams
14	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Special Topics: Equilibrium and Kinetics in Industry	Case Studies + Mini Project	In-person exams
15	3	• Conduct experiments safely and effectively • Understand physical chemistry principles • Analyze experimental results	Final Review + Preparation for Final Exam	Group Review + Final Test	In-person exams

19- Course Evaluation

1. PParticipation and attendance

2. In-person tests 3. Lab reports 4. Practical exam 5. Final semester exam
20- Learning and Teaching Resources

Required textbooks (curricular books, if any)	▯ *Fundamentals of Physical Chemistry* – Prof. Ahmed Hassan Shehata & Mohammed Al-Hadi ▯ *Foundations of Colloid Chemistry* – Prof. Mohammed Magdy Wasel ▯ *Surface and Catalytic Chemistry* – Prof. Mohammed Magdy Wasel ▯ *Foundations of Chemical Kinetics* – Dr. Mohammed Magdy Abdallah Wasel
Main references (sources)	▯ ERJ Journal Reference ▯ Al-Ayen University PDF ▯ SHMS Reference ▯ Thermodynamics PDF
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	▯ *Interactive Physical Chemistry* – Imam Abdulrahman Bin Faisal University • iau.edu.sa ▯ *Physical Chemistry (LibreTexts)* • chem.libretexts.org

	Manaraa Consulting Library – Offers theses and books • manaraa.com *Arabic Book Library* – Scientific Arabic books • sanadkk.com

Course Description: Thermodynamics (Level One)

1. Course Name:
Thermodynamics
2. Course Code:
ICTI 123
3. Semester / Year:
First Semester, Academic Year (2024–2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
On-campus in lecture halls of the department
6. Number of Credit Hours (Total) / Number of Units (Total)
45 ours / 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Tolin Salah Othman Email: tolin.s.othman@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Understand the fundamental principles of thermodynamics, including the definition of a thermal system, closed and open systems, and intensive and extensive properties of materials. 2. Apply the first law of thermodynamics to analyze processes involving energy transfer as heat and work in closed and open systems. 3. Interpret the second law of thermodynamics by studying the concept of entropy and the natural direction of processes, with the ability to calculate thermal efficiency.

4. Analyze power cycles such as Carnot, Otto, and Rankine cycles, determining their efficiency and industrial applications.
5. Use thermodynamic tables and diagrams (e.g., steam tables, P–V and T–S diagrams) to accurately calculate thermal properties.
6. Understand phase changes of substances and distinguish between physical states and the effects of pressure and temperature.
7. Interpret the working principles of thermal industrial equipment such as heat exchangers, compressors, pumps, and boilers, with basic calculations.
8. Enhance computational and engineering skills related to energy and thermal processes for practical applications in chemical industries.
9. Bridge theoretical concepts with practical applications in industrial chemical processes like distillation, drying, heating, and cooling.
10. Prepare students for deeper understanding in future specialized courses such as Heat Transfer, Reactor Design, and Chemical Process Operations.

9. Teaching and Learning Strategies

Strategy

- Understand the fundamental principles of thermodynamics, including the definition of a thermal system, closed and open systems, and intensive and extensive properties of materials.
- Apply the first law of thermodynamics to analyze processes involving energy transfer as heat and work in closed and open systems.
- Interpret the second law of thermodynamics by studying the concept of entropy and the natural direction of processes, with the ability to calculate thermal efficiency.
- Analyze power cycles such as Carnot, Otto, and Rankine cycles, determining their efficiency and industrial applications.
- Use thermodynamic tables and diagrams (e.g., steam tables, P–V and T–S diagrams) to accurately calculate thermal properties.
- Understand phase changes of substances and distinguish between physical states and the effects of pressure and temperature.
- Interpret the working principles of thermal industrial equipment such as heat exchangers, compressors, pumps, and boilers, with basic calculations.
- Enhance computational and engineering skills related to energy and thermal processes for practical applications in chemical industries.

- Bridge theoretical concepts with practical applications in industrial chemical processes like distillation, drying, heating, and cooling.
- Prepare students for deeper understanding in future specialized courses such as Heat Transfer, Reactor Design, and Chemical Process Operations.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Introduction to Thermodynamics – Definition of system, surroundings, boundaries, and types	Lecture + Guided Discussion	Oral Question + Questionnaire
2	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Physical properties of materials – Thermodynamic tables – Intensive and extensive properties	Theoretical + Practical	Problem-solving
3	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	First Law of Thermodynamics – Application in closed systems	Theoretical + Practical	In-person Exam + Homework
4	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	First Law for Open Systems – Analysis using the First Law	Theoretical + Practical	Exercise Book
5	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design	Thermal Processes: Heating, Expansion, Compression	Theoretical + Practical	Class Question + Participation

		thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.			
6	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Enthalpy and Internal Energy – Mathematical Relations	Theoretical + Practical	In-person Exam
7	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	General Review + Midterm Exam	Theoretical + Practical	In-person Exam + Weekly Assignment
8	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Second Law of Thermodynamics	Theoretical + Practical	In-person Exam + Practical Problems
9	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Calculating Efficiency of Ideal Carnot Cycle	Theoretical + Practical	In-person Exam + In-class Exercise
10	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Concept of Entropy and Entropy Change in Gases	Theoretical + Practical	In-person Exam + Participation
11	3	Understanding the basic principles of thermodynamics and the laws governing	Power Cycles (Otto, Diesel, Rankine)	Theoretical + Practical	In-person Exam + Short Quiz

		thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.			
12	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Heat Transfer and Its Relation to Thermodynamics	Theoretical + Practical	In-person exams
13	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Use of Steam Tables to Determine Properties	Lecture + Data Analysis	In-person exams
14	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Industrial Applications: Distillation, Heating	Case Studies + Mini Project	In-person exams
15	3	Understanding the basic principles of thermodynamics and the laws governing thermal systems. Ability to design thermodynamic systems such as heat engines. Application of thermodynamic principles in industries.	Comprehensive Review + Final Exam Preparation	Group Review + Final Test	In-person exams

11. Course Evaluation

1. Short quizzes to assess concept understanding.
2. Regular homework assignments for skill reinforcement.
3. Mini projects or short reports on thermal applications in industry.
4. Final theoretical exam to evaluate overall understanding.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	▯ *Engineering Thermodynamics*, Dr. Mohamed Abdullah Zeidan, Dar Al-Fikr Al-Arabi ▯ *Fundamentals of Engineering Thermodynamics*, Dr. Abdel-Moneim Abdel-Hamid Ibrahim ▯ *Principles of Thermodynamics and Its Engineering Applications*, Dr. Saud Al-Luhaiani ▯ *Essentials of Thermodynamics*, Dr. Emad Zaki
Main references (sources)	▯ EKB Journals – Thermodynamics ▯ Al-Ayen University Resources ▯ SHMS Educational Platform ▯ EduSchool – Thermodynamics
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	▯ **NIST Chemistry WebBook** – Thermal data for gases and pure substances https://webbook.nist.gov ▯ **Engineering Toolbox – Thermodynamics Section** – Thermodynamic diagrams and examples https://www.engineeringtoolbox.com

Course Description: General Chemistry

1. Course Name:
General Chemistry
2. Course Code:
ICTI 124
3. Semester / Year:
First Semester, Academic Year (2024–2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours) / (5 units)
7. Course administrator's name (mention all, if more than one name)
Name: Lect. Nagham Nooreldeen Saeb Email: nagham.nooraldeen@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Introduce students to the fundamental concepts in chemistry, such as atoms, elements, compounds, chemical bonds, chemical reactions, and stoichiometry. 2. Understand the physical and chemical properties of materials and the changes they undergo. 3. Differentiate between types of chemical reactions and recognize their importance in life and industry. 4. Master key chemical laws and theories and use them to explain phenomena scientifically.

5. Develop laboratory skills in conducting chemical experiments and analyzing results.
6. Apply safety procedures in chemical laboratories.
7. Use glassware and laboratory equipment properly and efficiently.Bridge theoretical concepts with practical applications in industrial chemical processes like distillation, drying, heating, and cooling.
8. Prepare students for deeper understanding in future specialized courses such as Heat Transfer, Reactor Design, and Chemical Process Operations.

9. Teaching and Learning Strategies

Strategy

- Interactive lectures.
- Practical demonstrations.
- Concept explanation through examples.
- Interactive online quizzes.
- Utilization of learning platforms (e.g., Google Classroom, Moodle).
- Experiment-based learning.
- Project-based learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Introduction to Thermodynamics – Definition of system, surroundings, boundaries, and types	Lecture + Guided Discussion	Oral Question + Questionnaire
2	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Physical properties of materials – Thermodynamic tables – Intensive and extensive properties	Theoretical + Practical	Short Exercises
3	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	First Law of Thermodynamics – Application in closed systems	Theoretical + Practical	In-class Exam + Homework

4	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	First Law for Open Systems – Analysis using the First Law	Theoretical + Practical	Exercise Book
5	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Thermal Processes: Heating, Expansion, Compression	Theoretical + Practical	Class Question + Participation
6	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Enthalpy and Internal Energy – Mathematical Relations	Theoretical + Practical	In-person Exam
7	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	General Review + Midterm Exam	Theoretical + Practical	In-person Exam + Weekly Assignment
8	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Second Law of Thermodynamics	Theoretical + Practical	In-person Exam + Practical Problems
9	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Calculating Efficiency of Ideal Carnot Cycle	Theoretical + Practical	In-person Exam + In-class Exercise
10	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Concept of Entropy and Entropy Change in Gases	Theoretical + Practical	In-person Exam + Participation
11	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Power Cycles (Otto, Diesel, Rankine)	Theoretical + Practical	In-class Exam + Quiz
12	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Heat Transfer and Its Relation to Thermodynamics	Theoretical + Practical	In-class Exam
13	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Use of Steam Tables to Determine Properties	Lecture + Data Analysis	In-class Exam
14	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Industrial Applications: Distillation, Heating	Case Studies + Mini Project	In-class Exam
15	3	Understanding basic concepts of general chemistry and atomic/molecular structures.	Comprehensive Review + Final Exam Preparation	Group Review + Final Test	In-class Exam

11. Course Evaluation
1. Interactive lectures. 2. Practical demonstrations. 3. Concept explanation through examples. 4. Interactive online quizzes. 5. Utilization of learning platforms (e.g., Google Classroom, Moodle). 6. Experiment-based learning. 7. Project-based learning.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	*General Chemistry – Part One*, by Dr. Abdullah Mohammed Al-Ahmad, Dar Al-Safa Publishing. *General Chemistry Laboratory Manual*, Ministry of Higher Education and Scientific Research – Iraq, Technical Institutes.
Main references (sources)	General Chemistry, by Raymond Chang, 12th Edition, McGraw-Hill Education. Chemistry: The Central Science, by Brown, LeMay, and Bursten, Pearson Education.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	• Journal of Applied Chemical Research – Technical Institute.

