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

2025

Ministry of Higher Education and Scientific Research

Scientific supervision and evaluation device

Department of Quality Assurance and Academic Accreditation

Academic program description form for institutes and colleges

University name: Northern Technical University

Name of the college or institute: Technical Institute / Mosul

Department Name: Chemical and Petroleum Industries Technologies

Date of submitting the file:

the signature :
Scientific Assistant:. Dr. Ahmed Jadaan Ali
the date: 12/2/2025

the signature:
Department Head: Dr. Sama a Adnan Raouf
Date 12/2025

The file was reviewed by the Quality Assurance and University Performance Division

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

Muhammad Khaled Youssef

The Date:

the signatur:

the signature :
Dean: Prof. Abdul Nasser Abdul Razzaq Kashmoula
the date 12 / 2 / 2025

1−Program vision:
The department aims to be a leading provider of education and training in chemical and petroleum technologies, fostering innovation and research, and contributing to the advancement of local and diverse industries.

2-Program message:
The Chemical and Petroleum Industries Techniques Department aims to deliver an exceptional educational experience, blending theory and hands-on practice, to produce skilled graduates who can meet market demands while embracing sustainability and innovation..

3- Program objectives
1- Train skilled technicians specializing in the chemical and petroleum industries. **2- Modernize curricula to reflect cutting-edge science and technology.** **3- Advance research and practical application through industry collaborations and projects.** **4- Prepare students with the technical and practical skills needed to succeed in their chosen fields.** **5- Promote awareness of sustainable environmental practices and industrial safety.** **6- Build partnerships with industry and academia to create student training and career opportunities.** .

4-Program accreditation:
Nothing

5-Other external influences:
Nothing

6.1–Program structure for first level:				
Program Structure	Number of Courses	Study Unit	Percentage	Notes *
University requirements	4	8	%13.1	8وحدةاجباري+4 اختياري
Institute requirements	4	10	%16.4	10اجباري
Department requirements	8	43	%70.5	43اجباري
summer training	مستوفي		–––––––	
Other	16+2اختياري	61		61مطالب بها

6.2–Program structure for second level For a branch operating industrial units				
Program Structure	Number of Courses	Study Unit	Percentage	Notes *
University requirements	5	10	15.4	8اجباري
Institute requirements	1	2	3.1	2وحدة اختياري
Department requirements	12	53	81.5	50وحدة اجباري +3وحدة اختياري
	17	65	100	مطالب بها الطالب

6.3–Program structure: For an oil refining branch				
Program Structure	Number of Courses	Study Unit	Percentage	Notes *
University requirements	5	10	14.7	8اجباري
Institute requirements	1	2	2.9	2وحدة اختياري
Department requirements	13	56	82.4	53وحدة اجباري +3وحدة اختياري
	18	68	100	مطالب بها الطالب

7- Program description				
Year/level	Course or course code	Name of the course or course	Hours	Note
2024-2025 first	NTU101	English Language	2	
	NTU102	Computer science	2	
	NTU103	Arabic Language	2	
	NTU100	Human Rights and Democracy	2	
	NTU104	Sport	2	
	NTU106	French Language	2	
	MTI100	Mathematics	2	
	MTI101	Mechanical Workshop	3	
	MTI102	Engineering Drawing	3	
	MTI103	Calculus	2	
	ICTI120	Fluid	6	
	ICTI121	Operation of Industrial Units	6	
	ICTI122	Physical Chemistry	6	
	ICTI123	Thermodynamics	6	
	ICTI124	Analytical and inorganic chemistry	6	
	ICTI129	Organic chemistry	5	
	ICTI225	Industrial devices and equipment	4	
	ICTI130	Power Sources	4	
2024-2025 / 2ed	2	English Language2		
	2	Professional Ethics		
	2	Crimes of the Baath system in Iraq		
	2			
	2	Arabic language		
	2	The computer		
	2	Principles of		

		occupational safety		
	5	Industrial management		
	5	Crude oil technology		
	5	Crude oil improvement techniques		
	5	Heat transfere		
	5	Mass transfere		
	4	Measurement techniques		
	4	Principles of control		
	4	Materials Properties		
	4	Building of devices		
	5	Chemical industries 1		
	5	Chemical industries 2		
	4	Project		
	3	Environmental pollution		
	3	Quality control		

8- Expected learning outcomes of the programme

Knowledge:

:The student will be able to

Understands the methods of operating and controlling various chemical industrial equipment -1 units and carrying out chemical and petroleum production work

Compares laboratory chemical and physical tests for raw materials and products produced in -2 .chemical and petroleum factories

Uses industrial drawings, maps and plans related to chemical laboratories -3

4- He carries out quality control work for the purpose of conforming the product according to Iraqi and international standards

Skills

. - Providing the student with communication and conversation skills such as English, .computers, presentation skills, and informing the student of his rights .And his duties

Providing the student with teamwork skills and encouraging policy discussions to enhance -2 scientific creativity

Providing the student with self-learning and self-reliance skills to link mathematical formulas -3 and scientific laws to chemistry

4- Training the student to use the Internet and modern scientific programs

Value

Dealing with chemical reactions and complex processes enhances your ability to analyze and .solve problems in scientific and systematic ways
Understanding safety standards in factories and protecting the environment from pollution -2 enhances a sense of social responsibility and sustainability
The work environment in these industries depends on integrated teams, so you will learn how -3 to collaborate effectively with your colleagues
4-Understanding how to optimize raw material and energy consumption helps increase efficiency and reduce waste

9-Teaching and learning strategies

Theoretical lecture, Power point, practical training in laboratories, seminars, seminars, scientific developments, summer training, educational video clips, scientific trips, scientific graduation research, methodological and external books, and websites on the Internet.

10-Evaluation methods

Pretests -
Daily tests -2
Homework assignments to solve independently -3
Practical tests -4
Oral tests during lectures -5
Competitive tests between groups of students for one section -6
Tests to encourage scientific competition between student groups and stages -7
Submitting reports in the field of specialization and then discussing the reports -8
9- Semester and final exams (practical + theoretical)

Academic rank		Specialization		preparation of the teaching staff	
		General	Specialized	lecturer	staff
Dr.sama adnan raoof	Ass.prof	Chemistry	Inorganic Chemistry	Staff	
Dr.Rana Sami Saeed	Ass.prof	Chemistry	Analytical chemistry	Staff	
Dr.Rawya zaglol saeed	Ass.prof	Chemistry	Physical chemistry	Staff	
Dr.Heba Meshal awad	Lecturer	chemistry	Industrial chemistry	Staff	
Dr.Qais Mohammed abduallhameed	Lecturer	chemistry	Industrial chemistry	Staff	
Dr.Reem talal nather	Lecturer	Chemistry	Analytical chemistry	Staff	

Saba saeed mohammed	Ass. Lecturer	Chemical engineering		Staff
Zena adrees amer	Lecturer	Civil Engineering	Environmental Engineering	Lecturer
Aws zahed younis	Ass. Lecturer	Chemistry	Physical chemistry	Lecturer
Abdul wahab fathi shareef	Ass. Lecturer	Computer science	verbal statements	Lecturer
Ahmad salim Abdulla	Ass. Lecturer	English translation	English translation	Lecturer
Zainab adel mare	Ass. Lecturer	Political science	political systems	Lecturer
Dr.SAFA abdul sattar younis	Lecturer			Lecturer
Dr.Sara maher	Lecturer			Lecturer

12-Professional development

Employing new teaching methods
Employing new and appropriate educational methods that serve the student's acquired - information that will help him in the areas of public and professional life
Flexibility of the curriculum to make it subject to change to keep pace with scientific progress - Employing the necessary skills for the educational process and the necessary techniques to - obtain information
- Role model through the personality of the teacher and the extent of his influence on the student

13-Acceptance criterion

- Central admission prepared by the Ministry according to the conditions it sets
Student average in the preparatory stage, scientific and vocational stream -2
3- The department's capacity

14- The most important sources of information about the program

Methodical scientific courses
(External scientific sources (books - archives - the Internet -2
Teaching staff -3
4- Practical laboratory and research skills

15-Program development plan
1- Adding information on all topics related to peroluem and industrial chemistry **2- Learn about recent scientific developments.** **3- Participation in international and local conferences.** **4- Participation in scientific workshops inside and outside Iraq.** **5-Hosting scientific** competencies in the field of specialization

first level modules / chemical and petroleum industries techniques Department

Code	UNIT	Hours		Course name		Requirement type
		P	TH	English Language	Arabic Language	
NTU101	2	0	2	English Language		University
NTU102	2	1	1	Computer science		
NTU103	2	0	2	Arabic Language		
NTU100	2	0	2	Human Rights and Democracy		
MTI100	2	0	2	الجامعية المطلوبة مجموع الوحدات		
MTI101	3	3	0	Mathematics		Institute
MTI102	3	3	0	Mechanical Workshop		
MTI103	2	0	2	Engineering Drawing		
MTI100	2	0	2	Calculus		
ICTI120	6	3	3	Fluid		Department
ICTI121	6	3	3	Operation of Industrial Units		
ICTI122	6	3	3	Physical Chemistry		
ICTI123	6	3	3	Thermodynamics		
ICTI124	6	3	3	Analytical and inorganic chemistry		
ICTI129	5	2	3	Organic chemistry		
ICTI225	4	2	2	Industrial devices and equipment		
ICTI130	4	2	2	Power Sources		
Summer training	ICTI223		استيفاء فقط	Summer training		

Second level modules / chemical and petroleum industries techniques Department
For a branch operating industrial units

Code	UNIT	Hours		Course name		Requirement type
		P	TH	English Language2	Arabic Language	
NTU200	2	-	2	English Language2		University
NTU204	2	-	2	Professional Ethics		
NTU203	2	-	2	Crimes of the Baath system in Iraq		
NTU202	2	1	1	The computer		
NTU201	2		2	Arabic language		
TIMO202	2	-	2	Principles of occupational safety		Institute
TIMO203	2	-	2	Industrial management		
ICTI210	5	3	2	Crude oil technology		
ICTI211	5	3	2	Crude oil improvement techniques		
ICTI212	5	3	2	Heat transfere		
ICTI213	5	3	2	Mass transfere		
ICTI214	4	2	2	Measurement techniques		
ICTI215	4	2	2	Principles of control		
ICTI216	4	2	2	Materials Properties		
ICTI217	4	2	2	Building of devices		
ICTI218	5	3	2	Chemical industries 1		
ICTI219	5	3	2	Chemical industries 2		
NTU400	4	4	-	Project		
ICTI221	3	2	1	Environmental pollution		
ICTI222	3	2	1	Quality control		
	65					

