Ministry of Higher Education and Scientific Research
Supervision and Scientific evaluation Directorate
Quality Assurance and Academic Accreditation
Department Accreditation Section

Academic Program Specification from the Academic

Mechanical Power Techniques Engineering Department

2025

Introduction

The educational program is considered a coordinated and organized package of curricula that includes procedures and experiences aimed at building and refining the skills of graduates, thereby qualifying them to meet the demands of the labor market. The program is reviewed and evaluated annually through internal or external auditing procedures and programs, such as the external examiner program.

The academic program description provides a brief summary of the main features of the program and its courses, outlining the skills that students are expected to acquire based on the program's objectives. The importance of this description lies in its role as the cornerstone for obtaining program accreditation, with contributions from teaching staff under the supervision of scientific committees in academic departments.

This guide, in its second edition, includes an updated description of the academic program after revising the terms and sections of the previous guide in light of recent developments in the educational system in Iraq. It encompasses traditional descriptions of the academic program (annual, semester-based) and adopts a generalized description of the academic program as per the letter from the Department of Studies (T M3/2906) dated 3/5/2023, concerning programs that primarily follow the Bologna process.

In this context, we cannot emphasize enough the importance of writing descriptions for academic programs and curricula to ensure the smooth functioning of the educational process.

Concepts and Terminology

Academic Program Description: Provides a concise overview of the program's vision, mission, and objectives, including a precise description of the targeted learning outcomes based on specific learning strategies.

Course Description: Offers a brief summary of the key characteristics of the course and the expected learning outcomes that students should achieve, demonstrating whether they have maximized the available learning opportunities. This description is derived from the program description.

Program Vision: An ambitious image of the future of the academic program, aiming to be innovative, inspiring, motivating, realistic, and applicable.

Program Mission: Clearly outlines the goals and necessary activities to achieve them concisely, as well as defining the pathways for the program's development and directions.

Program Objectives: Statements that describe what the academic program intends to achieve within a specific timeframe and are measurable and observable.

Curriculum Structure: All courses/subjects included in the academic program according to the adopted learning system (semester-based, annual, Bologna process), whether they are requirements from the ministry, university, college, or scientific department, along with the number of credit hours.

Learning Outcomes: A coherent set of knowledge, skills, and values acquired by students after successfully completing the academic program. Learning outcomes must be specified for each course in a way that achieves the program's objectives.

Teaching and Learning Strategies: The strategies employed by faculty members to enhance student education and learning. These are plans followed to reach learning objectives and describe all classroom and extracurricular activities aimed at achieving the program's learning outcomes.

Republic of Iraq

Ministry of Higher Education & Scientific Research

Supervision and Scientific Evaluation Directorate

Quality Assurance and Academic Accreditation

Academic Program Specification Form for the Academic

University: Northern Technical University

College: Technical Engineering College of Kirkuk

Department: Mechanical Power Engineering Techniques

Date of Form Completion: 28/8/2025

Asst. Prf. Dr.	Asst. Prf. Dr.	Asst. Prf. Dr.
Sami Reda Aslan	Kilan Ismat Safaa Al-Din	Hussein Hayder Mohammed Ali
Dean's Name	Dean's Assistant for	Head of Department
Date: 28 / 8 / 2025	Scientific Affairs	Date: 28 / 8 / 205
	Date: 28 / 8 / 2025	Signature
Signature	Signature	

Quality Assurance and University Performance Manager

Date: / /

Signature

1-Program Vision

The Department of Power Mechanical Engineering Technology aims to educate students and equip them with expertise in the field of mechanical engineering, preparing them to become applied engineers in response to the urgent needs of the job market for specialties in mechanical engineering, refrigeration, and air conditioning. The department aspires to be a center of scientific and research excellence that leads the way in innovation within the fields of mechanical engineering, refrigeration, and air conditioning and their applications, achieving leadership in engineering education in its area of specialization.

2-Program Mission

The department prepares a conducive theoretical and practical learning environment for students by delivering valuable lectures in the specialization, conducting laboratory experiments, and engaging in scientific research using the equipment available in the department's laboratories and mechanical workshops. The department's mission also extends to enhancing students' capabilities through discussion sessions and continuous exposure to the latest scientific developments in their field of specialization.

3-Program Objectives

• The goal is to prepare graduates to become technical engineers capable of developing preliminary designs for thermal systems and equipment related to both branches. They should also be able to implement designs and supervise the installation of various types of thermal equipment and systems, in addition to enhancing their skills in routine and general maintenance of those systems and equipment. Furthermore, they will be trained to prepare economic feasibility studies for projects related to each of the following branches:

- Renewable Energy Engineering Technology
- Power Plant Engineering Technology

4-Program Accreditation

ABET

5-Other External Influences

A compatible set of knowledge, skills and values acquired by the student after the successful completion of the academic program and must determine the learning outcomes of each course in a manner that achieves the program objectives

6-Program Structure

Power plants Branch							
					Units		
Final Percentage	**Total**	**Fourth**	**Third**	**Second**	**First**	**level**	
100	154	38	34	44	38	Total	
14.3	22	2	2	6	12	University	Type of Requirement
19.5	30	6	6	8	10	College	
66.2	102	30	26	30	16	Department	
Renewable Energy Branch							
					Units		
Final Percentage	**Total**	**Fourth**	**Third**	**Second**	**First**	**level**	
100	154	38	34	44	38	Total	
14.3	22	2	2	6	12	University	Type of Requirement
19.5	30	6	6	8	10	College	
66.2	102	30	26	30	16	Department	

Level 1							
NO	Requirement Type	Module Name in English	Requirement	SSWL (hr/w)		Units	Module Code
				Theory	Practical		
1	University	Human rights	compulsory	1	0	1	ntu100
2		English Languge	compulsory	2	0	2	ntu101
3		Computer principles 1	compulsory	1	2	2	ntu102
4		Computer principles 2	compulsory	1	2	2	ntu103
5		Arabic Languge	compulsory	2	0	2	ntu104
6		Democracy	compulsory	1	0	1	ntu106
7		Sport	compulsory	1	1	2	ntu105
8		French language	compulsory	2	0	2	ntu107
9	College	mathematics1	compulsory	2	0	2	teck101
10		Engineering drawing	compulsory	1	2	2	teck103
11		Engineering Mechanics	compulsory	3	0	3	teck105
12		mathematics 2	compulsory	2	0	2	teckI102
13		Workshop	compulsory	0	3	1	teck104
14	Department	Thermodynamics 1	compulsory	3	2	4	mpe103
15		Electrotechnology	compulsory	4	2	5	mpe106
16		Mechanics Engineering /dynamics	compulsory	3	0	3	mpe102
17		Thermodynamics 2	compulsory	3	2	4	mpe104
	Total			32	16	38	