Course Description: Organic Chemistry

1. Course Name:
Organic Chemistry
2. Course Code:
ICTI 123
3. Semester / Year:
First Semester, Academic Year (2024–2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours) / (5 units)
7. Course administrator's name (mention all, if more than one name)
Name: Lect. Gasheen Ibraheem Tayeb Email: gasheen-ibraheem@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Understand the fundamentals of organic chemistry and the molecular structure of organic compounds. 2. Recognize the different classes and properties of organic compounds. 3. Safely and effectively conduct organic chemistry experiments. 4. Analyze data obtained from organic experiments. 5. Apply organic chemistry principles in various industries such as pharmaceuticals and chemical manufacturing. 6. Develop students' practical and theoretical skills in the field of organic chemistry.

7. Prepare students to work in industries requiring a solid understanding of organic chemistry.

9. Teaching and Learning Strategies

Strategy

- Delivery of theoretical concepts through lectures and discussions.
- Conducting laboratory experiments to reinforce theoretical knowledge.
- Encouraging student participation through interactive discussions and practical activities.
- Using educational tools such as molecular models and animations.
- Continuous student assessment through quizzes, assignments, and lab performance.
- Incorporating educational software and electronic resources to enhance learning.
- Promoting group work to foster collaborative learning.
- Providing necessary learning resources.
- Encouraging students to solve organic chemistry problems through applied exercises.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand the structure and classification of organic compounds.	Introduction to Organic Chemistry, Hydrocarbons, Carbon, Alkyl Halides	Lecture + Guided Discussion	Oral Question + Questionnaire
2	2	Understand the structure and classification of organic compounds.	Alkanes: General Formula, Preparation, Reactions, Physical Properties	Theory + Lab	Short Exercises
3	2	Understand the structure and classification of organic compounds.	Alkenes: General Formula, Preparation, Reactions, Physical Properties	Theory + Lab	In-class Exam + Homework
4	2	Understand the structure and classification of organic compounds.	Alkynes: General Formula, Preparation, Reactions, Physical Properties	Theory + Lab	Exercise Book
5	2	Understand the structure and classification of organic compounds.	Alcohols: General Formula, Preparation, Reactions, Physical Properties	Theory + Lab	Class Question + Participation

6	2	Understand the structure and classification of organic compounds.	Ethers: General Formula, Preparation, Reactions, Physical Properties	Theory + Lab	In-person Exam
7	2	Understand the structure and classification of organic compounds.	Phenols: General Formula, Preparation, Reactions, Physical Properties	Theory + Lab	In-person Exam + Weekly Assignment
8	2	Understand the structure and classification of organic compounds.	Ketones and Aldehydes: General Formula, Preparation, Reactions, Physical Properties	Theory + Lab	In-person Exam + Practical Problems
9	2	Understand the structure and classification of organic compounds.	Carboxylic Acids: General Formula, Preparation, Reactions, Physical Properties	Theory + Lab	In-person Exam + In-class Exercise
10	2	Understand the structure and classification of organic compounds.	Esters, Amines, and Amides	Theory + Lab	In-person Exam + Participation
11	2	Understand the structure and classification of organic compounds.	Acids, Bases, and Salts: Nomenclature, Classification, Reactions	Theory + Lab	In-class Exam + Quiz
12	2	Understand the structure and classification of organic compounds.	Polymers and Polymerization Processes – Types of Polymers	Theory + Lab	In-class Exam
13	2	Understand the structure and classification of organic compounds.	Polymer Preparation: Condensation and Addition Polymerization – Physical Properties	Lecture + Data Analysis	In-class Exam
14	2	Understand the structure and classification of organic compounds.	Basics of Chromatography – Techniques: Gas, Paper Chromatography	Case Studies + Mini Project	In-class Exam
15	2	Understand the structure and classification of organic compounds.	Thin Layer Chromatography, Column Chromatography, Liquid Chromatography	Group Review + Final Test	In-class Exam

11. Course Evaluation

1. Daily preparation and participation.
2. Daily oral quizzes.
3. Homework and assignments.
4. Practical reports / Lab reports.

5. Monthly written exam (theoretical). 6. In-class activities / Presentations. 7. Final practical laboratory exam..

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. *Organic Chemistry* (Parts I & II) – Dr. Fahd Ali Hussein and team, 1st Edition, Baghdad, 1977.
Main references (sources)	*Organic Chemistry*, Morrison & Boyd, 3rd Edition, 1975, USA. *Chemistry: The Central Science*, Brown, LeMay, Bursten, Pearson Education.
Recommended books and references (scientific journals, reports…)	*Chemistry of Organic Compounds*, Noller, Philadelphia, USA, 1951. *Organic Chemistry*, Vol. 1 and 2, Finar – Longman Group Ltd., 1973.
Electronic References, Websites	• info@libretexts.org

Course Description: Engineering Drawing

1. Course Name:
Engineering Drawing
2. Course Code:
ICTI 128
3. Semester / Year:
First Semester, Academic Year (2024–2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(45 hours) / (3 units)
7. Course administrator's name (mention all, if more than one name)
Name: Parween Tayeb Hassan Email: hparween637@ntu.edu.iq Name: Ali Hussein Ameen Email: Ali.alashoor66@ntu.edu.iq
8. Course Objectives
Course Objectives 1. To introduce students to the fundamentals and principles of engineering drawing. 2. To familiarize students with solid shapes and spatial geometry. 3. To enable students to create process flow diagrams for industrial units using AutoCAD (2017). 4. To train students in projecting three-dimensional shapes into orthographic views.

5. To develop students' ability to use computers in technical applications and maintain engineering software..

9. Teaching and Learning Strategies

Strategy

- Theoretical lectures using data show presentations.
- Hands-on computer-based application of engineering drawing.
- Teaching students basic shading techniques in engineering sketches.
- Utilizing educational tools such as molecular models and animations for visualization.
- Continuous student assessment through tests, assignments, and practical tasks.
- Integration of educational software and online resources to enhance learning.
- Promoting collaborative learning and group activities.
- Providing necessary learning materials and resources.
- Encouraging active student participation and creativity in engineering design.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understand basic concepts and tools of engineering drawing.	Introduction to Engineering Drawing: History and Tools	Lecture + Guided Discussion	Oral Question + Questionnaire
2	3	Understand the use of AutoCAD and its development.	Introduction to AutoCAD 2017 and its Versions	Theory + Practical	Short Exercises
3	3	Identify interface and tools in AutoCAD.	AutoCAD Interface and Basic Icons	Theory + Practical	In-class Exam + Homework
4	3	Apply drawing tools in AutoCAD.	Using the “DRAW” Menu and Drawing Tools	Theory + Practical	Exercise Book
5	3	Use modification tools in AutoCAD.	Using “MODIFY” Tools	Theory + Practical	Class Question + Participation
6	3	Set up paper sizes and drawing tables.	Setting Dimensions for A3 and A4 Sheets, Creating Title Blocks	Theory + Practical	In-person Exam

7	3	Extract dimensions and sizes of objects.	Using the "DIMENSION" Tool	Theory + Practical	In-person Exam + Weekly Assignment
8	3	Draw 2D shapes.	Drawing 2D Geometrical Shapes	Theory + Practical	In-person Exam + Practical Problems
9	3	Understand cutting planes and sectional views.	Projection Theory and Simple Orthographic Views	Theory + Practical	In-person Exam + In-class Exercise
10	3	Add dimensions to projections.	Dimensioning Perspective and Projections	Theory + Practical	In-person Exam + Participation
11	3	Apply operations and draw sectional views.	Section Theory – Types of Section Lines – Sectional Views	Theory + Practical	In-class Exam + Quiz
12	3	Understand the structure and classification of organic compounds.	Engineering Operations and Dimensioning – Drawing Sectional Views	Theory + Practical	In-class Exam
13	3	Draw complete engineering diagrams.	Drawing Ready-Made Engineering Diagrams	Lecture + Data Analysis	In-class Exam
14	3	Solve comprehensive design exercises.	Comprehensive Exercises and Mini-Projects	Case Studies + Mini Project	In-class Exam
15	3	Draw geometric cuts using coordinates.	Drawing Geometric Sections – Circles, Semi-circles, Lines with Coordinates	Group Review + Final Test	In-class Exam

11. Course Evaluation

1. Daily quizzes after lectures.
2. Daily practical tests.
3. Homework and assignments.
4. Practical reports.
5. In-class activities and presentations.
6. Final practical lab examination.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. *Essentials of AutoCAD 2017*
Main references (sources)	▯ *AutoCAD / Sames – Leach* ▯ *Engineering Drawing* – Abdul Rasool Al-Khaffaf
Recommended books and references (scientific journals, reports…)	1. *Manual of Engineering Drawing* – Simmons C.H., Maguire D.E. 2. *Al-Marji' fi Al-Rasm Al-Handasi* (The Reference in Engineering Drawing) – Dr. Mahmoud Saleh Zammut
Electronic References, Websites	

Course Description: Food Industries

1. Course Name:
Food Industries
2. Course Code:
ICTI 127
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (3 units)
7. Course administrator's name (mention all, if more than one name)
Name: Nagham Nooruldeen Saab Email: nagham.nooraldeen@ntu.edu.iq
8. Course Objectives
Course Objectives 1. To provide students with basic concepts of food industries. 2. To introduce the main techniques and processes used in food manufacturing. 3. To familiarize students with food quality and safety concepts. 4. To develop students' practical skills in food processing. 5. To raise awareness of food laws, regulations, and standards.
9. Teaching and Learning Strategies

Strategy

1. Lecture-based instruction.
2. Structured content delivery using PowerPoint presentations and whiteboard.
3. Practical demonstrations and laboratory experiments.
4. Concept explanation through real-world examples.
5. Use of interactive e-assessments.
6. Utilization of e-learning platforms (e.g., Google Classroom, Moodle).
7. Experiment-based learning.
8. Project-based learning.
9. Field visits to food production facilities.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand the nutritional properties and quality of food.	Introduction to Food Industries and Their Importance	Lecture + Guided Discussion	Oral Questions + Survey
2	2	Analyze and classify food based on source and composition.	Classification of Foods by Source and Composition	Theory + Practical	Quiz
3	2	Identify spoilage factors affecting food.	Sources of Food Spoilage	Theory + Practical	In-class Exam + Homework
4	2	Understand basic preservation methods.	Primary Preservation: Drying and Freezing	Theory + Practical	Exam
5	2	Learn thermal preservation methods.	Thermal Preservation: Pasteurization and Sterilization	Theory + Practical	Class Question + Participation
6	2	Evaluate advantages and disadvantages of packaging.	Canning and Packaging	Theory + Practical	In-person Exam
7	2	Mid-course assessment and review.	Midterm Review and Evaluation	Theory + Practical	In-person Exam + Weekly Assignment
8	2	Learn dairy product processing.	Dairy Products and Derivatives	Theory + Practical	In-person Exam + Practical Problems