Second level modules / chemical and petroleum industries techniques Department

For a branch oil refining branch

Code	UNIT	Hours		Course name		Requirement type
		P	TH	English Language2	Arabic Language	
NTU200	2	-	2	English Language2		University
NTU204	2	-	2	Professional Ethics		
NTU203	2	-	2	Crimes of the Baath system in Iraq		
NTU202	2	1	1	The computer		
NTU201	2		2	Arabic language		
TIMO202	2	-	2	Principles of occupational safety		Institute
TIMO203	2	-	2	Industrial management		
ICTR260	3	2	1	Oil Industrial		
ICTR261	5	3	2	Heat transfer		
ICTR262	5	3	2	Mass transfer		
ICTR263	5	3	2	Manufacture of lubricating oils		
ICTR264	5	3	2	Asphalt and Candles		
ICTR265	3	2	1	Principles of industrial machinery		
ICTR266	4	2	2	Measuring technique		
ICTR267	4	2	2	Principles of control		
ICTR268	5	3	2	Thermodynamic		
ICTR269	5	3	2	Petrochemicals industries		
ICTR270	5	3	2	Industrial chemistry’s		
NTU400	4	4	-	Project		
ICTR272	3	2	1	Environmental pollution		
ICTR273	3	2	1	Oil geology		

Program skills chart															
Learning outcomes required from the program															
Values				Skills				Knowledge				Essential or optional	Course name	Course code	Year/level
C4	C3	C2	C1	B4	B3	B2	B1	A4	A3	A2	A 1				
												optiona	English Language	NTU101	2024-2025/
												optiona	Computer science	NTU102	
									/			optiona	Arabic Language	NTU103	
												optiona	Human Rights and Democracy	NTU100	
							/			/		optiona	Mathematics	MTI100	
												optiona	Mechanical Workshop	MTI101	
												Essential	Engineering Drawing	MTI102	
		/					/			/		Essential	Fluid	ICTI120	
		/					/	/			/	Essential	Operation of Industrial Units	ICTI121	
		/					/				/	Essential	Physical Chemistry	ICTI122	
		/					/				/	Essential	Thermodynamics	ICTI123	
												Essential	Analytical and inorganic chemistry	ICTI124	
			/				/				/	Essential	Organic chemistry	ICTI129	
			/				/				/	Essential	Industrial devices and equipment	ICTI225	
		/				/					/	optional	Power Sources	ICTI130	
			/				/				/	Optiona	English Language2	NTU200	
	/	/					/	/			/	optiona	Professional Ethics	NTU204	

/			/	/			/		/		/	optiona	Crimes of the Baath system in Iraq	NTU203	
/			/	/			/		/		/	optiona		NTU202	
/			/	/			/		/		/	optiona	Arabic language	NTU201	
/			/	/			/		/		/	optiona	Principles of occupational safety	TIMO202	
/			/	/			/		/		/	optiona	Industrial management	TIMO203	
/			/	/			/		/		/	Essential	Crude oil technology	ICTI210	
/			/	/			/		/		/	Essential	Crude oil improvement techniques	ICTI211	
			/				/				/	Essential	Heat transfere	ICTI212	
		/					/				/	Essential	Mass transfere	ICTI213	
		/					/				/	Essential	Measurement techniques	ICTI214	
		/					/				/	Essential	Principles of control	ICTI215	
		/					/				/	Essential	Materials Properties	ICTI216	
		/	/				/				/	Essential	Building of devices	ICTI217	
		/	/				/				/	Essential	Chemical industries 1	ICTI218	
		/	/				/				/	Optional	Chemical industries 2	ICTI219	
		/	/				/				/		Project	NTU400	
		/	/				/				/	optiona	Environmental pollution	ICTI221	
		/	/				/				/	optiona	Quality control	ICTI222	
		/	/				/				/	Essential	Oil Industrial	ICTR260	

		/	/				/				/	Essential	Heat transfer	ICTR261	
		/	/				/				/	Essential	Mass transfer	ICTR262	
		/	/				/				/	Essential	Manufacture of lubricating oils	ICTR263	
		/	/				/				/	Essential	Asphalt and Candles	ICTR264	
		/	/				/				/	Essential	Principles of industrial machinery	ICTR265	
		/	/				/				/	Essential	Measuring technique	ICTR266	
/			/	/			/		/		/	Essential	Principles of control	ICTR267	
/			/	/			/		/		/	Essential	Thermodynamic	ICTR268	
/			/	/			/		/		/	Essential	Petrochemicals industries	ICTR269	
/			/	/			/		/		/	Essential	Industrial chemistry’s	ICTR270	
/			/	/			/		/		/		Project	NTU400	
/			/	/			/		/		/	optiona	Environmental pollution	ICTR272	
/			/	/			/		/		/	optiona	Oil geology	ICTR273	

Course description

The first level

Northern Technical University/Administrative Technical Colleg	1. Educational institution .1
Chemical industrie	1. Scientific department/center .2
Arabi	1. Course name/code .3
First stage/first course student	1. coursename/code .4
First semester/2024-2025 A	1. Semester/year .5
2 hours per week for 15 weeks (semester)	Total number of hours .6
2025 /1/27	1. The date this description was prepare .7
	1. Course objectives .8
• Enable the student to read correctly. • Enable the student to write correctly and use punctuation marks well. • That the student acquires the ability to use the Arabic language correctly. • Introducing the student to the correct Arabic language words, their correct structures and methods in an interesting way. • Accustoming the student to sound, clear expressions of his ideas. • Help the student understand complex structures and ambiguous methods.	

10. Course outcomes and teaching, learning and evaluation methods Learning and teaching method: discussion method, lecture method Evaluation method: daily exams, semester exams and final exam
A- Cognitive objectives • The student should recognize the common mistakes in writing the Arabic language in order to avoid them • The student should recognize punctuation marks and use them correctly • The student should distinguish between the solar lam and the lunar lam, which helps in pronouncing them correctly. • The student should differentiate between the ḍād and the ḍā', and this helps him avoid making spelling mistakes • To distinguish between a verb, a noun, and a letter. This is what his Arabic speech is based on.

B - The skills objectives of the course. B1 - Providing the student with a linguistic wealth that makes him more able to correctly express what he wants. B2- Correcting the student's tongue and protecting him from mistakes
C- Emotional and value goals C1- Developing, activating and organizing thinking C2- Working to make the student's imagination fertile by highlighting the beauty of the language and thus enabling him to express the inner beings of the soul in a sound way.
D - Transferable general and qualifying skills (other skills related to employability and personal development). D1- The ability to develop and improve his expressive skills, such as poetry and stories. D2- The ability to communicate with the outside world correctly.

10. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes Name of the unit/or subject Teaching method Evaluation method	Watches	Week
Daily oral test	Discussion method, lecture method	Introduction to linguistic errors - the marfutah ta' and the fatha ta'	1. Identify the types of linguistic errors. 2. Differentiating between the open ta' and the marbuta ta'	Two hours	1
Daily oral test	Discussion method, lecture method	Rules for writing extended and short alifs - solar and lunar letters	1. Differentiating between writing the extended alif and the shortened alif and the positions of writing the alif 2. Differentiating between the solar letters and the lunar letters	Two hours	2
Daily oral test	Discussion method, lecture method	Dhaad and Dhaa	Differentiating between ḍād and dha	Two hours	3
Daily oral test	Discussion method, lecture method	Writing the hamza	Enable the student to write the hamza correctly	Two hours	4
Daily oral test	Discussion method, lecture method	punctuation marks	Identify punctuation marks and write them in their correct location	Two hours	5
Daily oral test	Discussion method, lecture method	The noun, the verb, and the difference between them	1. Identify the noun and verb and explain the sign of each 2. Differentiate between a noun and a verb 3. Explaining the types of action 4. Differentiating between types of verbs	Two hours	6
Daily oral test	Discussion method, lecture method	Th nun, th frp, at th difference bellies then	Identify the types of effects and differentiate between them	Two hours	7

Daily oral test	Discussion method, lecture method	Th nun, th frp, at th difference bellies then	Enable the student to write numbers correctly	Two hours	8
Daily oral test	Discussion method, lecture method	Applications of common linguistic errors	Identify and avoid common linguistic errors	Two hours	9
Daily oral test	Discussion method, lecture method	Applications of common linguistic errors	Identify and avoid common linguistic errors	Two hours	10
Daily oral test	Discussion method, lecture method	Noun and Tanween - meanings of prepositions	1. Differentiating between nun and tanween 2. Identify the meanings of prepositions	Two hours	11
Daily oral test	Discussion method, lecture method	aspects of administrative discourse	Identify the formal aspects of administrative discourse	Two hours	12
Daily oral test	Discussion method, lecture method	The language of administrative discourse	Recognizing the language of administrative discourse	Two hours	13
Daily oral test	Discussion method, lecture method	The language of administrative discourse	Recognizing the language of administrative discourse	Two hours	14
Daily oral test	Identify examples of administrative correspondence	Examples of administrative correspondence Discussion method, lecture method Daily oral test	Identify examples of administrative correspondence	Two hours	15

10. البنية التحتية

1- Required prescribed book	• Prescribed books: Mandatory General Arabic Language for Technical Universities by Dr. Safaa Kazem Makki and Dr. Lama Muhammad Youni
Main references (sources -2	2- Main references (sources) • Clear dictation: Abdul Majeed Al-Naimi, Dahham Al-Kayyal, Dar Al-Mutanabbi Library, Baghdad, 6th edition, • 1987 AD. • Lessons in language, grammar, and dictation for state employees: Ismail Hamoud Atwan and others, Ministry of Education Press No. (3), Baghdad, 2nd edition, 1984 AD. • Arabic language for the third intermediate grade: Fatima Nazim

Al-Attabi, and others, 1st edition, 2018 AD. • General Arabic for non-specialization departments: Abdul Qadir Hassan Amin and others, Ministry of Higher Education and Scientific Research, 2nd edition, 2000 AD	
	Recommended books and references (scientific journals, reports,...
The World Wide We	B - Electronic references, Internet sites..

Course development plan .11
Correcting the linguistic errors that occurred in the fascicle to be taught and trying to add a definition to some of the terms contained in the fascicle, especially since the Arabic language fascicle was prepared for non-specialists in the Arabic language, and this leads to making the prescribed vocabulary more accurate and clear.