Level 2							
NO	Requirement Type	Module Name in English	Requirement	SSWL (hr/w)		Units	Module Code
				Theory	**Theory**		
1	University	English Languge	Compulsory	2	0	2	ntu200
		Professional Ethics	Compulsory	2	0	2	ntu201
2		Crimes of Ba'ath Party	Compulsory	2	0	2	ntu203
3	College	Mathematics 3	Compulsory	3	0	3	teck201
4		Mathematics 4	Compulsory	3	0	3	teck202
5		Summer Training	Compulsory	0	0	0	teck203
6		Physics	Compulsory	2	0	2	teck204
7	Department	Strength of Materials	Compulsory	2	2	3	mpe201
8		Engineering Materials	Compulsory	2	0	2	mpe202
9		Thermodynamics 3	Compulsory	2	2	3	mpe203
10		Thermodynamics 4	Compulsory	2	2	3	mpe204
11		Fluid Mechanics 1	Compulsory	3	2	4	mpe207
12		Fluid Mechanics 2	Compulsory	3	2	4	mpe208
13		Mechanical Drawing 1	Compulsory	1	3	2	mpe205
14		Mechanical Drawing 2	Compulsory	1	3	2	mpe206
		Calculator Applications-3	Compulsory	1	2	2	mpe211
		Calculator Applications-4	Compulsory	1	2	2	mpe212
15		Theory of Machines	Compulsory	2	2	3	mpe209
	Total			36	22	44	

Power plants Branch /Level 3							
NO	Requirement Type	Module Name in English	Requirement	SSWL (hr/w)		Units	Module Code
				Theory	Theory		
1	University	English	Compulsory	2	0	2	ntu300
2	College	Summer Training	Compulsory	-	-	-	teck302
3		Engineering Analysis	Compulsory	3	-	3	teck300
4		Numerical Analysis	Compulsory	2	2	3	teck301
5	Department	Internal Combustion Engines and Fuels 1	Compulsory	2	2	3	mpe300
6		Internal Combustion Engines and Fuels 2	Compulsory	2	2	3	mpe301
7		Heat Transfer 1	Compulsory	3	2	4	mpe303
8		Heat Transfer 2	Compulsory	3	2	4	mpe304
9		Electrical Engineering	Compulsory	2	2	3	mpe305
10		Mechanical Design 1	Compulsory	2	2	3	mpe307
11		Mechanical Design 2	Compulsory	2	2	3	mpe308
12		Gas Dynamics 1	Compulsory	2	2	3	mpe311
	Total			25	18	34	

Renewable Energy Branch / Level 3							
NO	Requirement Type	Module Name in English	Requirement	SSWL (hr/w)		Units	Module Code
				Theory	Theory		
1	University	English	Compulsory	2	0	2	ntu300
2	College	Summer Training	Compulsory				teck302
3		Engineering Analysis	Compulsory	3	-	3	teck300
4		Numerical Analysis	Compulsory	2	2	3	teck301
5	Department	Solar Energy Systems	Compulsory	2	2	3	mpe313
6		Renewable Energy Systems	Compulsory	2	2	3	mpe314
7		Heat Transfer 1	Compulsory	3	2	4	mpe303
8		Heat Transfer 2	Compulsory	3	2	4	mpe304
9		Electrical Engineering	Compulsory	2	2	3	mpe305
10		Mechanical Design 1	Compulsory	2	2	3	mpe307
11		Mechanical Design 2	Compulsory	2	2	3	mpe308
12		Gas Dynamics 1	Compulsory	2	2	3	mpe311
	Total			25	18	34	

Power plants Branch /Level 4							
NO	Requirement Type	Module Name in English	Requirement	SSWL (hr/w)		Units	Module Code
				Theory	Theory		
1	University	Scientific Research Methodology	Compulsory	2	0	2	ntu400
2	College	Project 1	Compulsory	0	3	1	teck401
3		Project 2	Compulsory	0	3	1	teck403
4		Engineering Economics	Compulsory	2	0	2	teck402
5		Engineering Project Management	Compulsory	3	0	3	teck400
6		Control Circuits 1	Compulsory	2	2	3	mpe403
7		Computer Applications-1	Compulsory	2	2	3	mpe405
8		Turbine Engines 1	Compulsory	2	2	3	mpe407
9		Maintenance and Operation of Power Plants	Compulsory	1	2	2	mpe409
10	Department	Power Generation Plants 1	Compulsory	2	2	3	mpe411
11		Control Circuits 2	Compulsory	2	2	3	mpe404
12		Computer Applications-2	Compulsory	2	2	3	mpe406
13		Turbine and Rotary Engines 2	Compulsory	2	2	3	mpe408
14		Air Conditioning Systems	Compulsory	2	2	3	mpe410
15		Power Generation Plants 2	Compulsory	2	2	3	mpe412
	Total			26	26	38	

Renewable Energy Branch / Level 4							
NO	Requirement Type	Module Name in English	Requirement	SSWL (hr/w)		Units	Module Code
				Theory	Theory		
1	University	Scientific Research Methodology	Compulsory	2	0	2	ntu400
2	College	Project 1	Compulsory	0	3	1	teck401
3		Project 2	Compulsory	0	3	1	teck403
4		Engineering Economics	Compulsory	2	0	2	teck402
5		Engineering Project Management	Compulsory	3	0	3	teck400
6		Control Circuits 1	Compulsory	2	2	3	mpe403
7		Computer Applications-1	Compulsory	2	2	3	mpe413
8		Turbine Engines 1	Compulsory	2	2	3	mpe407
9		Maintenance and Operation of Power Plants	Compulsory	1	2	2	mpe409
10	Department	Energy Storage and Recovery	Compulsory	2	2	3	mpe413
11		Control Circuits 2	Compulsory	2	2	3	mpe404
12		Computer Applications-2	Compulsory	2	2	3	mpe414
13		Turbine and Rotary Engines 2	Compulsory	2	2	3	mpe408
14		Air Conditioning Systems	Compulsory	2	2	3	mpe410
15		Energy and Available Energy	Compulsory	2	2	3	mpe414
	Total			24	26	36	