9	2	Study processing of dry foods.	Dry Food Products: Legumes, Grains, Spices	Theory + Practical	In-class Exam + Class Exercise
10	2	Assess food safety practices.	Food Safety and Contamination Prevention	Theory + Practical	In-person Exam + Participation
11	2	Determine shelf-life and labeling.	Shelf-life Determination, Production and Expiry Dates	Theory + Practical	In-class Exam + Quiz
12	2	Learn food standards and regulations.	National and International Food Standards	Theory + Practical	In-class Exam
13	2	Apply food quality control tools.	Quality Assessment: Sensory and Chemical Analysis	Lecture + Data Analysis	In-class Exam
14	2	Understand food additives and their roles.	Food Additives: Preservatives and Colorants	Theory + Practical	In-class Exam
15	2	Final review and course evaluation.	Comprehensive Review + Final Assessment	Theory + Practical	In-class Exam

11. Course Evaluation

1. Daily attendance and participation.
2. Daily oral quizzes.
3. Homework and student activities.
4. Laboratory reports and practical notebooks.
5. Monthly written theoretical test.
6. In-class presentations and activities.
7. Final practical examination (lab).

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	*Principles of Food Industries* – Dr. Mohamed Abdel Aziz Hassan, Dar Al-Fikr Al-Arabi. *Food Chemistry* – Dr. Abdel-Basit Al-Jamal, University of Baghdad Publications (if included in the curriculum).

Main references (sources)	Frazier, W. C., & Westhoff, D. C. (2007). *Food Microbiology*. McGraw-Hill Education. Potter, N. N., & Hotchkiss, J. H. (1998). *Food Science*.
Recommended books and references (scientific journals, reports…)	*Journal of Food Science and Technology* – Published by the Iraqi Scientific Society. *Iraqi Journal of Agricultural Sciences* – Department of Food Sciences.
Electronic References, Websites	

Course Description: English Language / 2

1. Course Name:
English Language / 2
2. Course Code:
NTU 200
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Nagham Nooruldeen Saab Email: nagham.nooraldeen@ntu.edu.iq
8. Course Objectives
Course Objectives 1. To enable students to communicate effectively in English (both spoken and written) in academic and professional contexts. 2. To develop the four basic language skills: listening, speaking, reading, and writing. 3. To build students' confidence in using English in everyday and professional situations. 4. To help students understand and read scientific and technical texts related to their specialties. 5. To train students in writing academic and professional reports (e.g., training reports, project papers, technical letters).

6. To familiarize students with technical terminology relevant to their field of study (e.g., medical, engineering, IT terms).
7. To develop students' skills in giving oral presentations in English.
8. To train students to read technical manuals and operational instructions for devices and software.

9. Teaching and Learning Strategies

Strategy

1. Lecture-based instruction.
2. Brainstorming and collaborative activities.
3. Use of technology such as PowerPoint presentations, educational apps, and online platforms.
4. Continuous assessment through quizzes, oral tests, written assignments, projects, presentations, classroom observation, and participation.
5. Interactive online testing and exercises.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Use English effectively in practical situations	Review of Basic Grammar & Pronouns	Lecture + Guided Discussion	Oral Questions + Survey
2	2	Collaborate in English-speaking environments.	Tenses: Present Simple & Present Continuous	Lecture	Written Test
3	2	Read and understand different English texts.	Talking about Daily Routine	Lecture	In-class Exam + Homework
4	2	Apply grammatical structures accurately.	Technical Vocabulary (1)	Lecture	Written Test
5	2	Identify and understand technical contexts.	Reading Technical Texts	Lecture	Class Question + Participation
6	2	Write structured and formal emails.	Writing a Professional Email	Lecture	In-person Exam

7	2	Listen to and understand practical audio input.	Listening: Instructions & Announcements	Lecture	In-class Exam + Weekly Homework
8	2	Describe people and objects using appropriate vocabulary.	Describing People and Things	Lecture	In-class Exam + Practical Tasks
9	2	Construct conditional sentences correctly.	Conditional Sentences (Type I)	Lecture	In-class Exam + Class Exercise
10	2	Use job-related expressions effectively.	Job Interview Skills	Lecture	In-class Exam + Participation
11	2	Write a professional résumé in English.	Writing a CV	Lecture	In-class Exam + Quiz
12	2	Deliver a short English presentation.	Giving a Short Presentation	Lecture	In-class Exam
13	2	Summarize course content effectively.	Final Review	Lecture	In-class Exam
14	2	Practice oral communication in a formal setting.	Giving a Short Presentation	Lecture	In-class Exam
15	2	Demonstrate language proficiency in all skills.	Final Exam	Lecture	In-class Exam

11. Course Evaluation

1. Attendance and class discussions.
2. Daily oral assessments.
3. Homework assignments and written reports.
4. First monthly written test.
5. Oral presentation and mock interview.
6. Second monthly written test.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	*The Role of English in the Professional Development of Technical Students* *Using Technical Vocabulary in the Workplace*

	▯ *The Role of English in Writing CVs and Attending Job Interviews*
Main references (sources)	▯ *Technical English 2*, Pearson Longman ▯ *English for Work and Life – Intermediate Level*
Recommended books and references (scientific journals, reports…)	• *Headway Beginner Student's Book*, by Liz and John Soars
Electronic References, Websites	

Course Description: Computer Fundamentals / 2

1. Course Name:
Computer Fundamentals / 2
2. Course Code:
NTU 200
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
1- Name: Mohammed Salah Mohammed Noori Email: mehmetkuzeci@ntu.edu.iq 2- Name: Esraa Noor Al-Deen Mustafa Email: isra.n.a.mustafa@ntu.edu.iq 3- Name: Aya Sami Ridha Email: aya_sami12@ntu.edu.iq
8. Course Objectives
Course Objectives 1. To enhance students' scientific and practical competencies.

2. To understand and adopt modern technologies in computer programming and maintenance.
3. To prepare technically skilled graduates ready for the labor market.
4. To introduce students to the AutoCAD software environment, command access, saving/opening files.
5. To enable students to design in their field using AutoCAD for 2D and 3D engineering drawing.

9. Teaching and Learning Strategies

Strategy

1. Theoretical concept delivery through lectures and discussion.
2. Hands-on computer-based practice to reinforce theoretical concepts.
3. Active student participation through discussion and practical activities.
4. Clear explanation of theoretical concepts and computing operations.
5. Use of educational software and online resources to support learning.
6. Continuous assessment through quizzes, assignments, and lab work.
7. Utilizing various educational software tools to reinforce computer fundamentals.
8. Providing individual support to students in need of further assistance.
9. Application of theoretical concepts to real-world computing problems.
10. Solving practical problems using various software applications.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand computer generations, hardware and software.	Introduction to Computers: Generations & Components	Theory + Practical	Daily & Monthly Exams
2	2	Understand operating systems and their types.	Introduction to Operating Systems	Theory + Practical	Daily & Monthly Exams
3	2	Identify features of Windows OS.	Windows Environment Overview	Theory + Practical	Daily & Monthly Exams
4	2	Identify desktop components.	Desktop Environment Components	Theory + Practical	Daily & Monthly Exams

5	2	Manage programs and interface customization.	Installing/Uninstalling Programs and UI Customization	Theory + Practical	Daily & Monthly Exams
6	2	Understand and navigate MS Word.	Introduction to MS Word	Theory + Practical	Daily & Monthly Exams
7	2	Utilize the Insert tab in MS Word.	Using the Insert Tab in MS Word	Theory + Practical	Daily & Monthly Exams
8	2	Insert images and shapes.	Inserting Shapes and Pictures	Theory + Practical	Daily & Monthly Exams
9	2	Apply watermarks and formatting.	Applying Watermarks – Practical Exercises	Theory + Practical	Daily & Monthly Exams
10	2	Page layout and formatting.	Page Borders and Layout Settings	Theory + Practical	Daily & Monthly Exams
11	2	Create and customize tables.	Creating and Merging Tables	Theory + Practical	Daily & Monthly Exams
12	2	Add/delete pages.	Page Management in Word	Theory + Practical	Daily & Monthly Exams
13	2	Page numbering techniques.	Adding Page Numbers with Different Styles	Theory + Practical	Daily & Monthly Exams
14	2	Save and print documents.	Saving and Printing Documents	Theory + Practical	Daily & Monthly Exams
15	2	Review and apply acquired knowledge.	Comprehensive Review & Final Practice	Theory + Practical	Daily & Monthly Exams

11. Course Evaluation

1. Daily quizzes at the start of class covering previous lecture content.
2. Oral assessments.
3. First monthly exam.
4. Oral tests during lectures.
5. Second monthly exam.
6. Final practical and theoretical exams.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	*Electrical Technology*, by Therage

	Electrical Technology, by Hayke *Electrical Engineering Theory and Practical Electrical Installation Work*, by Franc
Main references (sources)	• Virtual Library of the Ministry of Higher Education and Scientific Research (Iraq)
Recommended books and references (scientific journals, reports…)	1. Virtual Library of the Ministry of Higher Education and Scientific Research 2. Available resources in the institute's electronic library 3. Integration between theoretical and practical aspects through student projects 4. Use of educational videos and online updates to support learning

Course Description: Arabic Language / 2

1. Course Name:
Arabic Language / 2
2. Course Code:
NTU 202
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Ibrahim Rawi Saleh Email: Ibrahimrawe@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Master correct and proper sentence structure in writing and correspondence. 2. Enable students to distinguish between nouns, verbs, and particles. 3. Teach appropriate use of punctuation marks. 4. Familiarize students with correct language usage and avoidance of common mistakes. 5. Train students in the art of formal communication and correspondence.