Ministry of Higher Education and Scientific Research	Educational institution
Mosul Technical Medical Institute / Department of Chemical and Oil Industries Technologies	University/Scientific Department
NTU101 English language	Course Name/Code
Technical Diploma	The program(s) you are entering into.
Weekly lesson schedule (theoretical) Discussions, scientific seminars and other extracurricular activities	Forms of attendance
	Semester/Year
30	Number of study hours (total)
1/9/2024	Date
.1Course objectives	
Introducing the student to the basics of the English language with regard to developing the four language skills (speaking, listening, reading and writing).	
1- To introduce the student to the vocabulary of communication and academic writing in the English language.	
Develop students' skills to use and practice communication in English.	
Course details teaching, learning and assessment methods	
Cognitive objectives: Introducing the student to the basics of the English language with regard to developing the four language skills (speaking, listening, reading and writing).	
Course specific skill objectives: To familiarize the student with the vocabulary of communication and academic writing in English.	
Teaching and learning methods	
(Theoretical lectures / conversation lectures / interactive lectures)	
Evaluation methods	
(conversation exams / written exams / weekly reports / daily attendance /) participation and interaction in lectures / semester and final exams))	
Affective and value-based objectives: Developing students' skills to use and practice communication in the English language.	
Teaching and learning methods	
(Theoretical lectures / discussion groups / debates between students)))	
Evaluation methods	

(conversation tests / written tests / observation / student's cumulative record)))
• General and transferable skills (other skills related to employability and personal development). • Improving students' discussion skills in English • Raising students' research awareness in writing reports, research and university theses using English

Course structure					
Evaluation method	Teaching method	Unit name/topic	Required learning	Hours	Week
Test and discussion	Theoretical	Unit 1 / Hello/ Part of speech	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	1
Test and discussion	Theoretical	Unit 2 / Your world/ Auxiliary verbs	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	2
Test and discussion	Theoretical	Unit 3 / All about you/ Modal verbs	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	3
Tests and reports	Theoretical	Unit 4 / Family and Friends Compound words	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	4
Test and discussion	Theoretical	Unit 5 / The way I live Passive voice	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	5
Tests and reports	Theoretical	Unit 6 / Every day	Grammar/ Vocabulary/ Skills Work/ Everyday	2	6

		Future tense	English		
Test and discussion	Theoretical	Unit 7 / My favorite Present simple+ past simple	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	7
Test and discussion	Theoretical	Unit 8 / Where I live present continuous+ past continuous	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	8
Test and discussion	Theoretical	Unit 9 / Times past	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	9
Test and discussion	Theoretical	Unit 10 / We had a great time!	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	10
Test and discussion	Theoretical	Unit 11 / I can do that	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	11
Test and discussion	Theoretical	Unit 12 / Please and Thank you	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	12
Test and discussion	Theoretical	Unit 13 / Here and now	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	13
Test and discussion	Theoretical	Unit 14 / It's time to go	Grammar/ Vocabulary/ Skills Work/ Everyday English	2	14
Discussion	Theoretical	Review	Review	2	15

Structure	
New Headway Plus / Beginner/ John and Liz	Required Textbooks

/ Oxford University Press / 2014 Soars	
1. An A-Z of English Grammar & Usage / Geoffrey Leech / Longman / 1990 2. Common Mistakes in English / T.J. Fitikides / Longman 2002 3. English Grammar in Use / Raymond Murphy / Cambridge University Press 2004	References
1. Express English / Omer Al- Hourani / Jordan	Website references

Curriculum Development Plan
1. Developing appropriate curricula for university graduates 2- Holding seminars and conferences aimed at updating curricula -1

1- **Educational Institution:** Northern Technical University	• **Educational Institution:** Northern Technical University
2- **College/Institute:** Technical Institute / Mosul	• **College/Institute:** Technical Institute / Mosul
3- **Scientific Department / Center:** Chemical and Petroleum Industries Technologies	• **Scientific Department / Center:** Chemical and Petroleum Industries Technologies
4- **Course Name / Code:** Mathematics / MTI100	• **Course Name / Code:** Mathematics / MTI100
5- **Available Attendance Modes:** Mandatory	• **Available Attendance Modes:** Mandatory
6- **Semester / Academic Year:** 2024-2025	• **Semester / Academic Year:** 2024-2025
7- **Total Credit Hours:** 2	• **Total Credit Hours:** 2

8- **Date of Description Preparation:**	

9- Course Objectives:
Graduating qualified technical personnel capable of:
1. Understanding the relationships between different variables and connecting them to their specialization.
2. Conducting mathematical analyses in the laboratory, verifying their accuracy, and relating them mathematically to practical applications.
3. Understanding the scientific material (Mathematics) and Algebraic Engineering.

10- Course Learning Outcomes, Teaching and Learning Methods, and Assessment Methods:**

A- Cognitive Objectives:
The student should be knowledgeable about matrices and their related topics, as well as derivatives and integrals, and be able to relate them to real-world application

B- Course-Specific Skills Objectives
The student should graduate with the ability to perform algebraic analyses on systems of linear equations and solve them using matrices. Additionally, the student should have a solid understanding of how to perform differentiation and mathematical integration .

Teaching and Learning Methods
Utilizing theoretical and online lecture systems (Google Meet), using YouTube lectures, and engaging students in practical problem-solving .

Assessment Methods:
Evaluating students to assess their engagement with the lecture through weekly, midterm, and final exams.

C- Affective and Value-Based Objectives:

1. The student recognizes matrices, determinants, derivatives, and integrals and relates these topics to practical applications.
2. Encouraging the student to acquire analytical mathematical skills and connect them to theoretical principles.
3. Learning precision and discipline in acquiring knowledge and sciences.
4. Developing communication and interaction skills during lectures.

D- Teaching and Learning Methods:

Practical and theoretical lectures, listening to scientific principles in the course from professors, and utilizing the internet

E- Assessment Methods:

Oral exams, periodic daily tests, and scientific discussions.

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

1. Focusing on those who possess strong mental capabilities and a high level of comprehension.
2. Encouraging a discussion-based policy to enhance students' creative and scientific abilities.
3. Developing students' intellectual and scientific capabilities.
4. Improving students' performance and monitoring weaker students.

11-Course Structure:

Assessment Method	learning method	Unit Name / Topic:	Required Learning Outcomes:	hours	week
First Stage					
Test	Lecture, Discussion, Video Presentations	Mathematics / Matrices	Identifying Types of Matrices and Performing Arithmetic Operations	2	1st
Test	Lecture, Discussion, Video Presentations	Finding the Capacity and Rank of Matrices	Finding the Capacity and Rank of Matrices	2	2nd
Test	Lecture, Discussion, Video Presentations	Arithmetic Operations	Performing Matrix Multiplication and Conditions for Matrix Multiplication	2	3rd
Test	Lecture, Discussion, Video Presentations	Arithmetic Operations	examples	2	4th
Test	Lecture, Discussion, Video	rank of Matrices	Finding the Trace and Rank of Matrices	2	5th

	Presentations				
Test	Lecture, Discussion, Video Presentations	Inverse of Matrices	Inverse of Matrices	2	6th
Test	Lecture, Discussion, Video Presentations	Matrices	System of Linear Equations		7th
Test	Lecture, Discussion, Video Presentations	System of Linear Equations	Homogeneous and Non-Homogeneous Linear Equations	2	8th
Test	Lecture, Discussion, Video Presentations	Determinants	Determinant of a Matrix	2	9th
Test	Lecture, Discussion, Video Presentations	Determinants	Methods for Finding the Determinant	2	10th
Test	Lecture, Discussion, Video Presentations	Determinants	Cramer's Rule for Finding Variable Values	2	11th
Test	Lecture, Discussion, Video Presentations	Determinants	Properties of Determinants	2	12th
Test	Lecture, Discussion, Video Presentations	Determinants	Examples	2	13th
Test	Lecture, Discussion, Video	Directional Values	Vectors	2	14th

	Presentations				
Test	Lecture, Discussion, Video Presentations	Vectors	Examples	2	15th
Test	Lecture, Discussion, Video Presentations	Derivatives	Differentiation	2	16th
Test	Lecture, Discussion, Video Presentations	**Derivatives**	Derivative of Algebraic Functions	2	17th
Test	Lecture, Discussion, Video Presentations	**Derivatives**	Chain Rule	2	18th
Test	Lecture, Discussion, Video Presentations	**Derivatives**	Applications of Derivatives	2	19th
Test	Lecture, Discussion, Video Presentations	Limits	Definition of Limit	2	20th
Test	Lecture, Discussion, Video Presentations	Limits	Types of Limits	2	21th
Test	Lecture, Discussion, Video Presentations	Integration	Integration	2	22th
Test	Lecture, Discussion, Video	Integration	Types of Integrals	2	23th

	Presentations				
Test	Lecture, Discussion, Video Presentations	Integration	Applications of Integration	2	24th
Test	Lecture, Discussion, Video Presentations	Integration	Examples	2	25th
Test	Lecture, Discussion, Video Presentations	**Derivatives**	**Derivative of Trigonometric Functions**	2	26th
Test	Lecture, Discussion, Video Presentations	Integration	**Integration of Trigonometric Functions**	2	27th
Test	Lecture, Discussion, Video Presentations	**Derivatives**	Chain Rule	2	28th
Test	Lecture, Discussion, Video Presentations	Integration	**Integration of Trigonometric Functions**	2	29th
Test	Lecture, Discussion, Video Presentations	**Derivatives**	Chain Rule	2	30th

12- Infrastructure:	
2. Required Textbooks	1. Required Textbooks
3. Online Lectures from the Internet: *Mathematics Scale* by Muhammad Al-Hadi Smaqji	1- Online Lectures from the Internet: *Mathematics Scale* by Muhammad Al-Hadi

	Smaqji

13- Course Development Plan:
1-Reviewing the latest scientific literature. 2- Participating in relevant scientific conferences. 3- Allocating teaching and training staff time for practical application and work in operational and industrial institutions. 4- Inviting specialized professors. 5-Promoting scientific collaboration with other universities and related colleges.

Course Description Form

Course Description:

The course description provides a brief summary of the main characteristics of the course and the learning objectives expected of the student, proving whether he or she has taken full advantage of the available educational opportunities.

1-Educational Institution	Northern Technical University
2- College/Institute	Technical Institute/Mosul
3- Scientific Department / Center	Chemical and Petroleum Industries Techniques
4. Course Name/Code	Power Sources / ICTI130
5. Available Attendance Forms	Mandatory
6. Semester/Year	1st semester / 2024-2025
7. (Number of study hours (total	60

8. Date of preparation of this description	9/ 2/ 2025

9. Course Objectives

1. Provide the student with basic knowledge about the different types of energy sources, whether conventional or renewable, and understand the importance of each source in various industries, especially in the chemical and oil sectors.
2. Enable the student to analyze the advantages and disadvantages of each energy source in terms of economic and environmental effectiveness.
3. Enhance the student's ability to apply energy concepts in solving problems related to energy efficiency and innovation in sustainable energy technologies.