7-Program Description				
Credit Hours		Department Name	Department code	Year/Level
Theory	Theory			
16	**32**	Power Mechanics Techniques / Level 1		First / 2023-2024
22	**36**	Power Mechanics Techniques / Level 2		2023-2024 / Second
Power Stations Branch 18 **Energy Branch 22**	**Energy Branch 22** **Power Stations Branch 25**	Power Mechanics Techniques / Level 3		Third / 2023-2024
Power Stations Branch 18 **Energy Branch 26** **Power**	**Stations Branch 25** **Energy Branch 24**	Power Mechanics Techniques / Level 4		2023-2024 / Fourth

Expected learning outcomes of the program	
	Knowledge
1. **Understanding Economic Feasibility:** The department aims to teach students how to conduct economic feasibility studies for engineering projects related to the field of power mechanics, helping them evaluate the financial and technical viability of projects. 2. **Fault Diagnosis:** Developing students' skills in diagnosing faults and supervising maintenance and repair work, enabling them to address technical issues efficiently. 3. **Research on Energy Consumption Efficiency:** The department encourages students to engage in research related to energy consumption efficiency and finding effective alternatives in the field of power mechanics, enhancing their ability to innovate and develop. 4. **Handling Modern Equipment:** Training students to use modern diagnostic tools and equipment for fault diagnosis, ensuring they can work effectively in advanced work environments.	A- Cognitive Objectives

5. **Enhancing Self-Learning:** The department seeks to foster a culture of creativity, innovation, and self-learning among students, helping them keep pace with rapid developments in modern technologies. 6. **Developing Technical Skills:** Focusing on equipping students with the essential knowledge and technical skills needed to meet the labor market's demands in areas such as construction, the oil industry, and automotive manufacturing. These objectives aim to prepare graduates who can effectively contribute to their fields and face contemporary challenges in mechanical engineering.	

	Skills
1. **Improving Production:** Developing production methods and controlling machinery and equipment to meet the demands of modern industry. 2. **Machine Design:** Teaching students how to design production machines and various manufacturing methods efficiently. 3. **Machine Management and Maintenance:** Equipping students with skills in managing and maintaining production machines using modern technological methods. 4. **Utilizing Modern Technologies:** Enhancing the use of computer and automation technologies in production processes to ensure quality and efficiency. 5. **Research and Development:** Directing graduation research towards solving industrial problems and fostering innovation in the fields of renewable energy, refrigeration, and air conditioning. 6. **Creative Thinking:** Enhancing students' scientific capabilities and stimulating creative and engineering thinking to keep pace with rapid developments in the industrial field. These objectives aim to prepare graduates to be applied engineers capable of contributing to industrial and technological development in Iraq.	**B- The program' s skill objectives**
	Values
1. **Providing Comprehensive Scientific Knowledge:** Offering a thorough understanding of mechanical engineering, with a focus on power mechanics, to enhance deep comprehension of fundamental principles. 2. **Empowering Students for Practical Projects:** Enabling students to execute practical and field projects, thereby enhancing their ability to solve complex engineering problems. 3. **Preparing Students for Graduate Studies:** Equipping students with a strong scientific foundation and in-depth knowledge to pursue advanced studies. 4. **Encouraging a Culture of Creativity and Innovation:** Fostering an environment where students can develop new solutions to energy and modern technology challenges. 5. **Enhancing Community Engagement:** Applying technical knowledge in projects that serve the community and meet its needs. 6. **Focusing on Sustainable Solutions:** Emphasizing sustainable approaches in the design of systems and technologies, contributing to environmental preservation.	C- Value Goals

9-Teaching and Learning Strategies

Teaching and learning strategies in the field of Power Mechanical Engineering Technology are considered essential elements for preparing engineers capable of facing technical and economic challenges in this field. These strategies aim to integrate theoretical knowledge with practical applications, contributing to the development of students' skills and enhancing their ability to innovate.

10-Evaluation Methods

1. **Continuous Assessment:** Used to monitor students' progress throughout the semester, it includes quizzes, projects, and presentations. This type of assessment helps identify students' strengths and weaknesses and promotes active learning.
2. **Practical Exams:** Focus on measuring students' ability to apply theoretical knowledge in practical situations. These exams may involve conducting experiments in laboratories or working on engineering projects that require the use of modern tools and equipment.
3. **Research Projects:** Students are required to conduct research on specialized topics in power mechanics, enhancing their research and analytical skills. These projects reflect the student's ability to apply knowledge in solving real engineering problems.
4. **Final Assessment:** Includes comprehensive exams that evaluate all the knowledge and skills students have acquired during their studies. These exams serve as a fundamental criterion for determining students' readiness to enter the job market.
5. **Self-Assessment:** Encourages students to evaluate their personal performance and identify areas for improvement. This type of assessment is an effective tool for enhancing self-awareness and motivating continuous learning.

11. Faculty							
Faculty members							
Names	Academic Rank	Specialization		Requirements/Special Skills if any		Faculty Members Count	
		General	private			Staff	Lecturer
Ehsan Fadhil Abbas	Prof.	Mechanical Engineering	Power generation			Staff	
Dr. Jawdat Ali Yagoob	Prof.	Metallurgical Engineering	Metallurgical Engineering			Staff	
Dr.Adnan Mohammed Hussein	Prof.	Mechanical Engineering	capacity			Staff	
Dr. Musa Mustafa Weiss	Assistant Prof.	Mechanical Engineering	Thermal			Staff	
Dr. Hussein Hayder Mohammed Ali	Assistant Prof.	Refrigeration and Air Conditioning Engineering	Thermal			Staff	
Dr. Sherwan Mohammed Najm	Lecturer	Mechanical Engineering	Metal Forming			Staff	
Dr. Shahen Mohammed Fakhraldin	Lecturer	Mechanical Engineering	Renewable Energy			Staff	
Dr. Afrah Turki Awad	Lecturer	Mechanical Engineering	Renewable Energy and Nanotechno			Staff	

		g	logy				
Iesam Jondi Hasan	Assistant Prof.	Mechanical Engineering	Applied Mechanics Design			Staff	
Najat Najmaldeen Hamed	Lecturer	Metallurgical Engineering	Production Engineering			Staff	
Murad Saeed Sedeeq	Lecturer	Refrigeration and Air Conditioning Engineering	Thermal / Energy			Staff	
Intisar Khalaf Saleh	Lecturer	Electronics and Control Engineering	Electronics and Control Engineering			Staff	
Zaynab Ismail Abdullah	Assistant Lecturer	Refrigeration and Air Conditioning Engineering	Thermal			Staff	
Ehsan Mohammed Khader	Assistant Lecturer	Refrigeration and Air Conditioning Engineering	Thermal			Staff	
Zhala Azeez Mohammed	Assistant Lecturer	Refrigeration and Air Conditioning Engineering	Thermal			Staff	
Intisar Sabah Khalaf	Assistant Lecturer	Refrigeration and Air Conditioning Engineering	Thermal			Staff	
Furqan Haider Mohammed	Assistant Lecturer	Refrigeration and Air Conditioning Engineering	Thermal			Staff	

Firas Faisal Qader	Assistant Lecturer	Refrigeration and Air Conditioning Engineering	Thermal			Staff	
Manar mohammed Noori	Assistant Lecturer	هندسة ميكانيك	Thermal			Staff	

Professional development
Professional development for new department members
Through the teaching methods course and the teaching eligibility test, as well as holding courses, seminars, workshops and seminars to train
Them to work in approved contexts.
Assigning him to give lectures, scientific trips, training courses, educational meetings.