9. Teaching and Learning Strategies

Strategy

1. Presenting theoretical concepts of the Arabic language through lectures and discussions.
2. Encouraging active student participation through exercises in writing, reading, and speaking.
3. Clearly explaining Arabic grammatical rules and illustrating them to students.
4. Promoting active learning through discussions and applied activities.
5. Utilizing educational tools such as texts, poems, and examples to clarify linguistic concepts.
6. Continuously assessing student performance through exams, assignments, and practical tasks.
7. Using technology, including educational software and online resources, to enhance the learning process.
8. Encouraging regular reading and writing practice to strengthen language skills.
9. Applying Arabic language concepts in practical contexts.
10. Promoting effective use of Arabic in professional and everyday life.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Introduction to Common Language Errors	Lecture	Daily & Monthly Exams
2	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Rules of Writing Alif Maqsura and Alif Madda	Lecture s	Daily & Monthly Exams
3	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Differentiating between Ḍād (ض) and Ẓā’ (ظ)	Lecture	Daily & Monthly Exams
4	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Rules of Writing Hamza	Lecture	Daily & Monthly Exams

5	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Punctuation Marks	Lecture	Daily & Monthly Exams
6	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Nouns and Verbs – How to Differentiate	Lecture	Daily & Monthly Exams
7	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Objects (Al-Maf'ūlāt)	Lecture	Daily & Monthly Exams
8	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Numbers in Arabic Grammar	Lecture	Daily & Monthly Exams
9	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Applications on Common Language Mistakes	Lecture	Daily & Monthly Exams
10	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Nūn and Tanwīn	Lecture	Daily & Monthly Exams
11	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Structural Aspects of Official Letters	Lecture	Daily & Monthly Exams
12	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Meanings of Prepositions	Lecture	Daily & Monthly Exams
13	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Sun and Moon Letters	Lecture	Daily & Monthly Exams
14	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	Tied Tā' (Tā' Marbūṭah) and Long Tā' (Tā' Ṭawīlah)	Lecture	Daily & Monthly Exams
15	2	Reading, writing, and speaking Arabic correctly; understanding and applying grammar.	التاء المفتوحة	Lecture	Daily & Monthly Exams
11. Course Evaluation					

1. Daily written quizzes based on the previous lecture.
2. Daily oral assessments.
3. First monthly exam.
4. Oral testing during lectures on the same topic.
5. Second monthly exam.
6. Final comprehensive exam.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	▯ *The Difference between Ḍād and Ẓā'*, by Saad bin Ali bin Mohammed Al-Zanjani. ▯ *Quranic Sciences and Tajweed*, by Ghanim Qaddouri Al-Hamad.
Main references (sources)	• Tongue Slips in Arabic Language, by Abdul Qadir Al-Maghribi. • Al-Tahdhib fi Muhkam al-Tarteeb, by Ibn Shahid Al-Andalusi.
Recommended books and references (scientific journals, reports…)	▯ The Virtual Library of the Ministry of Higher Education and Scientific Research (Iraq). ▯ Available resources in the institute's electronic library. ▯ Scientific websites and films related to course developments and updates.

Course Description: Crimes of the Baath Regime in Iraq

1. Course Name:
Crimes of the Baath Regime in Iraq
2. Course Code:
NTU 203
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Idrees Ihsan Sattar Aziz Email: idrees_ihsan@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Raise awareness of the importance of justice and holding accountable those responsible for crimes committed by the Baath regime in Iraq. 2. Show empathy towards victims and their families and appreciate their suffering. 3. Promote respect for human rights and commitment to its principles. 4. Apply the acquired knowledge of Baath regime crimes in practical life. 5. Develop the ability to use various sources to study the crimes of the Baath regime in Iraq.

6. Analyze the crimes committed by the regime, identifying their causes and consequences.
7. Understand the historical context and various crimes committed by the Baath regime.
8. Examine the impact of these crimes on Iraqi society and its people.
9. Identify types of crimes committed, including war crimes and crimes against humanity.

9. Teaching and Learning Strategies

Strategy

1. Presentation of theoretical concepts about the Baath regime's crimes through lectures and discussions.
2. Encouraging active learning through research, analysis, and discussion.
3. Continuous student assessment through tests, assignments, and practical tasks.
4. Use of technology (e.g., internet and educational software) to support learning.
5. Encouraging student participation in discussions related to the crimes.
6. Applying theoretical concepts in practical contexts.
7. Promoting the use of acquired knowledge in real-world scenarios.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Ability to give effective presentations; contribution to justice and human rights.	Overview of the Course	Lecture	Daily & Monthly Exams
2	2	Ability to give effective presentations; contribution to justice and human rights.	Crimes According to the Iraqi High Criminal Court Law (2005); Definition of Crime	Lecture s	Daily & Monthly Exams
3	2	Ability to give effective presentations; contribution to justice and human rights.	Crimes of Authority, Psychological Crimes, Religious Freedom Violations, and Property Seizures	Lecture	Daily & Monthly Exams
4	2	Ability to give effective presentations; contribution to justice and human rights.	Crimes Against Humanity and War Crimes; Court Decisions	Lecture	Daily & Monthly Exams

5	2	Ability to give effective presentations; contribution to justice and human rights.	Psychological & Social Crimes and State Responsibility	Lecture	Daily & Monthly Exams
6	2	Ability to give effective presentations; contribution to justice and human rights.	Baathist Violations of Iraqi Laws and Human Rights	Lecture	Daily & Monthly Exams
7	2	Ability to give effective presentations; contribution to justice and human rights.	Mechanisms and Effects of Psychological and Social Crimes	Lecture	Daily & Monthly Exams
8	2	Ability to give effective presentations; contribution to justice and human rights.	Political and Military Crimes, Prison Sites, Environmental Crimes	Lecture	Daily & Monthly Exams
9	2	Ability to give effective presentations; contribution to justice and human rights.	War and Radiation Pollution, Landmines, Scorched Earth Policy, Draining Marshes, Palm Orchard Destruction	Lecture	Daily & Monthly Exams
10	2	Ability to give effective presentations; contribution to justice and human rights.	Mass Graves: 1963 Events, Iran–Iraq War, 1983 Incidents	Lecture	Daily & Monthly Exams
11	2	Ability to give effective presentations; contribution to justice and human rights.	Shaaban Uprising and Chronology of Mass Graves (1963–2003)	Lecture	Daily & Monthly Exams
12	2	Ability to give effective presentations; contribution to justice and human rights.	Mass Graves from 1963 & Iran–Iraq War	Lecture	Daily & Monthly Exams
13	2	Ability to give effective presentations; contribution to justice and human rights.	Mass Graves of Barzani Kurds (1983)	Lecture	Daily & Monthly Exams
14	2	Ability to give effective presentations; contribution to justice and human rights.	Anfal Campaign Mass Graves (1987–1988)	Lecture	Daily & Monthly Exams
15	2	Ability to give effective presentations; contribution to justice and human rights.	Mass Grave of the 1991 Shaaban Uprising	Lecture	Daily & Monthly Exams

11. Course Evaluation

1. Tests to assess understanding of theoretical concepts.
2. Evaluation of student assignments on the subject.
3. Assessment of research projects related to the course.
4. Participation in classroom discussions.
5. Analysis and evaluation of crimes committed by the Baath regime.
6. Evaluation of students' communication skills on the topic.

7. Use of multiple-choice questions to assess comprehension. 8. Use of assignments and projects to measure practical application. 9. Providing feedback on student performance.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Ministry of Higher Education Textbook
Main references (sources)	• Ministry of Higher Education Textbook
Recommended books and references (scientific journals, reports…)	▯ The Virtual Library of the Ministry of Higher Education and Scientific Research ▯ Electronic books available in the institute's library ▯ Online academic sources and documentaries related to the topic

Course Description: Occupational Safety

1. Course Name:
Occupational Safety
2. Course Code:
TIKI 207
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Amjad Ahmed Jassim Email: amjedahmed@ntu.edu.iq
8. Course Objectives
Course Objectives 1. To introduce students to the concepts and systems of occupational safety and health, and their importance in the workplace. 2. To enable students to identify occupational hazards and learn prevention methods according to recognized standards. 3. To develop students' awareness of safe work behaviors and promote a safety culture in institutions. 4. To protect workers from injuries and occupational diseases. 5. To comply with occupational safety laws and regulations.

6. To reduce costs associated with accidents and injuries.
7. To protect the environment by reducing risks and pollution caused by accidents.
8. To enhance the organization's reputation through commitment to occupational safety.
9. To ensure effective emergency response through planning and preparedness.
10. To conduct periodic inspections of the work environment.

9. Teaching and Learning Strategies

Strategy

1. Encouraging students to work in groups to promote cooperative learning.
2. Using practical examples to explain theoretical concepts of occupational safety.
3. Presenting safety principles through lectures and discussions.
4. Continuous assessment through tests, assignments, and practical activities.
5. Providing individual support for students needing additional assistance.
6. Supplying the necessary educational resources to support learning.
7. Using case studies to link theoretical knowledge to practical applications.
8. Organizing field visits to industrial or service workplaces to observe safety practices in real environments..

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding core ethical and professional behavior	Introduction to Occupational Safety	Lecture	Daily & Monthly Exams
2	2	Understanding core ethical and professional behavior	Basics and Concept of Occupational Accidents and Injuries	Lecture s	Daily & Monthly Exams
3	2	Understanding core ethical and professional behavior	Workplace Injuries and First Aid Measures	Lecture	Daily & Monthly Exams
4	2	Understanding core ethical and professional behavior	Rules and Regulations of Occupational Safety	Lecture	Daily & Monthly Exams
5	2	Understanding core ethical and professional behavior	General Objectives of Safety to Preserve Workers' Health	Lecture	Daily & Monthly Exams

6	2	Understanding core ethical and professional behavior	Definition and Types of Accidents	Lecture	Daily & Monthly Exams
7	2	Understanding core ethical and professional behavior	Causes and Classification of Accidents by Severity	Lecture	Daily & Monthly Exams
8	2	Understanding core ethical and professional behavior	Work Environment and Safe Handling Practices	Lecture	Daily & Monthly Exams
9	2	Understanding core ethical and professional behavior	Causes of Mechanical Accidents	Lecture	Daily & Monthly Exams
10	2	Understanding core ethical and professional behavior	Chemical Hazards and Prevention Methods	Lecture	Daily & Monthly Exams
11	2	Understanding core ethical and professional behavior	Solvents, Gases, and Liquids	Lecture	Daily & Monthly Exams
12	2	Understanding core ethical and professional behavior	Warning Signs in Chemical Laboratories	Lecture	Daily & Monthly Exams
13	2	Understanding core ethical and professional behavior	Safety Guidance Methods	Lecture	Daily & Monthly Exams
14	2	Understanding core ethical and professional behavior	Pollution: Air Pollutants and Their Sources	Lecture	Daily & Monthly Exams
15	2	Understanding core ethical and professional behavior	Electrical Hazards: Prevention, and Unfavorable Climate Conditions	Lecture	Daily & Monthly Exams