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

A- Cognitive objectives

1. Introduce students to the various types of renewable and non-renewable energy sources and understand the basic physical and chemical processes associated with energy production.
2. Learn about energy conversion techniques from different sources.
3. Study the environmental and economic impacts of the use of various energy sources.

B - Skill objectives of the course.

1. Ability to evaluate different energy sources in terms of efficiency and environmental feasibility.
2. Develop research and analysis skills in sustainable energy topics

Teaching and learning methods.

Use of theoretical and practical lecture system, laboratory and electronic presentation (data show projector)

Evaluation methods

Oral tests / written tests / report work / daily attendance / participation and interaction in lectures / semester and final exams.

C. Emotional and value goals

1. Raise awareness among students about the urgent need to use renewable energy sources to preserve the environment for future generations.
2. Instilling the concept of responsibility among students in dealing with energy and environmental challenges, and their role in making sustainable energy decisions at the individual and community levels.

3. Motivate students to think creatively and develop innovative energy solutions that contribute to improving the efficiency of natural resource use.
D. Teaching and learning methods Theoretical lectures / practical lectures / seminars
E. Evaluation methods Oral tests / written tests / report work / daily attendance / participation and interaction in lectures / semester and final exams.
General and qualifying skills transferred (other skills related to employability and personal development). 1- Ability to effectively research and analyze information related to energy sources. 2. Enhancethe ability to collaborate with others on group projects to discuss and develop sustainable energy solutions.

11. Course Structure

Chapter One

Theoretical hours	Topic Name	Required Learning Outcomes	Method of education
2	Introduction to Energy Sources	Recognize the different forms of energy Distinguishing the types of potential and kinetic energy	Lecture Presentation, Explanation, Q&A, Discussion

2	Non-renewable energy sources	-Identify non- renewable energy sources of both types (fossil fuel and nuclear fuel)	Lecture Presentation, Explanation, Q&A, Discussion
2	Fossil fuels	- Types (coal, crude oil, natural gas) - Understand its advantages and disadvantages	Lecture Presentation, Explanation, Q&A, Discussion
2	Crude Oil	- Understand crude oil formation theories - Understanding the petroleum system and its main parts	Lecture Presentation, Explanation, Q&A, Discussion
2	Chemical composition of crude oil	- Understand the compounds involved in the composition of crude oil and know their varieties and proportions and the consequent formation of heavy and light oil	Lecture Presentation, Explanation, Q&A, Discussion

Chapter Two			
Topic Name	**Required Learning Outcomes**	**Method of education**	**Evaluation methods**
First exam		Lecture Presentation, Explanation, Q&A, Discussion	Exam
Crude Oil Extraction Mechanisms	- Identify primary, secondary and improved crude oil recovery mechanisms - Understand how each of the primary mechanisms works, and know the percentage of its efficiency and ability to extract crude oil	Lecture Presentation, Explanation, Q&A, Discussion	Exam
enewable Energy	- Knowledge of the types of renewable energies -Identify the motives for searching for renewable energy sources - Understand their advantages and disadvantages	Lecture Presentation, Explanation, Q&A, Discussion	Exam

Solar Energy	- Understand the mechanism of the emergence of solar energy and identify the solar radiation types - Understand the effect of the tilt of the Earth's axis on the amount of solar radiation	Lecture Presentation, Explanation, Q&A, Discussion	Exam
Solar Cell	- Understand the installation of the solar cell - Understand how the solar cell works	Lecture Presentation, Explanation, Q&A, Discussion	Exam

Chapter Three			
Topic Name	**Required Learning Outcomes**	**Method of education**	**Evaluation methods**
Second exam		Lecture Presentation, Explanation, Q&A, Discussion	Exam
Wind Energy	- Identify the basic components of a wind turbine - Understand the functions of each part of the wind turbine and the mechanism of generating electricity from it	Lecture Presentation, Explanation, Q&A, Discussion	Exam
Biomass Energy	- Types of biomasses - Biomass energy uses	Lecture Presentation, Explanation, Q&A, Discussion	Exam
Production of biogas and biofuels	- Understand the mechanism of methane gas production from anaerobic digestion - Understand the steps of producing ethanol from agricultural crops	Lecture Presentation, Explanation, Q&A, Discussion	Exam
Review		Lecture Presentation, Explanation, Q&A, Discussion	Exam

12. Course Infrastructure

Required textbooks	
Main references (sources)	• Renewable Energy: Resources and .(2023) Technology.(n.p.): Dr. Yousry Moustapha. • Fundamental of petroleum.
Books and references recommended by scientific journals, reports ,....)	
Electronic references, websites	:Related suggested links https://youtu.be/cwtycCW9kOI?si=3HCKQ_dGrQn8ZgsU https://youtu.be/mGTbwFcLiTQ?si=Zmj5_AARiN3wb0va https://youtu.be/FseVfgvQpPk?si=Obomhm5P7oT6m5iS https://youtu.be/YvuN0RLw7TI?si=A2iwWZne_ZzNeNfc

13. Course Development Plan

- Organizing field visits to industrial facilities for energy sources (such as solar power plants) to enrich students with practical experiences.
- Being updated to the recent scientific research in this field.
- Scientific twinning with the corresponding departments in other universities.

Course Description Form

: Description

A brief summary of the main characteristics of the Course description provides course and the learning outcomes expected of the student, demonstrating .learning opportunities whether he has made the most of the available

University Technical Northern	Educational institution -1
Technical Institute/Mosul	College/Institute -2
And oil technologies Chemical industry	Scientific Department / Center -3
NTU102- The Computer	Course name/code -4
mandatory	Available forms of attendance -5
2025-202 4	Semester / Year -6
hours per week 4	Number of study hours (total) -7
	Date of preparation of this description -8

Course objectives -9

out Graduating qualified technical personnel to carry

2- and oil Operation, maintenance and control work on the operating devices of chemical .in chemical factories, especially oil factories industrial units

3- Conducting laboratory tests on raw and finished materials and ensuring compliance with Linking theoretical information to practice tions andstandard specifica

Informing the student about the technologies used
Understanding and using scientific materials
Familiarity with industrial drawings and maps

methods Course outcomes, teaching, learning and evaluation -10

Cognitive objectives -A

1. **Understanding the Basics**: Enable students to understand the basic concepts of computers, such ashardware andsoftware.
2. **Software Usage**: Teach students how to use basic software such as word processing, spreadsheets, and presentation programs.
3. **Developing technical skills**: Enhancing students' skills in programming, application development, and database management.
4. **Information Analysis**: eveloping data analysis skills and using information analysis D tools.
5. **Problem Solving**: Enhance the ability to think critically and solve problems using computer technologies.
6. **Communication and Collaboration**: Using technology to enhance communication and collaboration skills online.
7. **Digital Security Awareness**: Enhancing students' understanding of online security concepts and protecting personal information.

These objectives help students prepare to interact effectively with technology in their daily and professional lives.

. The course's skill objectives -B

1. **Software Use**: Develop skills to use various computer programs efficiently, such as word processing and spreadsheets.
2. **Programming**: Developing the ability to write codes and understand basic programming languages.
3. **Problem Solving**: analyze technical problems Enhance critical thinking skills and.
4. **File Management**: Learn how to organize, store, and retrieve information effectively.
5. **Digital Communication**: Gain skills in using online communication tools, such as email and meeting platforms.
6. **Online Collaboration**: Use collaborative work tools and collaborate on projects.
7. **Digital Security**: Develop skills to protect personal information and understand the basics of cybersecurity.

These skills help students interact effectively with technology and apply it in various fields.

Teaching and learning methods

Using the theoretical and practical lecture system, electronic calculator and electronic display)DATASHOW .learn the basics of chemical engineering and chemistry to (

Evaluation methods

Testing students to determine their level of interaction with the lecture and conducting weekly, .semester and annual tests

based goals-Emotional and value -C

learns about the work of industrial and practical operating units and their role in The student -1 .building the country

.Encouraging the student to gain practical experience and link it to theoretical principles -2 .and knowledge Learn accuracy and discipline in receiving sciences -3 .Learn to communicate and interact during the lecture -4
-D Teaching and learning methods
Practical and theoretical lectures, visual observations, listening to scientific rules in the courses .from professors and the Internet
Evaluation methods -D
.Oral tests, daily tests on a regular basis and scientific discussions
.(General and transferable skills (other skills related to employability and personal development - .comprehension Focus on those who have a high mental capacity and -1 .Encouraging discussion policy so that the student has scientific creativity -2 .Developing students' mental and scientific abilities -3 .Raising the level of students and following up on weak students -4

Course structure -11

Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
stage first					
Test	Lecture, discussion, presentation of explanatory posters , presentation of videos and films	Computer	Introduction to Computer: Hardware and software concepts and components; Concept of computing. Data and information: ICT input applications: Linking and output devices and peripherals to the central .processing unit	2	the first
Test	Lecture, discussion, presentation of explanatory posters , presentation of videos and films	Computer	Computer Components: Computer Parts. Hardware Output Parts, Input and Units, Memory Types, Basic CPU Components, Computer Ports, Personal Computer, Personal Computer (Features and (Types	2	the second
Test	Lecture, discussion, presentation of explanatory posters , presentation of videos and	Computer	System Introduction Graphical User Interface: Operating System; Basics of Common Operating Systems; User Interface, Using Mouse Techniques: Using Common Icons, Status Bar, Using Menu	2	the third

	films		and Menu Selection, Concept of Folders and Directories, Opening and ng Different Closi Windows; Creating .Shortcuts		
Test	Lecture, discussion, n presentatio of explanatory posters , presentation of videos and films	Computer	Word Processing: Word Processing Basics: Opening and Closing Documents: Creating and Manipulating Text: Formatting Text; Table Manipulation; Spell Checking, Language Setting and Synonyms; Printing aWord Document .	2	Fourth
Test	Lecture, discussion, presentation of explanatory posters , presentation of videos and films	Computer	Spreadsheet: Spreadsheet basics; working with cells, formulas and functions, editing a spreadsheet, .printing a spreadsheet	2	Fifth
Test	Lecture, discussion, presentation of explanatory posters , presentation of videos and films	Computer	Drecentoti Presentation Software : Create presentations. Prepare and present slides: Slide show. Take printouts of .presentations/printouts	2	Sixth
Test	ture, Lec discussion, presentation of explanatory posters , presentation of videos and films	Computer	Introduction to the Internet and Web Browsers: Computer Networks, Local and Wide Area Networks, Internet Concept and Applications, Internet Connection, World Wide Web, Search Engines in Web Browsers, Understanding URL: :Domain NameIP Address	2	Seventh
Test	Lecture, discussion, presentation of explanatory posters , presentation	Computer	Communications and Email: Email Basics Get an email account: Send and receive email; Access emails sent using email: Collaborate on .documents	2	The eighth

	of videos and films				
Test	Lecture, discussion, presentation of explanatory posters , presentation of videos and films	Computer	**Computer Troubleshooting: Identify and solve common problems that computer users encounter with hardware and software. Basic troubleshooting techniques and tools to diagnose and solve .problems**	2	Ninth