12-Acceptance Criteria
The admission criteria are based on a plan specific to the ministry and according to the student's branch in middle school and his average.
13-most important sources of information about the program
Books and resources, handouts, YouTube videos, and scientific research.

14 -Program Development Plan
Future plans include increasing laboratory equipment as well as developing the curriculum by deleting, adding and replacing.

Program Skills Chart																
Required learning outcomes of the program																
Year/Level	Course code	Course name	Essential o ?optional	Knowledge					Skills Values			Chemistry				
				1A	2A	3A	4A	1A	2B	3B	4B	1C	2C	3C	/	
2023-2024 Level 1	ntu100	Human rights and democracy	essential	*	*	*	*	*	*	*	*	*	*	*		
	teck101	Differentiation and integration methods	essential	*	*	*	*	*	*	*	*	*	*	*		
	teck103	Workshop	essential	*	*	*	*	*	*	*	*	*	*	*		
	ntu101	English	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe101	Mechanics Engineering /static	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe104	Thermodynamics	essential	*	*	*	*	*	*	*	*	*	*	*		
	ntu102	Computer	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe106	Electrotechnology	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe102	Mechanics Engineering /dynamics	essential	*	*	*	*	*	*	*	*	*	*	*		
	teck102	Engineering Drawing	essential	*	*	*	*	*	*	*	*	*	*	*		
	ntu103	Arabic Languge	essential	*	*	*	*	*	*	*	*	*	*	*		
	teck104	Physics	essential	*	*	*	*	*	*	*	*	*	*	*		

2023-2024 Level 2	ntu200	Crimes of Ba'ath Party	essential	*	*	*	*	*	*	*	*	*	*	*		
	teck201	Differentiation equations	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe201	Engineering materials	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe207	Fluid mechanics-static	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe205	Mechanical drawing	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe203	Steam & gas power plants	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe208	Fluid mechanics dynamics	essential	*	*	*	*	*	*	*	*	*	*	*		
	teck202	Statics	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe206	Assembly drawing of mechanical parts	essential	*	*	*	*	*	*	*	*	*	*	*		
	ntu201	Professional Ethics	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe202	Strength of materials	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe209	Theory of machine	essential	*	*	*	*	*	*	*	*	*	*	*		

2023-2024 Level 3 Power plants Branch	mpe301	Computer applications	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe302	Conduction and radiation heat transfer	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe303	mechanical design	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe304	Engineering analytics	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe300	Internal combustion engine	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe306	Convection heat transfer and heat exchangers	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe307	Numerical analytics	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe308	Gas dynamics	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe309	Electrical machines	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe310	vibrations	essential	*	*	*	*	*	*	*	*	*	*	*		

2023-2024 Level 3 Renewable Energy Branch	mpe301	Computer applications	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe302	Conduction and radiation heat transfer	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe303	mechanical design	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe304	Engineering analytics	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe305	Renewable energy	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe306	Convection heat transfer and heat exchangers	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe307	Numerical analytics	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe308	Gas dynamics	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe309	Electrical machines	essential	*	*	*	*	*	*	*	*	*	*	*		
	mpe310	vibrations	essential	*	*	*	*	*	*	*	*	*	*	*		

2023-2024 Level 4 Power plants Branch	mpe401	Engineering project management	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe402	control circuits	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe403	Heat system simulation	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe411	parts of steam power plants	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe405	Refrigeration and air conditioning	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe406	quality control	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe407	Turbo machines	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe412	gas and air power plant	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe409	Maintenance and operation of stations	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe410	project	essential	*	*	*	*	*	*	*	*	*	*	*	

2023-2024 Level 4 Renewable Energy Branch	mpe401	Engineering project management	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe402	control circuits	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe403	Heat system simulation	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe404	station economics	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe405	Refrigeration and air conditioning	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe406	quality control	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe407	Turbo machines	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe408	Store and recover energy	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe409	Maintenance and operation of stations	essential	*	*	*	*	*	*	*	*	*	*	*	
	mpe410	Project	essential	*	*	*	*	*	*	*	*	*	*	*	

Differentiation and integration methods - teck101 - First Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
Differentiation and integration methods - teck101 - First Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
First Semester\First year
6. Number of Credit Hours (Total) / Number of Units (Total):
150\6
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Intisar Khalaf Saleh Email: Intisarks@ntu.edu.iq
8. Course Objectives :

Course Objectives	• **Understand the fundamental concepts of limits, derivatives, and integrals, and their applications in solving real-world problems.** • **Develop the ability to analyze and interpret mathematical functions using graphical, numerical, and analytical methods.** • **Apply differentiation and integration techniques to solve problems in physics, engineering, and economic**

9. Teaching and Learning Strategies :	
Strategy	Lectures and interactive problem-solving sessions will be used to explain core concepts and encourage student engagement. Students will participate in group discussions, assignments, and quizzes to reinforce learning and develop critical thinking skills.