11. Course Evaluation

1. Daily quizzes to assess student understanding of safety principles.
2. Evaluation of assignments related to the course topics.
3. Evaluation of student projects on occupational safety.
4. Assessment of student participation in discussions on injury risk reduction.
5. Assessment of students' ability to apply safety principles in various contexts.
6. Evaluation of students' adherence to professional values and responsibilities.
7. Use of multiple-choice tests to assess comprehension.
8. Providing feedback to students on their performance.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Ministry of Higher Education official textbook.
Main references (sources)	▯ Ministry of Labor – Occupational Safety and Health Systems Guide (local/national edition) ▯ OSHA Standards – Occupational Safety and Health Administration (USA)
Recommended books and references (scientific journals, reports…)	▯ Hamad Al-Sarawi, *Occupational Safety and Health*, Dar Al-Kutub Al-Ilmiyah ▯ Abdul Razzaq Al-Sayyid, *Principles of Health and Occupational Safety*, University of Baghdad publications
Electronic References, Websites	▯ OSHA – Occupational Safety and Health Administration (USA) ▯ NIOSH – National Institute for Occupational Safety and Health ▯ HSE – Health and Safety Executive (UK)

Course Description: Heat Transfer

1. Course Name:
Heat Transfer
2. Course Code:
ICTI 212
3. Semester / Year:
First Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(150 hours) / (5 units)
7. Course administrator's name (mention all, if more than one name)
Name: Lect. Azhar Ahmed Abed Email: Azhar84ahmed@ntu.edu.iq
8. Course Objectives

Course Objectives

1. Provide students with theoretical knowledge related to heat and mass transfer.
2. Familiarize students with heat transfer equipment and their operating principles.
3. Enable students to operate heat transfer devices and conduct practical experiments.
4. Understand the three fundamental modes of heat transfer: conduction, convection, and radiation.
5. Identify applications of heat transfer in engineering and industrial fields.
6. Analyze the factors influencing heat transfer, such as temperature, materials, and geometry.

7. Calculate heat transfer rates in various systems.
8. Evaluate the performance and efficiency of heat transfer systems.
9. Apply heat transfer principles to the engineering design of systems and equipment.
10. Solve heat transfer-related problems and propose appropriate engineering solutions.

9. Teaching and Learning Strategies

Strategy

1. Provide students with theoretical knowledge related to heat and mass transfer.
2. Familiarize students with heat transfer equipment and their operating principles.
3. Enable students to operate heat transfer devices and conduct practical experiments.
4. Understand the three fundamental modes of heat transfer: conduction, convection, and radiation.
5. Identify applications of heat transfer in engineering and industrial fields.
6. Analyze the factors influencing heat transfer, such as temperature, materials, and geometry.
7. Calculate heat transfer rates in various systems.
8. Evaluate the performance and efficiency of heat transfer systems.
9. Apply heat transfer principles to the engineering design of systems and equipment.
10. Solve heat transfer-related problems and propose appropriate engineering solutions.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Design heat transfer systems; Apply fundamental principles	Introduction to Heat Transfer and Applications	Lecture + Lab	Daily/Monthly Exams
2	2	Design heat transfer systems; Apply fundamental principles	Methods and Calculations of Heat Transfer	Lecture + Lab	Daily/Monthly Exams
3	2	Design heat transfer systems; Apply fundamental principles	Convection Heat Transfer in Flat Surfaces	Lecture + Lab	Daily/Monthly Exams
4	2	Design heat transfer systems; Apply fundamental principles	Free and Forced Convection	Lecture + Lab	Daily/Monthly Exams
5	2	Design heat transfer systems; Apply fundamental principles	Flow Types and Non-Dimensional Numbers	Lecture + Lab	Daily/Monthly Exams

6	2	Design heat transfer systems; Apply fundamental principles	Flow in Cylindrical Surfaces	Lecture + Lab	Daily/Monthly Exams
7	2	Design heat transfer systems; Apply fundamental principles	Non-Dimensional Numbers in Convective Heat Transfer	Lecture + Lab	Daily/Monthly Exams
8	2	Design heat transfer systems; Apply fundamental principles	Calculating Reynolds, Prandtl, and Grashof Numbers	Lecture + Lab	Daily/Monthly Exams
9	2	Design heat transfer systems; Apply fundamental principles	Overall Heat Transfer Coefficient	Lecture + Lab	Daily/Monthly Exams
10	2	Design heat transfer systems; Apply fundamental principles	Types of Heat Exchangers	Lecture + Lab	Daily/Monthly Exams
11	2	Design heat transfer systems; Apply fundamental principles	Heat Exchanger Connections and Efficiency Calculations	Lecture + Lab	Daily/Monthly Exams
12	2	Design heat transfer systems; Apply fundamental principles	Heat Transfer Efficiency Calculations	Lecture + Lab	Daily/Monthly Exams
13	2	Design heat transfer systems; Apply fundamental principles	Types and Functions of Fins	Lecture + Lab	Daily/Monthly Exams
14	2	Design heat transfer systems; Apply fundamental principles	Radiative Heat Transfer	Lecture + Lab	Daily/Monthly Exams
15	2	Design heat transfer systems; Apply fundamental principles	Effect of Color on Absorptivity and Emissivity	Lecture + Lab	Daily/Monthly Exams

11. Course Evaluation

1. Provide students with theoretical knowledge related to heat and mass transfer.
2. Familiarize students with heat transfer equipment and their operating principles.
3. Enable students to operate heat transfer devices and conduct practical experiments.
4. Understand the three fundamental modes of heat transfer: conduction, convection, and radiation.
5. Identify applications of heat transfer in engineering and industrial fields.
6. Analyze the factors influencing heat transfer, such as temperature, materials, and geometry.
7. Calculate heat transfer rates in various systems.
8. Evaluate the performance and efficiency of heat transfer systems.
9. Apply heat transfer principles to the engineering design of systems and equipment.
10. Solve heat transfer-related problems and propose appropriate engineering solutions.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• *Heat Transfer* by **John H. Lienhard**
Main references (sources)	Ministry of Labor – National Occupational Safety and Health Systems Guide OSHA Standards – Occupational Safety and Health Administration (USA)
Recommended books and references (scientific journals, reports…)	*Fundamentals of Heat Transfer* by **Frank P. Incropera & David P. DeWitt** *Heat and Mass Transfer* by **C. P. Yunus** *Introduction to Heat Transfer* by **Incropera & DeWitt** *Heat Transfer: A Practical Approach* by **Yunus A. Cengel**
Electronic References, Websites	

Course Description: Mass Transfer

1. Course Name:
Mass Transfer
2. Course Code:
ICT 213
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(150 hours) / (5 units)
7. Course administrator's name (mention all, if more than one name)
Name: Lect. Azhar Ahmed Abed Email: Azhar84ahmed@ntu.edu.iq
8. Course Objectives

Course Objectives

1. Understand the fundamental principles of mass transfer, such as diffusion and flow.
2. Identify applications of mass transfer across engineering and industrial fields.
3. Analyze the factors affecting mass transfer, including temperature, pressure, and concentration.
4. Calculate mass transfer rates in various engineering scenarios.
5. Design mass transfer systems such as columns and exchangers.
6. Evaluate the performance and efficiency of mass transfer systems.
7. Apply mass transfer principles to engineering system and equipment design.

8. Diagnose and resolve mass transfer-related problems.
9. Analyze the performance of mass transfer units.
10. Evaluate the influence of environmental variables on mass transfer processes.

9. Teaching and Learning Strategies

Strategy

1. Continuous assessment through quizzes, assignments, and practical exercises.
2. Use of practical examples to reinforce theoretical concepts.
3. Hands-on problem-solving sessions and laboratory experiments.
4. Lectures and structured classroom discussions.
5. Collaborative learning through group projects and peer interaction.
6. Engagement in applied exercises and real-life case studies.
7. Multimedia and educational software to support visual learning.
8. Clear and focused explanation of theoretical concepts.
9. Relating theory to real-world applications.
10. Computer simulations to demonstrate mass transfer phenomena.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand basic mass transfer principles; design mass transfer systems	Introduction to Mass Transfer Principles	Lecture + Lab	Daily/Monthly Exams
2	2	Understand basic mass transfer principles; design mass transfer systems	Mass Transfer Mechanisms	Lecture + Lab	Daily/Monthly Exams
3	2	Understand basic mass transfer principles; design mass transfer systems	Distillation Methods (Simple & Fractional)	Lecture + Lab	Daily/Monthly Exams
4	2	Understand basic mass transfer principles; design mass transfer systems	Factors Affecting Distillation	Lecture + Lab	Daily/Monthly Exams
5	2	Understand basic mass transfer principles; design mass transfer systems	Role of Distillation in Crude Oil Separation	Lecture + Lab	Daily/Monthly Exams

6	2	Understand basic mass transfer principles; design mass transfer systems	Flash Point, Ignition Point, Separation Point	Lecture + Lab	Daily/Monthly Exams
7	2	Understand basic mass transfer principles; design mass transfer systems	Vapor Pressure and Equilibrium Curve	Lecture + Lab	Daily/Monthly Exams
8	2	Understand basic mass transfer principles; design mass transfer systems	Applied Calculations in Vapor Pressure	Lecture + Lab	Daily/Monthly Exams
9	2	Understand basic mass transfer principles; design mass transfer systems	Volatility Ratio and Its Impact on Separation	Lecture + Lab	Daily/Monthly Exams
10	2	Understand basic mass transfer principles; design mass transfer systems	Filtration Processes and Applications	Lecture + Lab	Daily/Monthly Exams
11	2	Understand basic mass transfer principles; design mass transfer systems	Binary Distillation Processes	Lecture + Lab	Daily/Monthly Exams
12	2	Understand basic mass transfer principles; design mass transfer systems	Calculation of Theoretical Plates in Distillation Towers	Lecture + Lab	Daily/Monthly Exams
13	2	Understand basic mass transfer principles; design mass transfer systems	Number of Stages in Distillation Columns	Lecture + Lab	Daily/Monthly Exams
14	2	Understand basic mass transfer principles; design mass transfer systems	Column Efficiency	Lecture + Lab	Daily/Monthly Exams
15	2	Understand basic mass transfer principles; design mass transfer systems	Column Packing Materials	Lecture + Lab	Daily/Monthly Exams

11. Course Evaluation

1. Quizzes to assess comprehension of theoretical concepts.
2. Grading of assignments related to mass transfer topics.
3. Evaluation of student projects focused on mass transfer system design.
4. Ongoing assessment of classroom performance.
5. Use of multiple-choice and essay-based questions.
6. Application-based testing of theory through case analysis.
7. Evaluation of problem-solving capabilities in distillation tower systems.
8. Assessment of knowledge related to mass transfer principles.