Infrastructure -12

raham brown, david watson. "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020) Alall Evans, Numan ivianin , niwy Ani Patty, "Technology in Action Complete" 16th Edition (2020). Ahmed Banara . "Introduction to Artificial Intelligence (AI)". Ist Edition (2024). ban Researcher. "Computer Basics" 2016Urban to Ur Dr. Adel Abdel Nour: Introduction to the World of Artificial Intelligence "2005	Required textbooks -1 (Main references (sources -2 Recommended books and -A references (scientific journals, reports, (.etc ...websites ,Electronic references -B

Curriculum development plan -13

Review of modern scientific literature
Participation in relevant scientific conferences
.Freeing the teaching and training staff to apply and work in operational and industrial institutions specialized professors Hosting
Scientific affiliation with other universities and similar colleges

1-Educational Institution	orthern Technical University

2-College/Institute	Technical Institute/Mosul
3-Scientific Department/Center	Chemical and Petroleum Industries Technologies
4-Course Name/Code	Fluid Flow ICTI120
5-Available Attendance Forms	Mandatory
6-Semester/Year	2024-2025
7-Number of Study Hours (Total)	90
8-Date of Preparation of this Description	2024-2025

Course Objectives

aims to provide students with the knowledge and skills necessary to The Fluid Flow course understand fluid behavior and design and analysis of fluid flow systems in various engineering .applications

-Course outcomes, teaching, learning and assessment methods10

Objectives Cognitive -A

Understanding the basic concepts: Students understand the basic concepts of fluid flow, such as . .the physical properties of fluids, the different types of flow, and the basic laws of fluid flow

lyze and design fluid flow systems, such as pipes Analysis and Design: Students learn how to ana . .and channels, and cooling and heating systems

Practical Applications: Students learn how to apply the concepts and principles of fluid flow in . .various engineering applications

udents are assessed through written tests that aim to assess their Written Assessment: St . .understanding of the concepts and principles of fluid flow

Practical Assessment: Students are assessed through practical projects that aim to assess their . .ing fluid flow systemsskills in analyzing and design

Oral Assessment: Students are assessed through oral discussions that aim to assess their skills in .3 .explaining the concepts and principles of fluid flow

.Course specific skill objectives -B

.how to think critically in solving problems related to fluid flow Critical Thinking: Students learn .
Computational Skills: Students learn how to apply computational skills in solving problems .
.related to fluid flow
iples of fluid flow Communication Skills: Students learn how to explain concepts and princ .
.clearly and usefully

Teaching and Learning Methods

Theoretical Lesson: The lecturer introduces the concepts and principles of fluid flow in the form .
.of theoretical lectures
applied computational exercises on the Computational Exercises: The lecturer introduces .
.concepts and principles of fluid flow
Practical Projects: The lecturer introduces applied practical projects on the concepts and .
.principles of fluid flow
n the concepts and principles of fluid Class Discussions: The lecturer leads class discussions o .
.flow
Use of Technology: The lecturer uses technology, such as computer programs and multimedia, to .
.introduce the concepts and principles of fluid flow

Evaluation Methods

Traditional Teaching Methods #
Theoretical Lesson: The lecturer introduces the concepts and principles of fluid flow in the form .
.of theoretical lectures
Computational Exercises: The lecturer introduces applied computational exercises on the .
.concepts and principles of fluid flow
actical Projects: The lecturer introduces applied practical projects on the concepts and Pr .
.principles of fluid flow

Modern Teaching Methods #
Use of Technology: The lecturer uses technology, such as computer programs and multimedia, to .
.epts and principles of fluid flowintroduce the conc
Learning: The lecturer uses electronic resources and computer programs to introduce the -E .
.concepts and principles of fluid flow
cts to Cooperative Learning: The lecturer encourages students to work in groups and group proje .
.enhance their understanding of the concepts and principles of fluid flow

Affective and Value Objectives

Class discussions: The lecturer leads class discussions on the concepts and principles of fluid .
.flow

provides interactive exercises, such as educational games and Interactive exercises: The lecturer .
.interactive activities, to enhance understanding of the concepts and principles of fluid flow

ed Research projects: The lecturer encourages students to conduct research projects on topics relat .
to fluid flow

D- Teaching and learning methods

Practical and theoretical lectures, visual observations, listening to scientific rules in the courses from professors and the Internet.
D- Evaluation methods
Oral tests, daily tests on a regular basis and scientific discussions
.(General and transferable skills (other skills related to employability and personal development Focus on those who have a great mental ability and comprehension -1 scientific creative ability Encourage discussion policy so that the student has a - Develop students' mental and scientific abilities - Raise the level of students and follow up on weak students -

Curriculum structure-11

	Assessment Method1	Unit/Subject Name	Key Learning Outcomes	Hours	Week
				Week Hours	Stage 1
Test	Lecture, discussion, presentation of explanatory ,posters	Study of the fluid at rest (pressure in the fluid, pressure distribution in the fluid	Units – SI units – other unit systems, conversion from one system to another	3	1&2
Test	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Fluids in motion (stable and unstable flow), continuity equation	Definition of fluid and its properties	3	3
Test	Lecture, discussion,presentation of videos and film	Find the flow rate of a fluid over a V-shaped barrier	Study of fluid properties (density, viscosity, compressibility, surface tension, etc.)	3	4
Test	Lecture, discussion,presentation of videos and film	Find the flow rate of a fluid over a rectangular barrier	Study of the fluid at rest	3	5&6
Test	Lecture, discussion,presentation of videos and film	Fluids in motion (stable and unstable flow), continuity equation	Fluids in motion		7
Test	Lecture, discussion,presentation of videos and film	Fluid movement with friction, types of flow and its relationship to Reynolds number	flow rate of fluid over -shaped barrier	3	8

Test	Lecture, discussion,presentation of videos and film	Derivation of Bernoulli's equation and applications of Bernoulli's equation (Orpheus, Venjouri tube, Pitot tube)	Fluid movement	3	9
Test	Lecture, discussion,presentation of videos and film	(Pressure loss in pipes and their networks)	Derivation of Bernoulli's equation	3	10&11
Test	Lecture, discussion,presentation of videos and film	Finding the pressure loss due to friction inside the pipes	(Pressure loss	3	12
Test	Lecture, discussion,presentation of videos and film	Finding the pressure loss due to the fluid passing through the reversers and valves	Finding the pressure loss	3	13
Test	Lecture, discussion,presentation of videos and film	Finding the pressure loss due to sudden narrowing of the tube	Fluid movement	3	14
Test	Lecture, discussion,presentation of videos and film	Find the pressure loss due to sudden expansion of the pipe	Derivation of Bernoulli's equation	3	15

Infrastructure12	
	1- Required textbooks
Unit. Operation of chemical Eng. By maccade, Published by maccraw-hill, 3ed edition 1967 Unit operation by Brown, published by willy London 1965 Priciples of unit operation by A. S . Faust published by Toppan and Willy 2nd edition 1961 Tokyo. Japan 1960 Chemical Eng Vol 1 and 2nd Coulson and Richardason by preutice- Hill 1960	2- Main references (sources)

Fluid mechanics for Eng. By manrice puplished by preutice- hill 1960	
Van den Akker, Harry, and Robert F. Mudde. *Mass, Momentum and Energy Transport Phenomena: A Consistent Balances Approach*. Walter de Gruyter GmbH & Co KG, 2023. Nakayama, Yasuki. *Introduction to fluid mechanics*. Butterworth-Heinemann, 2018. Morrison, Faith A. *An introduction to fluid mechanics*. Cambridge University Press, 2013. Cengel, Yunus, and John Cimbala. *Ebook: Fluid mechanics fundamentals and applications (si units)*. McGraw Hill, 2013. Jones, Ernest Beachcroft. *Instrument Technology: Measurement of pressure, level, flow and temperature*. Butterworth-Heinemann, 2013.	A- Recommended books and references (scientific journals, reports, etc.)
https://www.youtube.com/watch?v=fTv4qZnUuNA https://www.youtube.com/watch?v=QCB32otWD0I https://www.youtube.com/watch?v=qHPaHMvsXLk	B- Electronic references, Internet sites, etc.

13-Curriculum development plan
Reviewing modern scientific literature **Participating in relevant scientific conferences** **Devoting teaching and training staff to application and work in operational and industrial institutions.** **Hosting specialized professors** **Scientific pairing with other universities and similar colleges**

نموذج وصف المقرر

وصف المقرر:

This course description provides a necessary summary of the most important characteristics of the physical chemistry course, knowing the speed of the reaction, how to find the order of the reaction according to the zero, first, second, and third orders, knowing the effect of temperature on the speed of the reaction, knowing the most important terms in electrochemistry, studying Faraday's laws, types of electrical conduction, and some applications that use electrical conduction technology.

Northern Technical University	Educational institution-1
Mosul Technical Institute	Colege/Institute-2
Chemical and petroleum industries channel	Scientific Department/Center-3
ICTI122 Physical chemistry	Course name/code-4
mandatory	Available forms of attendance-5
2025-2024	Semester/Year-6
	Number of study hours (total)-7
	Date of preparation of this description-8

Course objectives-9

This course description provides a necessary summary of the most important characteristics of the physical chemistry course, knowing the speed of the reaction, how to find the order of the reaction according to the zero, first, second, and third orders, knowing the effect of temperature on the speed of the reaction, knowing the most important terms in electrochemistry, studying Faraday's laws, types of electrical conduction, and some applications that use electrical conduction technology.