10. Course Structure (Theoretical):

Week	**Hours 4 Hrs**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	Theoretical	Understanding matrices	Matrices and Determinants	Blackboard explanation with classroom and homework	Quizzes, weekly, monthly and final exams

				preparations	
2	Theoretical	Understanding Cramer's rule	Cramer's Rule	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
3	Theoretical	Knowing trigonometric equations and angles	Trigonometry	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
4	Theoretical	Drawing equations	Graph of Equations	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
5	Theoretical	Vector rules	Vectors	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
6	Theoretical	2D and 3D vector rules	2D and 3D Vectors	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
7	Theoretical	Understanding equations and limits	Equations and Limits	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
8	Theoretical	Rules and applications of limits	Application on Limits	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
9	Theoretical	Explaining derivative theory	Derivative Theory	Blackboard explanation with	Quizzes, weekly, monthly and

				classroom and homework preparations	final exams
10	Theoretical	What chain rule represents	Theory- Chain Rule	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
11	Theoretical	Understanding the inverse function	Inverse Functions	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
12	Theoretical	Understanding log. and exp.	Logarithmic and Exponential Derivatives	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
13	Theoretical	Conic section applications	Conic Sections	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
14	Theoretical	Calculating area under curves and by parts	Area under curves	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
15	Theoretical	Understanding integrations methods	Integration methods	Blackboard explanation with classroom and homework preparations	Quizzes, weekly, monthly and final exams
11. Course Structure (Practical):					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	Practical	Understanding matrices	Matrices and Determinants	More question about	Weakly examination

				the subject	
2	Practical	Understanding Cramer's rule	Cramer's Rule	More question about the subject	Weakly examination
3	Practical	Knowing trigonometric equations and angles	Trigonometry	More question about the subject	Weakly examination
4	Practical	Drawing equations	Graph of Equations	More question about the subject	Weakly examination
5	Practical	Vector rules	Vectors	More question about the subject	Weakly examination
6	Practical	2D and 3D vector rules	2D and 3D Vectors	More question about the subject	Weakly examination
7	Practical	Understanding equations and limits	Equations and Limits	More question about the subject	Weakly examination
8	Practical	Rules and applications of limits	Application on Limits	More question about the subject	Weakly examination
9	Practical	Explaining derivative theory	Derivative Theory	More question about the subject	Weakly examination
10	Practical	What chain rule represents	Theory- Chain Rule	More question about the subject	Weakly examination
11	Practical	Understanding the inverse function	Inverse Functions	More question about the subject	Weakly examination
12	Practical	Understanding log. and exp.	Logarithmic and Exponential Derivatives	More question about the subject	Weakly examination
13	Practical	Conic section	Conic Sections	More	Weakly

		applications		question about the subject	examination
14	Practical	Calculating area under curves and by parts	Area under curves	More question about the subject	Weakly examination
15	Practical	Understanding integrations methods	Integration methods	More question about the subject	Weakly examination

12. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
13. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	"CALCULUS", by George. B. Thomas.
Main references (sources)	"Engineering Mathematics", by John Bird.
Recommended books and references (scientific journals, reports...)	Any mathematics journal or report
Electronic References, Websites	https://www.youtube.com /@husseinkhashan1483

Electrotechnology - mpe106 - First Level

Course Description

14. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
15. Scientific Department:
Mechanical Power Techniques Engineering
16. Course Name / Course Code / Level:
Electrotechnology - mpe106 - First Level
17. Available Attendance Forms:
Attendance
18. Semester / Year:
Second Semester\ First Year
19. Number of Credit Hours (Total) / Number of Units (Total):
Total hour 175\ Number of Units 7
20. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Intisar Khalaf Saleh Email: Intisarks@ntu.edu.iq

21. Course Objectives :

Course Objectives	**Understand Fundamental Electrical Concepts** Students will be able to explain and apply basic electrical principles, such as voltage, current, resistance, and power. **Develop Practical Skills in Circuit Design and Troubleshooting** Students will learn how to design, assemble, and test electrical circuits safely and effectively. **Apply Theoretical Knowledge to Real-World Electrical Systems** Students will connect theoretical concepts to practical applications in residential, commercial, or industrial electrical systems

22. Teaching and Learning Strategies :

Strategy	Teaching and Learning Strategies refer to the methods used by teachers to deliver content and engage students in the learning process. These may include lectures, hands-on practical work, group discussions, and problem solving activities to enhance understanding and skill development

23. Course Structure (Theoretical):

Week	Hours (2 Hrs)	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	How can we measure I, v, r,	Measuring device	Explain Device Work	H.W C.W Data show
2	Theoretical	The R STILL FIXED WHEN V CHANGE	Ohm's law	Explain THE CIRCUIT	H.W C.W Data show
3	Theoretical	Distinguish Between three connection	resistors in series mixed parallel	Connection R on the board	H.W C.W Data show
4	Theoretical	Connection The circuit	Kirchhoff's law for voltage and current	Measurement and connection the circuit	H.W C.W Data show
5	Theoretical	Connection	Thevenin,	Measuremet and	H.W

		The circuit		connection the circuit	C.W Data show
6	Theoretical	Nodal theory	Norton	Measurement and connection circuit	H.W C.W Data show
7	Theoretical	Connection The circuit	resonant	Measurement and connection circuit	H.W C.W Data show
8	Theoretical	Connection The circuit	Voltageand alternating current magnetic circuits	Measurement and connection circuit	H.W C.W Data show
9	Theoretical	Connection The circuit	Frequency, wavelength, instant	Measurement and connection circuit	H.W C.W Data show
10	Theoretical	Connection The circuit	instantaneous value of voltage-and current	Measurement and connection circuit	H.W C.W Data show
11	Theoretical	Connection The circuit	Impedance-and phase-difference angle	Measurement and connection circuit	H.W C.W Data show
12	Theoretical	Connection The circuit	Conversion-from delta link to star link	Measurement and connection circuit	H.W C.W Data show
13	Theoretical	Connection The circuit	permittivity - power factor Drawa-phase diagram	Measurement and connection circuit	H.W C.W Data show
14	Theoretical	Connection The circuit	Voltage Adjustment Using Full Wave	Measurement and connection circuit	H.W C.W Data show
15	Theoretical	Connection The circuit	Voltage Adjustment Using Full-Wave	Measurement And connection circuit	H.W C.W Data show
Course Structure (Practical):					
Week	**Hours (2 Hrs)**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	Practical	How can we measure I, v, r,	Measuring device	Explain Device Work	Compare between theoretical results