9. Evaluation of practical application skills. 10. Provision of constructive feedback to support student progress.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• *Simulation of Distillation Towers using Aspen HYSYS*
Main references (sources)	*Design and Types of Distillation Columns* by **Eng. Ahmed Abbas Mohammed** *Stages of Petroleum Refining* by **Dr. Abdullah bin Mohammed Abdullah**
Recommended books and references (scientific journals, reports…)	• *Fundamentals of Mass Transfer* by **Dr. Mohammed Abdullah Mohammed Al-Faleh**
Electronic References, Websites	

Course Description: Measurements and Control

1. Course Name:
Measurements and Control
2. Course Code:
ICT 214
3. Semester / Year:
First Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person lectures held in the department's classrooms
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (4 units)
7. Course administrator's name (mention all, if more than one name)
Name: Kaziwa Fareeq Sdeeq Email: Kaziwa_fa23@ntu.iq
8. Course Objectives
Course Objectives 1. Understand and interpret measurement phenomena such as voltage, current, and power. 2. Acquire practical skills in circuit connection and instrumentation. 3. Interpret electrical schematics and perform corresponding practical implementations. 4. Analyze experimental data and interpret results effectively. 5. Compare experimental outcomes with theoretical predictions to enhance accuracy. 6. Develop teamwork skills within the laboratory environment.

7. Minimize errors and ensure safety in conducting laboratory experiments.

9. Teaching and Learning Strategies

Strategy

1. Demonstration of real instruments (e.g., ammeters, voltmeters, sensors).
2. Live experiments to illustrate instrumentation usage and safe setup procedures.
3. Group-based lab work to enhance collaboration (4–5 students per group).
4. Detailed explanations of device functions and circuit integration.
5. Use of critical thinking questions to stimulate analysis.
6. Incorporating project-based learning (e.g., Arduino-based room temperature control system).
7. Simulation-based learning for modeling control systems.
8. Utilizing educational videos, virtual labs, and control system simulators.
9. Applying software tools for measurement and control simulations.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand concepts of measurement and control	Introduction to Measurements and Control	Lecture + Lab	Daily/Monthly Exams
2	2	Identify measurement system components and connections	Elements of Measurement Systems	Lecture + Lab	Daily/Monthly Exams
3	2	Recognize different types of electrical transducers	Types and Functions of Electrical Transducers	Lecture + Lab	Daily/Monthly Exams
4	2	Analyze measurement device properties	Instrument Characteristics: Accuracy, Deviation, Time Response	Lecture + Lab	Daily/Monthly Exams
5	2	Understand and analyze measurement errors	Measurement Errors: Types and Analysis	Lecture + Lab	Daily/Monthly Exams
6	2	Differentiate open- and closed-loop systems	Introduction to Control Systems	Lecture + Lab	Daily/Monthly Exams

7	2	Solve dynamic system models	Dynamic System Representation & Math Problems	Lecture + Lab	Daily/Monthly Exams
8	2	Analyze system time response	Time Response of Systems	Lecture + Lab	Daily/Monthly Exams
9	2	Perform system stability analysis	Stability Testing	Lecture + Lab	Daily/Monthly Exams
10	2	Design control system models	Methods of Control System Design	Lecture + Lab	Daily/Monthly Exams
11	2	Use controllers in manual and automatic modes	Control Applications: Manual and Automatic	Lecture + Lab	Daily/Monthly Exams
12	2	Operate common measurement tools	Practical Measuring Instruments	Lecture + Lab	Daily/Monthly Exams
13	2	Apply software tools in control and measurement	Software Applications in Measurements and Control	Lecture + Lab	Daily/Monthly Exams
14	2	Execute hands-on projects	Practical Test and Project Implementation	Lecture + Lab	Daily/Monthly Exams
15	2	Review and reinforce understanding	Final Review: Theory and Practice	Lecture + Lab	Daily/Monthly Exams

11. Course Evaluation

1. Quizzes to assess theoretical understanding.
2. Evaluation of student assignments on measurement systems.
3. Grading of practical projects related to measurement and control system design.
4. Continuous assessment through lab performance.
5. Evaluation of technical reports on system design and execution.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Measurement and Control by Dr. Abdullah bin Mohammed bin Abdullah Al-Faleh • Fundamentals of Measurement by Dr. Abdulaziz bin Mohammed bin Abdullah Al-Faleh

Main references (sources)	*Measurement and Quality Control Systems* by Dr. Mohammed Al-Faleh *Industrial Measurements and Control* by Dr. Abdulaziz bin Mohammed
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Coursera – Offers courses on measurement and control Udemy – Includes various modules on control engineering Opcat.org – Focus on industry-oriented control systems Engineering.com – General engineering education portal AIChE – American Institute of Chemical Engineers: Resources for control systems in

Course Description: Equipment Construction

1. Course Name:
Equipment Construction
2. Course Code:
ICT 217
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person (classroom lectures at the department)
6. Number of Credit Hours (Total) / Number of Units (Total)
(60 hours) / (4 units)
7. Course administrator's name (mention all, if more than one name)
Name: Haider Hameed Mahmood Email: HayderMahmood35@ntu.edu.iq
8. Course Objectives
Course Objectives 1. Introduce students to the basic concepts of equipment construction. 2. Identify types of valves used in devices and machinery for chemical industries. 3. Equip graduates with practical skills for flange and valve connections relevant to industry demands. 4. Teach the application of safety and environmental standards related to chemical process equipment. 5. Provide students with knowledge on metal properties and corrosion prevention techniques.

6. Perform laboratory experiments related to equipment construction in chemical industries.
7. Train students in pipe testing to assess mechanical properties and corrosion resistance.

9. Teaching and Learning Strategies

Strategy

1. Apply equipment construction concepts through hands-on projects simulating real industrial conditions.
2. Use modern technologies such as software tools and simulations to enhance understanding.
3. Encourage teamwork to achieve targeted learning outcomes.
4. Focus on developing practical skills for designing, assembling, and maintaining industrial equipment.
5. Conduct continuous assessment via tests, assignments, and projects.
6. Link theoretical concepts to practical industrial applications.
7. Provide constructive feedback identifying student strengths and areas for improvement.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand basic principles of reactor and column design	Introduction to Production Processes in Chemical Industries	Lecture + Lab	Daily/Monthly Exams
2	2	Identify types of production machines and devices	Types of Machinery, Equipment, and Devices Used in Production	Lecture + Lab	Daily/Monthly Exams
3	2	Identify and describe types and functions of valves	Types of Valves, Importance, and Applications	Lecture + Lab	Daily/Monthly Exams
4	2	Understand protection and maintenance of valves	Valve Coating Methods and Corrosion Protection	Lecture + Lab	Daily/Monthly Exams
5	2	Learn proper methods of piping connections	Pipe and Valve Connections – Types and Techniques	Lecture + Lab	Daily/Monthly Exams

6	2	Understand cast iron properties and uses	Types of Cast Iron – Properties and Applications	Lecture + Lab	Daily/Monthly Exams
7	2	Understand steel alloys and applications	Carbon and Alloy Steel: Types, Properties, and Uses	Lecture + Lab	Daily/Monthly Exams
8	2	Understand raw materials and metallurgy	Iron Ores and Blast Furnace Reactions	Lecture + Lab	Daily/Monthly Exams
9	2	Learn methods of steel production	Bessemer, Thomas, Basic Oxygen Furnace Methods	Lecture + Lab	Daily/Monthly Exams
10	2	Select appropriate materials for equipment	Material Selection Based on Valve Type	Lecture + Lab	Daily/Monthly Exams
11	2	Learn flange connection and coatings	Flange Connections and Suitable Coating Selection	Lecture + Lab	Daily/Monthly Exams
12	2	Understand compression principles and machinery	Compressors – Meaning and Types	Lecture + Lab	Daily/Monthly Exams
13	2	Apply knowledge in compressor systems	Compressor Applications and Parameter Calculations	Lecture + Lab	Daily/Monthly Exams
14	2	Understand ceramic and non-metallic materials	Non-metallic Materials and Ceramic Types	Lecture + Lab	Daily/Monthly Exams
15	2	Identify ceramic material properties	Mechanical, Thermal, and Electrical Properties of Ceramics	Lecture + Lab	Daily/Monthly Exams

11. Course Evaluation

1. Multiple-choice quizzes to assess understanding of core concepts.
2. Weekly technical reports related to course content.
3. Essay-based questions to evaluate application of material concepts.
4. Oral assessments and in-class participation.
5. In-person written examinations.
6. Daily performance assessment.
7. Practical (laboratory) examinations.
8. Immediate feedback on student performance.
9. Constructive feedback to improve learning outcomes.
10. Midterm and final written examinations.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	*Strength of Materials* – R.C. Stephens, 1974 *Engineering Mechanics* – Singer, 3rd Edition, 1972 *Chemical Plant Technology – An Introduction* – Manual M.A. Ellison & Taylor, 1970
Main references (sources)	*Equipment Construction and Material Properties* – Maan Yahya Al-Hamdani & Hashim Kadhim Al-Jawahiri *Metals: Structure, Properties, and Heat Treatments* – G. Degurol & A. Ullmann (Translated by Dr. Jaafar T. Al-Haidari & Adnan N. Naama)
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Instructables – Project-based learning for device construction Hackaday – DIY and industrial device construction resources Udemy – Online courses on equipment and industrial machinery construction

Course Description: Properties of Materials

1. Course Name:
Properties of Materials
2. Course Code:
ICT 216
3. Semester / Year:
First Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person (classroom lectures at the department)
6. Number of Credit Hours (Total) / Number of Units (Total)
(60 ours) / (4 units)
7. Course administrator's name (mention all, if more than one name)
Name: Haider Hameed Mahmood Email: HayderMahmood35@ntu.edu.iq
8. Course Objectives
Course Objectives 1- Introduce students to the effects of external forces on machine parts, including stress and deformation. 2- Provide methods for evaluating and resolving stress-related issues using mathematical relationships. 3- Familiarize students with the types of metals used in constructing devices and machines in the chemical industry.

4- Understand types, properties, specifications, uses, extraction methods, and corrosion protection of metals.
5- Train students in mechanical property testing such as hardness, impact, toughness, tensile, and compressive strength.
6- Equip students with knowledge on maintaining materials and preventing corrosion.
7- Conduct laboratory experiments related to materials used in the chemical industry.
8- Develop students' understanding of how to evaluate and preserve the mechanical properties of metals.