Course outcomes, teaching,learning and assessment-10

a-Cognitive scorer

Develop knowledge of the basic concepts of physical chemistry and the study of the kinetic behavior of molecules

b-Course specific skill objectives

Developing analysis skills, using modern tools and techniques, quantitative interpretation of chemical reactions, and using mathematical problems

Teaching and learning methods

Using the theoretical and practical lecture system , electronic calculator and electronic display (DATASHOW) to learn the basics of chemical engineering and chemistry

Evaluation methods

To know the extent of their interaction with the lecture and conduct weekly ,semester and annual tests

-Emotional and value-based goals-c

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

D-Teaching and learning methods

Practical and theoretical lectures, visual observations ,listening to scientific rules in the courses from professors and the internet

d-Evalution methods

Oral tests , daily tests on a regular basis and scientific discussions

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

1-Focus on those who have a high mental capacity and comprehension
2-Encouraging discussion policy so that the student has scientific creativity
3-Developing students mental and scientific abilities
4-Raising leval of students and following up on weak students

11-Course structure			
Topic name	Required learning outcomes		
		Theoretical	week
Kinetic theory of fluids	Understand the kinetic interpretation of molecular molecules in a system	3	The first
Viscosity and surface tension	Understanding the correspondence between viscosity and internal friction between molecules and the factors affecting viscosity and knowing how molecules affect each other	3	The second week
Refractive index and solids - Gibbs equation for phases	Understanding the phenomenon of refraction and distinguishing between different phases using phases	3	The third and fourth week

Chapter Two				
		Understand the difference between adsorption and absorption and the factors affecting adsorption and the effect of temperature		
tion, rs,	Adsorption Solve problems-		3	Week five

tion, s,	Reaction kinetics The reaction rate - factors affecting the rate of the chemical reaction - calculating the reaction rate	Enabling the student to understand and analyze chemical reactions, distinguish between the reaction rate and the concentration of the reactants, and calculate the reaction rate	3	Week six
tion, s,	First, second and third order reactions and the half-life time equation for the reactions	Understand how to calculate the reaction constant and reaction order	3	Seventh week
tion, s,	Zero Order Reactions— Assign the order of the reaction	Understand how to calculate the reaction constant and reaction order	3	The eighth week

Chapter Three				
	The effect of temperature on the reaction rate - activation energy - cofactors - problem solving	Understanding the effect of temperature on the reaction rate, how to calculate the activation energy, and the effect of the catalyst on the reaction rate		The ninth and ten Weeks
estions	Electrochemistry - Ohm's Law - Faraday's Laws - Electrolysis - Electrical Conduction	Understand the basic principles of electrochemistry such as	3	Weeks elevenand twelfth

scussion		voltage, electric current, and the electrolysis process		
	Calculate specific and equivalent conductivity		3	The thirteenth week

tions	Calculating the degree of dissociation of a weak electrolyte - the effect of temperature on the		3	The fourteenth week
, stions ,	conductivity of the electrolyte mathematical equations		3	The fifteenth week
ecture tion, stions swers, ussion				

	Infrastructure-12
Physical Chemistry/Issam Abdel Hadi (teacher) (Abdul Hamid Rajab (teacher •	Required prescribed books -1

Physical Chemistry/Issam Abdel Hadi (teacher) • Abdul Hamid Rajab (teacher)	(Main references (sources -2
1 - Physical Chemistry Dr. Laila Muhammad Naguib • 2 – Physical Chemistry K. your. Sharman • Kinetic and electrochemistry Dr. Abdul Majeed Al-Dabbagh and Dr. Banan Ahmed Al-Aqrawi	Recommended books and references (...,(scientific journals, reports
• https://youtu.be/HHG99B0H-ic?si=CVGuxuWFvW8GAcyT • https://youtu.be/QSvBtaBZ3fA?si=_U_KFYDaBqKbGWDN • https://youtu.be/txpLtY45qDU?si=yfseIUY4G7WqE6ie • https://youtu.be/Fo6WUZWiCL0?si=_XPDQiOxjPe2xGST https://youtu.be/D0SUVq_OjJM?si=dW6kSUTm1yp_yF2a	....B - Electronic references, Internet sites

Course development plan -13
Access to modern scientific literature Participation in relevant scientific conferences The teaching and training staff is devoted to application and work in operational and industrial institutions. Hosting specialized professors Scientific pairing with other universities and corresponding colleges

نموذج وصف المقرر

وصف المقرر:

Thermodynamics focuses on the study of heat, work and energy .Thermodynamics is concerned with understanding how energy is converted between different forms and how this affects.

Northern Technical University	Educational institution-1
Mosul Technical Institute	Colege/Institute-2
Chemical and petroleum industries channel	Scientific Department/Center-3
Thermodynamics ICTI123	Course name/code-4

mandatory	Available forms of attendance-5
2025-2024	Semester/Year-6
90	Number of study hours (total)-7
	Date of preparation of this -8 description

Course objectives-9

The course aims to provide first –level students with basic knowledge of thermodynamics . It studies everthing related to energy and its related topics, such as the first law of thermodynamics , the second law and its applications.

The course aims to enable students to access the science of thermodynamics by understanding how to perform correct engineering analysisand how to deal with laws, equipment, illustrations and other data to each other to reach the outputs and enable the student to be able to understand chemical reaction by studying how heat and energy affect chemical reactions Develop analytical thinking by building the ability to use mathematical and analytical models to understand complex phenomena in thermodynamics

Course outcomes, teaching,learning and assessment-10

a-Cognitive scorer

Understand the basic concepts of thermodynamics such as heat , work and energy

b-Course specific skill objectives

Gain the skill to solve problems related to heat, work and energy and the ability to analyze the cycle of heat engines such as the carnot cycle and measure efficiency and calculate energy and develop comprehensive critical thinking skills to solve complex problems related to thermodynamics

Teaching and learning methods

Using the theoretical and practical lecture system , electronic calculator and electronic display (DATASHOW) to learn the basics of chemical engineering and chemistry

Evaluation methods To know the extent of their interaction with the lecture and conduct weekly ,semester and annual tests
-Emotional and value-based goals-c 1-The student learns about the work of industrial and practical operating units and their role in building the country 2-Encouraging the student to gain practical experience and link it to theoretical principles 3-Leam accuracy and discipline in receiving sciences and knowledge 4-leam to communicate and interact during the lecture
D-Teaching and learning methods
Practical and theoretical lectures, visual observations ,listening to scientific rules in the courses from professors and the internet
d-Evalution methods
Oral tests , daily tests on a regular basis and scientific discussions
General and transferable skills (other skills related to employability and personal development) 1-Focus on those who have a high mental capacity and comprehension 2-Encouraging discussion policy so that the student has scientific creativity 3-Developing students mental and scientific abilities 4-Raising leval of students and following up on weak students

11-Course structure			
Topic name	Required learning outcomes		
		Theoretical	week
Gases - The effect of the volume of a gas on its pressure (Boyle's law) The effect of temperature on the volume and pressure of a	Understand the basic principles by learning about the basic laws of thermodynamics, such as Boyle's Law, Charles' Law, and the First and Second Laws	3	The first week

gas (Charles’ Law).	of Thermodynamics.		
Derivation of the general gas law - calculation of the values of the gas constant (R) - density and molecular weight .(of gases - (Dalton's law	Understand the basic principles by learning about the basic laws of thermodynamics, such as Boyle's Law, Charles' Law, and the First and Second Laws of Thermodynamics.	3	The second week
Diffusion of gases (Craham's law) - Ofocadero's hypothesis - Real gases	Understand the basic principles by learning about the basic laws of thermodynamics, such as Boyle's Law, Charles' Law, and the First and Second Laws of Thermodynamics.	3	The third and fourth week

Chapter Two				
		Apply laws and theories to solve various problems related to heat and energy		
tion, s,			3	
tion, s,	Thermodynamics Isothermal process - adiabatic process - thermodynamic equilibrium - energy	Apply laws and theories to solve various problems related to heat and energy	3	Week five and six

tion, rs,	The reverse process First law of thermodynamics	Apply laws and theories to solve various problems related to heat and energy	3	Seventh week
tion, rs,	Heat capacity - the relationship between pressure and volume in the adiabatic process - the relationship between pressure and temperature in the adiabatic process - the relationship between volume and temperature in the adiabatic process	Apply laws and theories to solve various problems related to heat and energy	3	The eighth and ninth weeks

Chapter Three				
estions scussion	Thermochemistry - heat of reaction when pressure and volume are constant, calculation of standard heat of reaction (below 25 °C), calculation of heat of reaction when T is greater than 25 °C, energy of bonds	Learn about endothermic and endothermic reactions, how to calculate the heat of reaction when pressure and volume are constant, calculate the standard heat of reaction (below 25 °C), and calculate the heat of reaction when T is greater than 25 °C.	3	Weeks ten and eleven
	Solve mathematical problems		3	The twelfth week

Chapter Four (Scientific Content)				
tions	Perform accurate mathematical calculations related to energy transfer and work, including the use of mathematical equations		3	
, stions ,	The second law of thermodynamics - Entropy, Carnot cycle (converting heat into work) and calculating the efficiency of the cycle	Perform accurate mathematical calculations related to energy transfer and work, including the use of mathematical equations	3	The thirteenth week And the fourteenth week
ecture tion, stions swers, ussion	Entropy of a mixture of gases, free energy, problems and exercises.	Perform accurate mathematical calculations related to energy transfer and work, including the use of mathematical equations		The fifteenth week

Infrastructure-12

Physical Chemistry Book / Part One / Dr. Nabil Shaaban Mustafa	Required prescribed books -1
Basics of thermodynamics / Dr. Rahim Joy Mohi	(Main references (sources -2
Basics of thermodynamics / Dr. Rahim Joy Mohi	Recommended books and references (...,(scientific journals, reports
Thermodynamics an engineering approach Yunus A cengel Michael A boles	....B - Electronic references, Internet sites

Course development plan -13
Access to modern scientific literature Participation in relevant scientific conferences The teaching and training staff is devoted to application and work in operational and industrial institutions. Hosting specialized professors Scientific pairing with other universities and corresponding colleges

The second level

Course Description Model

Course Description:

The course "Principles of Control" aims to present the fundamental concepts related to control systems in various systems, the difference between open-loop and closed-loop systems, and the advantages and disadvantages of each type. It covers how to represent systems using mathematical equations and understand system behavior. The course also introduces various control techniques and methods, such as proportional, integral, and derivative control.