2	Practical	The R STILL FIXED WHEN V CHANGE	Ohm's law	Explain THE CIRCUIT	Compare between theoretical results
3	Practical	Distinguish Between three connection	resistors in series mixed parallel	Connection R on the board	Compare between theoretical results
4	Practical	Connection The circuit	Kirchhoff's law for voltage and current	Measurement and connection the circuit	Compare between theoretical results
5	Practical	Connection The circuit	Thevenin,	Measurement and connection the circuit	Compare between theoretical results
6	Practical	Nodal theory	Norton	Measurement and connection circuit	Compare between theoretical results
7	Practical	Connection The circuit	resonant	Measurement and connection circuit	Compare between theoretical results
8	Practical	Connection The circuit	Voltageand alternating current magnetic circuits	Measurement and connection circuit	Compare between theoretical results
9	Practical	Connection The circuit	Frequency, wavelength, instant	Measurement and connection circuit	Compare between theoretical results
10	Practical	Connection The circuit	instantaneous value of voltage-and current	Measurement and connection circuit	Compare between theoretical results
11	Practical	Connection The circuit	Impedance-and phase-difference angle	Measurement and connection circuit	Compare between theoretical results
12	Practical	Connection The circuit	Conversion-from delta link to star link	Measurement and connection circuit	Compare between theoretical results
13	Practical	Connection The circuit	permittivity - power factor	Measurement and connection	Compare between

			Drawa-phase diagram	circuit	theoretical results
14	Practical	Connection The circuit	Voltage Adjustment Using Full Wave	Measurement and connection circuit	Compare between theoretical results

25. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
26. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	
Main references (sources)	Theraja, A.K. (2016) Textbook of Electrical Technology. S Chand & Company Limited, New Delhi.
Recommended books and references (scientific journals, reports...)	Any journal or report related to Electrical technology.
Electronic References, Websites	https://www.youtube.com/watch?v=Gdq_cqS3fu8&list=PLXpxvao1zRCssfdWBTB5kPiesHbFhQroX

Engineering Drawing - teck102 - First Level

Course Description

27. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
28. Scientific Department:	
Mechanical Power Techniques Engineering	
29. Course Name / Course Code / Level:	
Engineering Drawing - teck102 - First Level	
30. Available Attendance Forms:	
Attendance	
31. Semester / Year:	
Semester	
32. Number of Credit Hours (Total) / Number of Units (Total):	
4 / 6	
33. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025 Name: Rahell Nasruldeen Mohammed Rashid Email: rahell.mohamed25@ntu.edu.iq	
34. Course Objectives :	
Course Objectives	• Understand Engineering Drawing Standards: Develop a solid foundation in interpreting and creating engineering drawings according to standard conventions (ISO, BIS, ANSI, etc.).

	• Master AutoCAD Tools and Techniques: Gain proficiency in using AutoCAD software for 2D drafting and basic 3D modeling, including drawing, modifying, annotating, and dimensioning tools. • Apply CAD Skills to Technical Drawings: Create accurate technical drawings such as orthographic projections, isometric views, sections, and assembly drawings used in engineering applications. • Enhance Design Communication Skills: Communicate design intent effectively through precise digital drawings, layouts, and plotting, preparing students for professional engineering workflows.
35. Teaching and Learning Strategies :	
Strategy	• Hands-on Practice with AutoCAD Software Encourage active learning through guided lab sessions and individual exercises, enabling students to apply commands and tools in real-time. • Project-Based Learning (PBL) Assign real-world engineering drawing projects (e.g., mechanical parts, architectural layouts) to develop problem-solving and design skills. • Blended Learning Approach Combine classroom instruction with video tutorials, interactive simulations, and online resources to support different learning styles. • Continuous Assessment and Feedback Use quizzes, assignments, and peer reviews to monitor progress, provide timely feedback, and reinforce correct drawing practices and CAD usage.

36. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours Theoretical	Introduction to Principles of drawing Using AutoCAD	Principles of drawing	Theoretical	Quizzes
2	2 hours Theoretical	drawing Title Block Using AutoCAD	Title Block	Theoretical	Online assignments
3	2 hours Theoretical	Drawing Commands with Exercise	drawing geometric shapes the	Theoretical	Homework

			basic		
4	2 hours Theoretical	Drawing Aids Commands with Exercise	Graphic Adjustments - Computer Graphics Aids	Theoretical	Quizzes
5	2 hours Theoretical	Introduction to Edit Commands with Exercise	Geometric line- Types of engineering drawing lines- Geometric operations- Dimensional placement.	Theoretical	Quizzes
6	2 hours Theoretical	Dimensions , Layers, Linetypes, Colors with Exercise	Orthographic Projections	Theoretical	Online assignments
7	2 hours Theoretical	Orthographic Projections Using AutoCAD with Exercise	Mid-term Exam	Theoretical	Quizzes
8	2 hours Theoretical	First angle projection Using AutoCAD with Exercise	Principle of First Angle Projection	Theoretical	Homework
9	2 hours Theoretical	Third angle projection Using AutoCAD with Exercise	Principle of Thired Angle Projection	Theoretical	Reports
10	2 hours Theoretical	Construct the view, from the two given views Using AutoCAD with Exercise	The conclusion of a third projection from Two known locations.	Theoretical	Online assignments
11	2 hours Theoretical	Principles of sectioning Using	Cutting theory- Shapes and	Theoretical	Project

		AutoCAD with Exercise	lines of cuts by type of material.		
12	2 hours Theoretical	Full Section Drawing Using AutoCAD with Exercise	Drawing of projections cut from a specific site	Theoretical	Quizzes
13	2 hours Theoretical	Half Section Drawing Using AutoCAD with Exercise	Drawing of partially cut elevations. Drawing of semi-cut elevations.	Theoretical	Reports
14	2 hours Theoretical	3D Coordinates Drawing Using AutoCAD with Exercise	3D Coordinates Drawing Using AutoCAD	Theoretical	Project
15	2 hours Theoretical	3D Solid Primitive Drawing Using AutoCAD with Exercise	3D Solid Primitive Drawing Using AutoCAD	Theoretical	Online assignments

37. Course Structure (Practical):

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2 hours Practical	Introduction to Principles of drawing Using AutoCAD	Principles of drawing	practical	Lab
2	2 hours Practical	drawing Title Block Using AutoCAD	Title Block	practical	Lab
3	2 hours Practical	Drawing Commands with Exercise	drawing geometric shapes the basic	practical	Lab
4	2 hours Practical	Drawing Aids Commands with Exercise	Graphic Adjustments - Computer Graphics	practical	Lab

			Aids		
5	2 hours Practical	Introduction to Edit Commands with Exercise	Geometric line- Types of engineering drawing lines- Geometric operations- Dimensional placement.	practical	Lab
6	2 hours Practical	Dimensions , Layers, Linetypes, Colors with Exercise	Orthographic Projections	practical	Lab
7	2 hours Practical	Orthographic Projections Using AutoCAD with Exercise	Mid-term Exam	practical	Lab
8	2 hours Practical	First angle projection Using AutoCAD with Exercise	Principle of First Angle Projection	practical	Lab
9	2 hours Practical	Third angle projection Using AutoCAD with Exercise	Principle of Thired Angle Projection	practical	Lab
10	2 hours Practical	Construct the view, from the two given views Using AutoCAD with Exercise	The conclusion of a third projection from Two known locations.	practical	Lab
11	2 hours Practical	Principles of sectioning Using AutoCAD with Exercise	Cutting theory- Shapes and lines of cuts by type of material.	practical	Lab
12	2 hours Practical	Full Section Drawing	Drawing of projections	practical	Lab