9. Teaching and Learning Strategies

Strategy

8. Introduce students to the effects of external forces on machine parts, including stress and deformation.
9. Provide methods for evaluating and resolving stress-related issues using mathematical relationships.
10. Familiarize students with the types of metals used in constructing devices and machines in the chemical industry.
11. Understand types, properties, specifications, uses, extraction methods, and corrosion protection of metals.
12. Train students in mechanical property testing such as hardness, impact, toughness, tensile, and compressive strength.
13. Equip students with knowledge on maintaining materials and preventing corrosion.
14. Conduct laboratory experiments related to materials used in the chemical industry.
15. Develop students' understanding of how to evaluate and preserve the mechanical properties of metals.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand stress, strain, and mechanical properties	Introduction to Forces, Stress, Deformation	Lecture + Lab	Daily/Monthly Exams
2	2	Apply mechanical principles to material analysis	Compressive Stress and Hooke's Law	Lecture + Lab	Daily/Monthly Exams

3	2	Apply Hooke's Law and analyze stress–strain graphs	Compressive Stress and Hooke's Law	Lecture + Lab	Daily/Monthly Exams
4	2	Analyze thermal strain effects	Strain & Thermal Stress	Lecture + Lab	Daily/Monthly Exams
5	2	Evaluate shear stress and joint stresses	Shear Stress in Riveting & Welding	Lecture + Lab	Daily/Monthly Exams
6	2	Continue application of shear stress concepts	Shear Stress in Riveting & Welding	Lecture + Lab	Daily/Monthly Exams
7	2	Introduction to metallurgy and its industrial relevance	Metallurgy Basics	Lecture + Lab	Daily/Monthly Exams
8	2	Classify industrial metals	Metals Used in Chemical Equipment	Lecture + Lab	Daily/Monthly Exams
9	2	Understand atomic/crystalline structures	Atomic, Granular, and Crystalline Structures	Lecture + Lab	Daily/Monthly Exams
10	2	Distinguish non–ferrous metals and their applications	Non–Ferrous Metals: Cu, Al, Sn, Pb, Zn	Lecture + Lab	Daily/Monthly Exams
11	2	Understand metal extraction and usage	Extraction, Properties, and Applications	Lecture + Lab	Daily/Monthly Exams
12	2	Identify corrosion effects on industrial systems	Introduction to Corrosion and Its Effects	Lecture + Lab	Daily/Monthly Exams
13	2	Apply protective techniques against corrosion	Coatings and Paints to Reduce Corrosion	Lecture + Lab	Daily/Monthly Exams
14	2	Evaluate economic impacts of corrosion	Destructive Effects of Corrosion	Lecture + Lab	Daily/Monthly Exams
15	2	Continue exploring corrosion types and impacts	Corrosion Types and National Impact	Lecture + Lab	Daily/Monthly Exams

11. Course Evaluation

1- Introduce students to the effects of external forces on machine parts, including stress and deformation.
2- Provide methods for evaluating and resolving stress–related issues using mathematical relationships.
3- Familiarize students with the types of metals used in constructing devices and machines in the chemical industry.

4- Understand types, properties, specifications, uses, extraction methods, and corrosion protection of metals.
5- Train students in mechanical property testing such as hardness, impact, toughness, tensile, and compressive strength.
6- Equip students with knowledge on maintaining materials and preventing corrosion.
7- Conduct laboratory experiments related to materials used in the chemical industry.
8- Develop students' understanding of how to evaluate and preserve the mechanical properties of metals.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	*Strength of Materials* – R.C. Stephens, 1974 *Engineering Mechanics* – Singer, 3rd Edition, 1972 *Chemical Plant Technology – An Introduction* – M.A. Ellison & Taylor, 1970
Main references (sources)	Virtual Library of the Ministry of Higher Education and Scientific Research Digital library resources available at the institute
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Coursera – Engineering and materials science courses from top universities edX – Online courses in technology, science, and materials FutureLearn – Courses from global universities like Oxford and Edinburgh Oxford Home Study Centre (OHSC) – Certified distance learning programs

	Alison – Free courses in engineering and materials with certificate options

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Course Description: Petroleum Technology (The second Academic level)

1. Course Name:
Petroleum Technology
2. Course Code:
ICT 210
3. Semester / Year:
First Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person (classroom lectures at the department)
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (5 units)
7. Course administrator's name (mention all, if more than one name)
Name: Mofeda Aziz Garib Email: enginasu81@gmail.com
8. Course Objectives
Course Objectives 1. Understand the fundamentals of oil and gas. 2. Introduce students to the sources of crude oil and natural gas. 3. Understand the properties and derivatives of crude oil. 4. Equip graduates with practical knowledge of the oil production process. 5. Teach students how to properly explore crude oil locations. 6. Understand the stages of petroleum production including drilling, production, transportation, and processing.

7. Perform laboratory experiments on petroleum refining and processing techniques.
8. Develop student skills in vertical and directional (horizontal) drilling technologies.
9. Promote awareness of environmental and industrial safety.
10. Understand environmental risks associated with the petroleum industry.
11. Apply safety and prevention procedures at work sites.
12. Recognize the impact of petroleum on local and global economies.

9. Teaching and Learning Strategies

Strategy

1. Project-based learning to simulate real-world oil technology applications.
2. Active learning through class discussions and brainstorming sessions.
3. Encourage fieldwork through visits to petroleum facilities (refineries, drilling sites).
4. Problem-solving approach using real industry issues such as production decline or gas leaks.
5. Continuous assessment through exams, assignments, and practical reports.
6. Encourage analytical and creative thinking for developing realistic industry solutions.
7. Use of short quizzes, reports, and practical demonstrations to assess progress.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand oil refining concepts and objectives	Introduction to Oil Refining and Its Goals	Lecture + Lab	Exams + Practical Reports
2	2	Understand crude oil characteristics and refining steps	Properties of Crude Oil and Refining Processes	Lecture + Lab	Exams + Practical Reports
3	2	Understand catalytic cracking techniques	Catalytic Cracking: Features and Influencing Factors	Lecture + Lab	Exams + Practical Reports
4	2	Understand hydrogen cracking	Hydrogen Cracking and Its Key Factors	Lecture + Lab	Exams + Practical Reports

5	2	Understand reforming operations and chemical reactions	Catalytic Reforming: Reactions and Feedstock	Lecture + Lab	Exams + Practical Reports
6	2	Understand lubricating oil properties and applications	Lubricating Oils: Properties and Uses	Lecture + Lab	Exams + Practical Reports
7	2	Understand lubricant manufacturing and treatment	Lubricant Manufacturing, Asphalt Removal	Lecture + Lab	Exams + Practical Reports
8	2	Learn oil purification and dewaxing	Used Oil Purification and Dewaxing Processes	Lecture + Lab	Exams + Practical Reports
9	2	Understand oil reprocessing stages	Stages of Used Oil Refining	Lecture + Lab	Exams + Practical Reports
10	2	Understand natural gas types	Natural Gas: Dry, Wet, Liquefied	Lecture + Lab	Exams + Practical Reports
11	2	Evaluate natural gas production	Evaluation of Natural Gas Industry	Lecture + Lab	Exams + Practical Reports
12	2	Learn gas processing operations	Natural Gas Processing	Lecture + Lab	Exams + Practical Reports
13	2	Understand gas dehydration and sweetening	Natural Gas Dehydration and Sweetening	Lecture + Lab	Exams + Practical Reports
14	2	Understand environmental pollution sources	Destructive Effects of Corrosion Environmental Pollution Caused by Petroleum Industries	Lecture + Lab	Exams + Practical Reports
15	2	Learn pollution control techniques	Pollution Treatment and Control Methods	Lecture + Lab	Exams + Practical Reports

11. Course Evaluation

1. Evaluation based on student performance in exams, assignments, and practical projects.
2. Oral assessments.
3. In-person written exams.

4. Daily performance evaluations.
5. Practical laboratory exams.
6. Assess students' abilities to apply theoretical concepts in practical environments.
7. Analyze and evaluate petroleum and gas data; design and execute oil and gas production processes.
8. Use multiple-choice tests to evaluate technical competencies.
9. Weekly reports documenting progress and methodology.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• *Petroleum Engineering* – Dr. Abdullah Bin Abdulrahman Al-Shuraida • *Petroleum and Gas Technology* – Dr. Mohammed Bin Abdullah Al-Abdulkarim
Main references (sources)	• *Petroleum Geology* – Dr. Fahd Bin Abdulaziz Al-Shuraida • *Crude Oil Refining* – Dr. Abdullah Bin Suleiman Al-Hammad • *Petroleum Engineering Handbook* – Society of Petroleum Engineers (SPE) • *The Petroleum System: From Source to Trap* – Leslie B. Magoon & Wallace G. Dow • *Oil and Gas Production Handbook* – Håvard Devold
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description: Principles of Petroleum Refining (The second Academic level)

1. Course Name:
Principles of Petroleum Refining
2. Course Code:
ICT 211
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person (classroom lectures at the department)
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 ours) / (5 units)
7. Course administrator's name (mention all, if more than one name)
Name: Mofeda Aziz Garib Email: enginasu81@gmail.com
8. Course Objectives
Course Objectives 1. Identify the components of crude oil (paraffins, naphthenes, aromatics). 2. Learn about various refining and upgrading technologies for crude oil. 3. Understand the basic principles of distillation processes (atmospheric and vacuum). 4. Understand thermal cracking and reforming operations used in laboratory and industry. 5. Learn how to analyze petroleum products such as gasoline, kerosene, and base oils. 6. Connect the chemical properties of crude oil with industrial refining processes.

7. Understand the economic aspects of the refining industry.
8. Enable students to analyze production cost versus economic return of refined products.
9. Raise awareness of environmental and industrial safety standards.
10. Understand the environmental risks associated with the petroleum industry.
11. Apply safety and preventive measures at the work site.
12. Understand the impact of petroleum on both local and global economies.