• Educational Institution	• Northern Technical University
• College/Institute	• Technical Institute/Mosul
• Scientific Department/Center	• Chemical and Petroleum Industries Technologies
• Course Name/Code	• Principles of Control
• Available Attendance Forms	• Mandatory or Elective
• Semester/Year	• 2024-2025
• Total Credit Hours	• 30 hours
• Date of Preparation of this Description	• 2/2025

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

	Behavioral Objective or Learning Outcome Detail	Assessment Mechanism
	• Explains the basic scientific concepts of control principles.	1. Oral Exam
	• Reviews the different types of methods for connecting electrical circuits.	2. Written Exam
	• Ability to design simple control systems using techniques such as proportional and integral control.	3. Oral Exam

	• Uses the fundamental concepts of control systems to analyze the behavior of various systems.	4. Written Exam

11- Course Structure

Week	Hours	Required Learning Outcomes	Unit Name / Topic	Teaching Method	Assessment Method
1		• Identify and Analyze Types of Errors in Measurements. • Evaluate Accuracy in Measurements and Determine Methods for Improvement. • Apply Concepts of Errors and Accuracy in Practical Projects and Measure System Performance.	Errors , Accuracy and Measurement	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam
2 and 3		• Understand Basic Principles of Electricity, Including Electrical Energy and Electric Force. • Apply Ohm's Law and Analyze Simple Electrical Circuits. • Identify and Analyze Components of Basic Electrical Circuits, Such as Resistors and Capacitors.	Principles of Electricity , Electrical energy and Electrical power , Ohm s Law , Resistors, Capacitors	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam
4		• Understand Types of Basic Electrical Measuring Instruments, Such as Voltage Meters (V), Current Meters (A),	Electrical measuring , Instruments , The (V,A,AVO)	• Lecture • Discussion • Poster Presentations • Video and Film	Exam

		and Power Meters (AVO). • Identify and Interpret Readings from Electrical Measuring Instruments. • Correctly Use Electrical Measuring Instruments to Measure Voltage, Current, and Power in Electrical Circuits.	meters	Presentations	
5		• Understand Basic Principles of Magnetism and Electromagnetism. • Identify and Analyze the Effects of Electric Currents on Magnetism. • Understand Types of Electric Currents, Such as Direct Current (DC) and Alternating Current (AC), and Analyze and Design Using Inductors.	Magnetism , Electrical Magnetism , Direct current , Alternating current , Inductors	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam
6		• Understand Basic Principles of Electrical Circuits. • Apply Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL) to Analyze Electrical Circuits. • Solve Electrical Circuit Problems Using Kirchhoff's Laws.	Electric circuit , Kirchhoff ′ s Law	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam
7		• Understand the Operating Principle of the Wheatstone Bridge for Measuring Resistances.	Whetstone Bridge , Power Measurement	• Lecture • Discussion • Poster Presentations • Video and	Exam

		• Use the Wheatstone Bridge to Accurately Measure Resistances. • Understand Methods for Measuring Electrical Power, Such as Using a Wattmeter.		Film Presentations	
8		• Understand Basic Control Principles in Unit Operations, Such as Controlling Temperature, Pressure, and Speed. • Identify Types of Control Systems, Such as Open Loop and Closed Loop Systems. • Understand the Operating Principle of Closed Loop Control Systems, Including the Feedback Loop.	Principles of control in unit operation , control system open and closed	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam
9,10 and 11		• Understand Types of Control Modes, Such as Batch Process Control and Continuous Process Control. • Identify Types of Control in Batch Processes, Such as On-Off Control. • Understand Types of Control Controllers, Such as: • P Controller (Proportional) • I Controller (Integral) • D Controller (Derivative) • PI Controller	Batch process control (on – off) and continues control modes Controllers : P , I ,D , PI ,PD PID	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam

		(Proportional-Integral) • PD Controller (Proportional-Derivative) • PID Controller (Proportional-Integral-Derivative)			
12		• Understand the Concept of Dead Time and Its Impact on System Performance. • Identify Dead Time in Various Systems. • Understand the Concept of Time Constant and Its Effect on System Response. • Calculate the Time Constant for Different Systems.	Dead time , Time constant	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam
13		• Understand the Operating Principles of Hydraulic Regulators, Electric Regulators, and Pneumatic Regulators. • Identify Types of Hydraulic, Electric, and Pneumatic Regulators. • Understand Applications of Hydraulic, Electric, and Pneumatic Regulators in Various Systems. • Analyze the Performance of Hydraulic, Electric, and Pneumatic Regulators in Different Conditions.	Hydraulic Regulators , Electric Regulators , Pneumatic Regulators	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam

14		1. Understand How to Read and Interpret Control Circuit Diagrams. 2. Identify Symbols and Standards Used in Control Circuit Diagrams. 3. Understand How to Represent Components and Control Systems in Circuit Diagrams. 4. Design Simple Control Circuit Diagrams.	Regulation circuit diagrams and symbols	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam
15		• Understanding the principles of process control for heat exchangers, such as controlling temperature and pressure. • Identifying types of process control for distillation, such as controlling temperature, pressure, and flow. • Understanding the principles of process control for reactors, such as controlling temperature, pressure, and flow.	Process control for heat exchanger , distillation and Reactors	• Lecture • Discussion • Poster Presentations • Video and Film Presentations	Exam

Infrastructure	
Required Textbooks	
• Main References (Sources)	• "Process Control: Modeling, Design, and Simulation" لجون ت. تاكر (John T. Tucker) • "Chemical Process Control: A Practical Approach" لجورج ستيب (George Stephanopoulos) • "Process Dynamics and Control" لداريل إم. بيرد (Darryl M. Bird) "Control Systems Engineering" لnorman s. nise
Recommended Books and References (Scientific Journals, Reports,...)	• مجلة "IEEE Transactions on Control Systems Technology" • مجلة "Journal of Process Control" مجلة "Control Engineering Practice"
• Electronic References, Websites,...	• "Process Control Systems" على موقع "ScienceDirect" • "Control Systems" على موقع "SpringerLink" "Process Dynamics and Control" على موقع "Google Books"

13 - Curriculum Development Plan

Review of Recent Scientific Literature
Participation in Relevant Scientific Conferences
Full Engagement of Teaching and Training Staff in Operational and Industrial Institutions
Hosting Specialized Professors
Scientific Collaboration with Other Universities and Equivalent Colleges

University Technical Northern	Educational institution -1
Technical Institute/Mosul	College/Institute -2
And oil technologies Chemical industry	Scientific Department / Center -3
Chemical Industries Theory 9 **ICTI21**	Course name/code -4
or optional Mandatory	Available forms of attendance -5
2025-202 4	Semester / Year -6
30	Number of study hours (total) -7
2025/2/3	-8 Date this description was prepared

9 - course the of description General

is a branch of chemistry that focuses on the application of chemistry Industrial scale production processes. Industrial chemistry involves -chemical principles to large the development and manufacture of chemicals, products, and processes that ods such as plastics, fertilizers, pharmaceuticals, and contribute to the production of go Industrial chemistry also involves the study of chemical reactions, the design of . food .chemical processes, improving efficiency, reducing costs, and ensuring safety

objectives General

Enhancing students' manual and technical skills through practical learning introducing students to the different stages of production and processes , introducing students to the different fields of work , used in the industry .s for professional developmentin industries and opportunitie

objectives Specific

After studying this subject, the student will be able to study the physical and chemical changes in production plans that occur in a number of . industries

outcomes Behavioral objectives or learning

- Behavioral objectives refer to the desired outcomes that education seeks to . achieve in students' behaviors. They can be classified into several categories

1- :Cognitive objectives

- .Promote understanding and critical thinking
- .analysis skills Develop research and

2- :Skill objectives

- .Mastering specific skills, such as using tools or implementing techniques
- .Improve teamwork and collaboration skills

Course structure

Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
2 Stage					
Test	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Industrial chemical methods	Knowledge -1 Skills -2 3- critical thinking	2	the first

Evaluation method	Teaching method	name/topic Unit	Required learning outcomes	Watches	The week
2 Stage					
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory ,posters presentation of videos and films	Chemical processes, physical processes, chemical reactors and their forms	Knowledge -1 Skills -2 Critical thinking -3	2	the second
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Sewage and industrial wastewater treatment	Knowledge -1 Skills -2 Critical thinking -3	2	the third
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Ceramic and porcelain industry	Knowledge -1 Skills -2 Critical thinking -3	2	Fourth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Glass industry chemical) properties and . (types	Knowledge -1 Skills -2 Critical thinking -3	2	Fifth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions,	Lecture, discussion,	Cement	Knowledge -1	2	Sixth

written and oral tests	presentation of explanatory posters, presentation of videos and films	industry (types and specifications, (raw materials	Skills -2 Critical thinking -3		
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Table salt and sodium compounds industry	Knowledge -1 Skills -2 Critical thinking -3	2	Seventh
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Sulfur (types, properties, production and (uses	Knowledge -1 Skills -2 Critical thinking -3	2	The eighth
Evaluation method	Teaching method	Unit name/topic	learning Required outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Sulfuric acid industry and its uses	Knowledge -1 Skills -2 Critical thinking -3	2	Ninth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, ,discussion presentation of explanatory posters, presentation of videos and films	**Chemical fertilizers their) benefits and (types**	Knowledge -1 Skills -2 Critical thinking -3	2	tenth

Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Nitrogen fertilizers, urea	Knowledge -1 Skills -2 thinking Critical -3	2	eleventh
Evaluation method n	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Phosphate fertilizer industry	Knowledge -1 Skills -2 Critical thinking -3	2	twelfth
Evaluation method	Teaching method	Unit name/topic	outcomes Required learning	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Ammonium sulphate, ammonium nitrate	Knowledge -1 Skills -2 Critical thinking -3	2	thirteenth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, ,discussion presentation of explanatory posters, presentation of videos and films	Nitric acid production by hoco method	Knowledge -1 Skills -2 Critical thinking -3	2	fourteenth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral	Lecture, discussion, presentation of	Industrial gases	Knowledge -1 Skills -2 thinking Critical -3	2	fifteenth

tests	explanatory posters, presentation of videos and films				

Infrastructure	
Available in free education and the institute's library	**Required Textbooks**
Available in free education and the institute's library	**(Main References (Sources**
Internet	**Electronic references, websites**
Curriculum Development Plan	
.the developments in local industries Develop curricula that are appropriate to	

: description Course

A brief summary of the main characteristics of Course description provides the course and the learning outcomes expected of the student, demonstrating whether he has made the most of the available learning .opportunities

University Technical Northern	utionEducational instit -1
Technical Institute/Mosul	College/Institute -2
And oil technologies Chemical industry	Scientific Department / -3 Center
Chemical Industries Theory 2) 9 **ICTI21 (**	Course name/code -4

or optional Mandatory	Available forms of -5 attendance
2025-202 4	Semester / Year -6
30	Number of study hours -7 (total)
2025/2/3	-8 Date this description was prepared

9 - course the of description General

is a branch of chemistry that focuses on the application of chemistry Industrial scale production processes. Industrial chemistry involves -chemical principles to large the development and manufacture of chemicals, products, and processes that ods such as plastics, fertilizers, pharmaceuticals, and contribute to the production of go Industrial chemistry also involves the study of chemical reactions, the design of . food .chemical processes, improving efficiency, reducing costs, and ensuring safety