		Using AutoCAD with Exercise	cut from a specific site		
13	2 hours Practical	Half Section Drawing Using AutoCAD with Exercise	Drawing of partially cut elevations. Drawing of semi-cut elevations.	practical	Lab
14	2 hours Practical	3D Coordinates Drawing Using AutoCAD with Exercise	3D Coordinates Drawing Using AutoCAD	practical	Lab
15	2 hours Practical	3D Solid Primitive Drawing Using AutoCAD with Exercise	3D Solid Primitive Drawing Using AutoCAD	practical	Lab

38. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student is :
Quizzes, Homework, Reports, Online assignments, Midterm exam and Final exam

39. Learning and Teaching Resources :

AutoCAD 2025 Tutorial First Level 2D Fundamentals –	by Randy H. Shi
utoCAD 2025 Instructor	by James A. Leach and Shawna Lockhart
AutoCAD 2025: A Problem-Solving Approach	by Sham Tickoo

Engineering Mechanics/Kinematics-MPE102- First level

Course Description

1. Educational institution
Northern Technical University / Technical Engineering College / Kirkuk
2. Scientific Department
Mechanical Power Engineering
3. Course Name/Code/Level
Engineering Mechanics/Kinematics-MPE102- First level
4. Available attendance forms
My presence
5. semester/year
Semester system
6. Number of study hours (total)
3hour
7. Date this description was prepared
1-7-2025
8. Course objectives (general objectives of the course)
The course focuses onDynamics focuses on understanding and analyzing the motion of objects under the influen of forces, enabling students to apply mechanical laws to solve practical problems, analyze performance, improve efficiency, prevent errors and injuries, and develop scientific research and analysis skills in this vital field.
1-Understanding the basic principles of kinematics
Introducing the student to the concepts of kinematics (the study of motion without regard to its causes) and kinetics (the study of forces affecting motion), including velocity, acceleration, displacement, and time, as well as forces and moments affecting moving objects..
2-Applying mechanical laws to the motion of objects
Training the student to use Newton's laws of motion and the laws of conservation of momentum and energy to analyze and interpret the motions of objects under various conditions, whether in a straight line, in a circular path, or in complex systems..
3- Scientific analysis of movement
To provide the student with the ability to analyze mathematical, engineering, or natural movements using scientific and mathematical foundations, and to interpret the results objectively and accurately..
4- Improving performance and developing practical solutions.

- Enable the student to use dynamic analysis to improve technical performance in applied fields (such as sports or engineering), and to develop practical solutions to problems related to motion and forces.

9. Course outcomes, teaching, learning and assessment methods

Course outcomes

identificationIt is a set of knowledge, skills and values that the course seeks to achieve in students.

Its importanceIt provides the learner with a clear idea of what they will be able to do after completing the course, and helps in designing and evaluating courses.

How is it determined?The course outcomes are determined based on the objectives of the academic program to which the course belongs.

Evaluation methods	Teaching and learning methods	Outputs
1-**Short tests and assignments** 2-**Class discussions** 3- Monthly tests	1-**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** 5-**For repetition and mental training**	أ- knowledge A1-**Understanding and analyzing the forces acting on moving objects** A2-**Understanding the concepts of velocity, displacement, and acceleration** A3-**Understanding projectile motion** A4-**Distinguish between mechanical processes of rest and motion** A5-**Understanding the principle of work, power and energy** A6-**Learn the principle of vibrations**
1-**Short tests and assignments** 2-**Class discussions** 3- Monthly tests	1-**Use of modern technological means** 2- 3-**Encourage dialogue and discussion** 4-**Use feedback** 5-**For repetition and mental training**	B - Skills B1-**Fine motor analysis skills** B2-**Motor performance interpretation skills** B3 -**Skills in using mechanical laws in practical application** B4-**Harat uses modern techniques in kinetic analysis**
1-**Short tests and assignments** 2-**Class discussions**	-**Use of modern technological means** 2-	C- Values A1-**Scientific and systematic thinking** A2-**The value of innovation and creativity** A3-**Professional and social responsibility**

3- Monthly tests	3-**Encourage dialogue and discussion** 4-**Use feedback** 5-**For repetition and mental training**	A4-**Self-learning and continuous development** A5-**Cooperation and teamwork**

Course structure**(Theoretical Vocabulary)** .10

Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	watches	week
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**Introduction to Dynamics and types movement**	Definition of dynamics and its importance in studying the motion of rigid and soft bodies. Types of motion: linear motion, rotational motion, and compound motion.	3 Theoretic	1
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**Kinematics(Kine atics)**	The study of the motion of objects in terms of position, velocity, and acceleration without regard to the forces causing the motion.. Description of motion in straight and plane coordinates, and motion of particles in Cartesian coordinates	3 Theoretic	2
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**Kinetics (Kinetics)**	Study of the forces acting on moving objects and their effect on motion. Applying Newton's laws of motion to rigid and accelerating bodies	3 Theoretic	3
1- Short tests and assignments 2-**Class**	**Oral explanation and guidance** 2-**Use of visual teaching aids**	**Movement (spee acceleration, displacement**	Analysis of the motion of objects in terms of velocity, acceleration, displacement, and time, whether in linear or rotational motion.	3 Theoretic	4

discussions	3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**				
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**Basic laws of dynamics**	Apply Newton's laws of motion, and th laws of conservation of momentum and energy, to understand how forces affect the motion of objects..	3 Theoretic	5
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**Projectile motion**	Study of the motion of objects moving curved paths under the influence of gravity, and calculating their speeds, accelerations, and range of motion	3 Theoretic	6
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**Central forces an moments**	Analysis of forces acting towards the center of rotation, such as the centripeta force, and the study of moments and th effect on the motion of solid bodies.	3 Theoretic	7
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**Work, energy, and ability**	Study the principle of work and energy, and analyze how energy is converted and its effect on the movement of objects..	3 Theoretic	8
1- Short tests	**Oral explanation**	**motion of rigid**		3	9

and assignments 2-**Class discussions**	**and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**bodies**		Theoretic	
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	moment of inertia		3 Theoretic	10
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**For mechanical vibrations**	Study of vibrational movements and th effect on mechanical systems.	3 Theoretic	11
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	**Applications of dynamics in biomechanics**		3 Theoretic	12
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion**	**Momentum and conservation of momentum**	Study of momentum and its conservation laws in closed systems. Collision Analysis and Multi-Body Systems	3 Theoretic	13