9. Teaching and Learning Strategies

Strategy

1. Project-based learning simulating real refining scenarios.
2. Real-world problem-solving (e.g., increasing production efficiency).
3. Encourage fieldwork through visits to refineries and drilling sites.
4. Conduct lab experiments to simulate distillation and chemical analysis of petroleum products.
5. Continuous assessment via exams, assignments, and projects.
6. Promote analytical and creative thinking to develop realistic industrial solutions.
7. Use quizzes, assignments, and practical observations to monitor progress.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand the role of petroleum as an energy source and exploration methods	Introduction to Petroleum and Exploration	Lecture + Lab	Exams + Practical Reports
2	2	Understand the chemical composition of crude oil	Chemical Composition of Crude Oil	Lecture + Lab	Exams + Practical Reports
3	2	Classify crude oil types	Classification of Crude Oil	Lecture + Lab	Exams + Practical Reports
4	2	Evaluate crude oil specifications	Evaluation of Crude Oil Properties (Density, Viscosity, Flash Point, Ignition Point)	Lecture + Lab	Exams + Practical Reports

5	2	Assess impurities in crude oil	Evaluation of Sulfur Content, Residue, Hydrogen Sulfide	Lecture + Lab	Exams + Practical Reports
6	2	Learn treatment and degassing methods	Crude Oil Treatment and Dissolved Hydrocarbon Gas Separation	Lecture + Lab	Exams + Practical Reports
7	2	Understand distillation systems	Distillation Methods and Towers	Lecture + Lab	Exams + Practical Reports
8	2	Learn desalting and refining operations	Water and Salt Separation, Industrial Refining	Lecture + Lab	Exams + Practical Reports
9	2	Apply practical desalting processes	Practical Application: Water and Salt Separation	Lecture + Lab	Exams + Practical Reports
10	2	Identify refined products and their uses	Refinery Products: Properties and Applications	Lecture + Lab	Exams + Practical Reports
11	2	Understand aviation fuels and their properties	Aviation Gasoline, Kerosene, Jet Fuel	Lecture + Lab	Exams + Practical Reports
12	2	Understand fuel oils and asphalt	Fuel Oil, Diesel Oil, Asphalt	Lecture + Lab	Exams + Practical Reports
13	2	Learn refining treatments	Refining Treatments of Petroleum Derivatives	Lecture + Lab	Exams + Practical Reports
14	2	Understand cracking and chemical reactions	Thermal Cracking and Related Chemical Reactions	Lecture + Lab	Exams + Practical Reports
15	2	Evaluate refining efficiency and refinery operations	Production Efficiency and Refinery Stations	Lecture + Lab	Exams + Practical Reports

11. Course Evaluation

1. Based on student performance in exams, assignments, and practical projects.
2. Oral examinations.
3. Written assessments.
4. Daily participation and engagement.
5. Practical laboratory examinations.

6. Assessment of students' ability to apply theoretical knowledge in real-world scenarios. 7. Analysis of petroleum data, process design, and production implementation. 8. Use of multiple-choice tests for technical skill evaluation. 9. Weekly reports reflecting methodological and analytical progress.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	▯ *Petroleum Engineering* – Dr. Abdullah Bin Abdulrahman Al-Shuraida ▯ *Petroleum and Gas Technology* – Dr. Mohammed Bin Abdullah Al-Abdulkarim
Main references (sources)	▯ *Petroleum Geology* – Dr. Fahd Bin Abdulaziz Al-Shuraida ▯ *Crude Oil Refining* – Dr. Abdullah Bin Suleiman Al-Hammad ▯ *Petroleum Engineering Handbook* – Society of Petroleum Engineers (SPE) ▯ *The Petroleum System: From Source to Trap* – Leslie B. Magoon & Wallace G. Dow ▯ *Oil and Gas Production Handbook* – Håvard Devold
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description: Water Treatment (The second Academic level)

1. Course Name:
Water Treatment
2. Course Code:
ICT 218
3. Semester / Year:
First semester of the academic year (2024-2025)
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person (classroom-based instruction at the department)
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Mustafa Jabbar Abdulkarim Email: mustafa.abdk639@ntu.edu.iq
8. Course Objectives
Course Objectives 1- Introduce students to the fundamental concepts of water treatment, including types of pollutants and treatment methods. 2- Enable students to analyze and evaluate water quality, identifying pollutants and health-related standards. 3- Train students in the design and implementation of various treatment processes, including physical, chemical, and biological methods. 4- Familiarize students with modern technologies used in water treatment, such as automated systems and continuous monitoring tools.

5- Enhance teamwork and communication skills through hands-on projects and technical report writing.

6- Teaching and Learning Strategies

Strategy

1- Introduce students to the fundamental concepts of water treatment, including types of pollutants and treatment methods.
2- Enable students to analyze and evaluate water quality, identifying pollutants and health-related standards.
3- Train students in the design and implementation of various treatment processes, including physical, chemical, and biological methods.
4- Familiarize students with modern technologies used in water treatment, such as automated systems and continuous monitoring tools.
5- Enhance teamwork and communication skills through hands-on projects and technical report writing.

7- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand basic concepts and importance of water treatment	Importance of Water Treatment and Usage	Lecture	Exams
2	2	Identify and classify water pollutants	Types of Water Pollutants	Lecture	Exams
3	2	Understand domestic water conditioning methods	Water Conditioning for Domestic Use	Lecture	Exams
4	2	Understand membrane separation techniques	Reverse Osmosis Water Purification	Lecture	Exams
5	2	Learn electrochemical separation methods	Electrodialysis in Water Purification	Lecture	Exams
6	2	Explore unconventional methods	Production of Magnetic Water	Lecture	Exams
7	2	Study water treatment for industrial purposes	Industrial Water Conditioning	Lecture	Exams
8	2	Learn basics of wastewater treatment	Sewage Water Treatment	Lecture	Exams

9	2	Identify sources and impacts of industrial wastewater	Industrial Wastewater	Lecture	Exams
10	2	Analyze water impurity types	Types of Impurities in Water	Lecture	Exams
11	2	Explore innovations in purification techniques	Modern Water Purification Methods	Lecture	Exams
12	2	Understand drinking water filtration process	Stages of Drinking Water Filtration	Lecture	Exams
13	2	Learn modern treatment technologies	Water Treatment Technologies	Lecture	In-person Exams
14	2	Address hardness-related problems	Water Hardness and Its Treatment	Lecture	In-person Exams
15	2	Apply advanced treatment techniques in practice	Practical Examples of Modern Water Treatment Techniques	Lecture	In-person Exams

8- Course Evaluation

1- Introduce students to the fundamental concepts of water treatment, including types of pollutants and treatment methods.

2- Enable students to analyze and evaluate water quality, identifying pollutants and health-related standards.

3- Train students in the design and implementation of various treatment processes, including physical, chemical, and biological methods.

4- Familiarize students with modern technologies used in water treatment, such as automated systems and continuous monitoring tools.

5- Enhance teamwork and communication skills through hands-on projects and technical report writing.

9- Learning and Teaching Resources

Required textbooks (curricular books, if any)	Iraqi Specifications Authority, 1974, First Edition – Dar Al-Hurriya Printing Press, Baghdad *Water and Wastewater Treatment* – Dr. Abdul Razzaq Al-Attiyah

Main references (sources)	Official standards and guidelines issued by governmental and industrial bodies. Educational programs and online resources covering water treatment topics. Technical reports and case studies in the field of water treatment. Scientific articles and research papers on water treatment. *Water Treatment and Environmental Pollution* – Dr. Abdul Hussein Abdul Reda *Water and Environmental Treatment* – Dr. Ali Abdul Hussein
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description: Chemical Industries (The second Academic level)

1. Course Name:
Chemical Industries
2. Course Code:
ICT 219
3. Semester / Year:
Second Semester / Academic Year 2024–2025
4. Description Preparation Date:
10/2/2025
5. Available Attendance Forms:
In-person (classroom-based instruction at the department)
6. Number of Credit Hours (Total) / Number of Units (Total)
(30 hours) / (2 units)
7. Course administrator's name (mention all, if more than one name)
Name: Mustafa Jabbar Abdulkarim Email: mustafa.abdk639@ntu.edu.iq
8. Course Objectives
Course Objectives 1- Introduce students to the basic concepts of chemical industries, including chemical reactions and industrial processes. 2- Enable students to analyze chemical industrial processes, including their design and implementation. 3- Apply chemical principles in various industries such as petrochemicals and pharmaceuticals. 4- Teach students to assess the environmental and public health impacts of chemical industries. 5- Enhance teamwork and effective communication through hands-on projects and technical reporting.

6- Train students to apply safety and environmental standards in chemical industries..

7- Teaching and Learning Strategies

Strategy

1- Encourage active participation through practical exercises, experiments, and projects.
2- Apply chemical industry concepts via real-world simulations and project-based learning.
3- Use modern technologies such as computer software and simulations to enhance understanding.
4- Promote collaborative work in teams to achieve learning goals.
5- Provide immediate feedback on students' progress and performance.
6- Focus on developing practical skills such as the design and execution of chemical industrial processes.
7- Connect theoretical concepts to practical industrial applications.
8- Use real-life examples and industry-based projects to apply theory in practice.

8- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand chemical industrial processes and catalysts	Chemical Process Techniques and Catalysts	Lecture	Exams
2	2	Understand batch and continuous processing	Batch vs. Continuous Processes	Lecture	Exams
3	2	Understand industrial quality standards	Iraqi Standards and Quality Control	Lecture	Exams
4	2	Understand gas production and treatment	Coal Gas, Water Gas, Producer Gas	Lecture	Exams
5	2	Learn about key industrial gases	Natural Gas, Hydrogen, Oxygen	Lecture	Exams
6	2	Understand more industrial gases	Nitrogen, Carbon Dioxide	Lecture	Exams
7	2	Study non-metallic materials industry	Ceramic and Porcelain Manufacturing	Lecture	Exams
8	2	Study refractory materials	Fireclay and Heat-Resistant Bricks	Lecture	Exams

9	2	Understand glass production	Glass Industry: Raw Materials and Manufacturing	Lecture	Exams
10	2	Understand cement production	Cement Manufacturing	Lecture	Exams
11	2	Learn about cement types and properties	Types and Specifications of Cement	Lecture	Exams
12	2	Study raw materials for cement	Raw Materials in Cement Production	Lecture	Exams
13	2	Study sodium compounds	Salt Production and Sodium Compounds	Lecture	In-person Exams
14	2	Study salt refining	Table Salt Refining and Uses	Lecture	In-person Exams
15	2	Study soda products	Sodium Carbonate and Caustic Soda Production	Lecture	In-person Exams

9- Course Evaluation

9. Introduce students to the fundamental concepts of water treatment, including types of pollutants and treatment methods.
10. Enable students to analyze and evaluate water quality, identifying pollutants and health-related standards.
11. Train students in the design and implementation of various treatment processes, including physical, chemical, and biological methods.
12. Familiarize students with modern technologies used in water treatment, such as automated systems and continuous monitoring tools.
13. Enhance teamwork and communication skills through hands-on projects and technical report writing.

10- Learning and Teaching Resources

Required textbooks (curricular books, if any)	Iraqi Specifications Authority, 1974, First Edition – Dar Al-Hurriya Printing Press, Baghdad *Water and Wastewater Treatment* – Dr. Abdul Razzaq Al-Attiyah

Main references (sources)	Official standards and guidelines issued by governmental and industrial bodies. Educational programs and online resources covering water treatment topics. Technical reports and case studies in the field of water treatment. Scientific articles and research papers on water treatment. *Water Treatment and Environmental Pollution* – Dr. Abdul Hussein Abdul Reda *Water and Environmental Treatment* – Dr. Ali Abdul Hussein
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	