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Enhancing students' manual and technical skills through practical learning introducing students to the different stages of production and processes , introducing students to the different fields of work , used in the industry .s for professional developmentin industries and opportunitie

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After studying this subject, the student will be able to study the physical and chemical changes in production plans that occur in a number of
. industries

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- .Promote understanding and critical thinking
- .analysis skills Develop research and

5- :Skill objectives

- .Mastering specific skills, such as using tools or implementing techniques
- .Improve teamwork and collaboration skills

Course structure

Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
2 Stage					
Test	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Vegetable oils , industry extraction, purification and hydrogenation	Knowledge -1 Skills -2 6- critical thinking	2	the first
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	week The
2 Stage					
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Soap making	Knowledge -1 Skills -2 Critical thinking -3	2	the second

Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Detergent industry	Knowledge -1 Skills -2 Critical thinking -3	2	the third
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Sugar production from beets and sugar cane	Knowledge -1 Skills -2 Critical thinking -3	2	Fourth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Brewing industry, pure alcohol, acetic acid and vinegar	Knowledge -1 Skills -2 Critical thinking -3	2	Fifth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Paper making	Knowledge -1 Skills -2 Critical thinking -3	2	Sixth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral	Lecture, discussion, presentation of	Polymers and polymerization	Knowledge -1 Skills -2 Critical thinking -3	2	Seventh

tests	explanatory posters, presentation of videos and films	processes			
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Classification polymers of	Knowledge -1 Skills -2 Critical thinking -3	2	The eighth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Polymerization Mechanics	Knowledge -1 Skills -2 Critical thinking -3	2	Ninth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Plastics Its uses and types	Knowledge -1 Skills -2 Critical thinking -3	2	tenth
Evaluation method	Teaching method	Unit name/topic	learning outcomes Required	Watches	The week
Discussio ,ns written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Plastics Its uses and types	Knowledge -1 Skills -2 Critical thinking -3	2	eleventh

Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Rubber industry and its types	Knowledge -1 Skills -2 Critical thinking -3	2	twelfth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	rubber vulcanization	Knowledge -1 Skills -2 Critical thinking -3	2	thirteenth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Dyes, their properties and types	Knowledge -1 Skills -2 Critical thinking -3	2	fourteenth
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	Watches	The week
Discussions, written and oral tests	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Synthetic fiber industry	Knowledge -1 Skills -2 Critical thinking -3	2	fifteenth

Infrastructure

Available in free education and the institute's library	**Required Textbooks**
Available in free education and the institute's library	**(Main References (Sources**
Internet	**Electronic references, websites**
Curriculum Development Plan	
.the developments in local industries Develop curricula that are appropriate to	

1-Educational Institution	Northern Technical University
2-College/Institute	Technical Institute/Mosul
3-Scientific Department/Center	Chemical and Petroleum Industries Technologies
4-Course Name/Code	Heat transfer ICTI120
5-Available Attendance Forms	Mandatory
6-Semester/Year	2024-2025
7-Number of Study Hours (Total)	90
8-Date of Preparation of this Description	2024-2025

Course Objectives

Heat Transfer course are to enable students to understand the The objectives of the scientific and technical foundations of heat transfer in different systems and their practical .applications

-Course outcomes, teaching, learning and assessment methods10

Objectives Cognitive -A Understanding the basic concepts: Students understand the basic concepts of heat transfer, .1 . such as heat transfer methods Analysis and design: Students learn how to analyze and design heat transfer systems, such as .2.2 .nd heating systemsexchangers, cooling a Practical applications: Students learn how to apply the basic concepts and principles of heat .3 .transfer in various engineering applications Written assessment: Students are assessed through written tests that aim to assess their .1 .understanding of the basic concepts and principles of heat transfer Practical assessment: Students are assessed through practical projects that aim to assess their .2 skills in analyzing and designing heat transfer systems assessed through oral discussions that aim to assess their skills in Oral assessment: Students are .3 .explaining the basic concepts and principles of heat transfer
.Course specific skill objectives -B related to heat Critical Thinking: Students learn how to think critically in solving problems .1. transfer Computational Skills: Students learn how to apply computational skills in solving problems .2 related to heat transfer Communication Skills: Students learn how to explain the basic concepts and principles of heat .3 ..clearly and meaningfully transfer
Teaching and Learning Methods Theoretical Lesson: The lecturer presents the basic concepts and principles of heat transfer in .1. .the form of theoretical lectures computational exercises on the basic Computational Exercises: The lecturer presents applied .2 concepts and principles of heat transfer Practical Projects: The lecturer presents applied practical projects on the basic concepts and .3 principles of heat transfer ssions on the basic concepts and principles of Class Discussions: The lecturer leads class discu .4 heat transfer Use of Technology: The lecturer uses technology, such as computer programs and multimedia, .5 .to present the basic concepts and principles of heat transfer
Evaluation Methods teaching methods Traditional Theoretical lesson: The lecturer presents the basic concepts and principles of heat transfer in the .1 .form of theoretical lectures Computational exercises: The lecturer presents applied computational exercises on the basic .2 d principles of heat transferconcepts an Practical projects: The lecturer presents applied practical projects on the basic concepts and .3 principles of heat transfer Modern teaching methods # ams and multimedia, Use of technology: The lecturer uses technology, such as computer progr .1 to present the basic concepts and principles of heat transfer learning: The lecturer uses electronic resources and computer programs to present the basic -E .2 .concepts and principles of heat transfer

lecturer encourages students to work in groups and group projects to Cooperative learning: The .3 enhance their understanding of the basic concepts and principles of heat transfer .
Affective and Value Objectives concepts and principles of heat Class discussions: The lecturer leads class discussions on the basic transfer Interactive exercises: The lecturer provides interactive exercises, such as educational games and .2 interactive activities, to enhance understanding of the basic concepts and principles of heat transfer projects: The lecturer encourages students to conduct research projects on topics Research .3 related to heat transfer
D- Teaching and learning methods
Practical and theoretical lectures, visual observations, listening to scientific rules in the courses from professors and the Internet.
D- Evaluation methods
Oral tests, daily tests on a regular basis and scientific discussions
.(General and transferable skills (other skills related to employability and personal development great mental ability and comprehension Focus on those who have a -1 Encourage discussion policy so that the student has a scientific creative ability - Develop students' mental and scientific abilities - Raise the level of students and follow up on weak students -

structure Curriculum-11

	Assessment Method1	Unit/Subject Name	Key Learning Outcomes	Hours	Week
				Week Hours	Stage 1
Test	Lecture, discussion, presentation of explanatory ,posters	Basic principles - Thermal processes - Basic forms of heat transfer	Basic knowledge of heat transfer	3	1
Test	Lecture, discussion, presentation of explanatory posters, presentation of videos and films	Heat conduction in steady state - Feuer's law - Thermal conductivity coefficient - Conduction through single flat walls - Conduction through	Knowledge of the methods of heat transfer by conduction and their laws	3	2

		compound plane walls - Thermal resistance			
Test	Lecture, discussion,presentation of videos and film	Conduction through single cylindrical walls - Conduction through compound cylindrical walls - Conduction through spherical walls.	Knowledge of the methods of heat transfer by conduction and their laws through walls	3	3
Test	Lecture, discussion,presentation of videos and film	Heat transfer by convection - free and forced convection - convection coefficient - the most important non-dimensional groups (Reynolds number, Krashoff number, Prandtl number, Nusselt number)	Knowing the methods of heat transfer by conduction and their laws through cylindrical walls	3	4
Test	Lecture, discussion,presentation of videos and film	Heat transfer by combined effect of conduction and convection - Heat transfer between two fluids through a flat wall - Heat transfer between two fluids through a cylindrical wall	Knowing the methods of heat transfer by convection and their laws		5
Test	Lecture, discussion,presentation of videos and film	Heat exchangers / Types of heat exchangers / Heat balance in heat exchangers Heat balance in condensers.	Knowing the methods of heat transfer by conduction and convection and their laws	3	6
Test	Lecture, discussion,presentation of videos and film	Shell and tube heat exchangers (single-pass shell and two-pass shell, two-pass shell and four-pass shell).	Knowing the types of exchanges	3	7

Test	Lecture, discussion,presentation of videos and film	Heat transfer with phase change - Heat transfer from condensed vapors - Condensation in the form of a film - Condensation in the form of drops	Laws	3	8
Test	Lecture, discussion,presentation of videos and film	Heat transfer by radiation. Reflectivity and absorption in solids - Stefan and Boltzmann - Radiation between real surfaces.	Specific to exchanges	3	9&10
Test	Lecture, discussion,presentation of videos and film	Radiation laws (Stephen-Boltzmann law of total radiation - Kirchhoff radiation law), heat exchange by radiation between black and non-black surfaces	Methods of condensation	3	11
Test	Lecture, discussion,presentation of videos and film	Heat transfer by radiation. Reflectivity and absorption in solids - Stefan and Boltzmann - Radiation between real surfaces.		3	13&12
Test	Lecture, discussion,presentation of videos and film	Radiation laws (Stephen-Boltzmann law of total radiation - Kirchhoff radiation law), heat exchange by radiation between black and non-black surfaces		3	14&15

Infrastructure12	
	1- Required textbooks
	2- Main references (sources)
Van den Akker, Harry, and Robert F. Mudde. *Mass, Momentum and Energy Transport Phenomena: A Consistent Balances Approach*. Walter de Gruyter GmbH & Co KG, 2023. Nakayama, Yasuki. *Introduction to fluid mechanics*. Butterworth-Heinemann, 2018. Morrison, Faith A. *An introduction to fluid mechanics*. Cambridge University Press, 2013. Cengel, Yunus, and John Cimbala. *Ebook: Fluid mechanics fundamentals and applications (si units)*. McGraw Hill, 2013. Jones, Ernest Beachcroft. *Instrument Technology: Measurement of pressure, level, flow and temperature*. Butterworth-Heinemann, 2013.	A- Recommended books and references (scientific journals, reports, etc.)
https://www.youtube.com/watch?v=fTv4qZnUuNA https://www.youtube.com/watch?v=QCB32otWD0I https://www.youtube.com/watch?v=qHPaHMvsXLk https://www.youtube.com/watch?v=1tklQ5x7W8k	B- Electronic references, Internet sites, etc.

13-Curriculum development plan

Reviewing modern scientific literature **Participating in relevant scientific conferences** **Devoting teaching and training staff to application and work in operational and industrial institutions.** **Hosting specialized professors** **Scientific pairing with other universities and similar colleges**