	4-**Use feedback** **5-Mental training**				
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	determination and ability	Study the definition, difference betwee them and applications of their use	3 Theoretic	14
1- Short tests and assignments 2-**Class discussions**	**Oral explanation and guidance** 2-**Use of visual teaching aids** 3-**Encourage dialogue and discussion** 4-**Use feedback** **5-Mental training**	Review and link topics		3 Theoretic	15

11. Curriculum Development Plan

Continuously updating the curriculum to keep pace with developments in the labor market (Curriculum Update Committee, Scientific Committee) such as:

1- **Develop curricula that are compatible with the labor market**
2- **Holding scientific seminars and conferences aimed at updating curricula**
3- **Follow up on scientific developments in the field of specialization**

12. infrastructure

Available	**Classrooms, laboratories and workshops**
Available	**1- Required textbooks**
-Hippler's Engineering Mechanics (Static) 15t Edition(15th Edition) **3- JL Meriam & LG Kraige, 8th Edit**	**2- Main References (Sources)**
1-Journal of Mechanical Engineering Science **2-Journal of Engineering Mechanics**	**أ) Recommended books and references (scientific journals, reports, etc.)**
• **https://mechanical-fet.com/%D8%AF%D9%8A%D9%86%D8%A7%D9%85%D9%8A%D9%83%D8%A7**	**ب) Electronic references, websites,.....**

• https://www.udemy.com/course/dynam s-course/?couponCode=ST16MT23062 • /	

Mechanics Engineering - Statics-MPE101- First level

Course Description

1. Educational institution
Northern Technical University Engineering Technical College Kirkuk
2. Sectionscientific
Mechanical Power Engineering
3. Course Name/Code/ Level
Mechanics Engineering - Statics - MPE101-The first level
4. Available attendance forms
My presence
5. semester/year
Semester system
6. Number of study hours(kidney)
3 hour
7. Date this description was prepared
1-7-2025
8. Course objectives (general objectives of the course)
The general objectives of studying the Static Engineering Mechanics course include:: • Develop students' ability to predict the effects of forces, moments, and couples on rigid bodies a rest. • Develop problem-solving skills and understand force analysis by applying the principle of equilibrium. • Understand and draw a free body diagram to analyze the forces acting on objects.. • Analyze forces and find the resultant forces in two- and three-dimensional systems • Applying the principle of equilibrium to simple structures such as bridges and frames • Understanding the phenomenon of friction and frictional force in machine parts • Providing the student with a solid foundation in the principles of engineering mechanics as a ba for various engineering sciences. • Providing the student with knowledge and understanding in the fields of engineering mechanics rest, and the analysis of forces and moments. • Preparing the student to be able to apply the principles of engineering mechanics to solve practi scientific and engineering problems.
9. OutputsThe decisionTeaching, learning and assessment methods **Course outcomes** **identificationIt is a set of knowledge, skills and values that the course seeks to achieve in students.**

Its importanceIt provides the learner with a clear idea of what they will be able to do after completing the course, and helps in designing and evaluating courses. **How is it determined?The course outcomes are determined based on the objectives of the academic program to which the course belongs.**					
Outputs				Teaching and learning methods	Evaluation methods
أ- knowledge A1- Identify the basic concepts of engineering mechanics principles in a state of rest, A2- The ability to apply the principle of equilibrium to solve power problems in two- and three-dimensional systems.D A3- Analyze the resulting forces and determine their resultant in simple structures such as bridges and frames. A4- Understanding the phenomenon of friction and frictional force and their effect on machine parts.				-Theoretical lectures -Explain using illustrations and diagrams -Theoretical discussions and problem solving -Use of visual presentations and educational videos	- Short tests (Quizzes - homework - Classroom participation - For reports or presentations
B -Skills B1-The skill of analyzing and composing forces and calculating frictional forces in different bodies B2 - Ability to calculate forces in structures such as trusses and analyze moments and moments of inertia B3 - Developing skills in solving theoretical problems related to analyzing forces and moments at rest in a systematic and scientific manner. B4- Acquire the skills of geometric analysis of different geometric shapes, which enhances the applied understanding of static mechanics.				-Theoretical lectures -Explain using illustrations and diagrams -Theoretical discussions and problem solving -Use of visual presentations and educational videos	-Short tests (Quizzes -homework -Classroom participation -For reports or presentations
C-values A1-Accuracy and attention to detail when analyzing forces and balance, which enhances concentration and organization skills in engineering work. A2- The ability to work in teams and cooperate through practical applications and projects that require coordination between students. A3- Awareness of the importance of safety and quality in the design and analysis of engineering structures and systems to ensure their stability and safety.				-Theoretical lectures -Explain using illustrations and diagrams -Theoretical discussions and problem solving -Use of visual presentations and educational videos	-Short tests (Quizzes - homework - Classroom participation - For reports or presentations
10. Course structure **(Theoretical Vocabulary)**					
week	watc	Required learning	Unit name/topic	Teaching	Evaluation

	hes	outcomes		method	method
1	theore al	tariff As a case balance Forces And determinat on bodies Fixed	concept stillness(Stati	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
2	theore al	How to Analyze it in after	Forces(Forces)And its types	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
3	theore al	How to Analyze it In three dimensions	Forces(Forces)And its types	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
4	theore al	Includes Condition the first For balance(total Forces clear It equals zero)	principle balance Al-Sakuni	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers**	Short tests (Quizzes - homework - Classroom participation - For reports or

				Visual and video educational	presentations
5	theore al	Condition the second F balance(total Determinations clear It equals zero)1.	principle balance Al-Sakuni	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
6	theore al	Its impact on bodies	determination(Momen	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
7	theore al	Its effect on bodies	husband Forces(Coupl	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
8	theore al	tool Basic To analyze Forces	fee a plan body Free(Free Body Diagram)	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues**	Short tests (Quizzes - homework - Classroom participation - For reports

				-Use of offers Visual and video educational	or presentations
9	theore al		analysis Structures simple like gables(Trusses)	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
10	theore al	Its impact on balance bodies	Centers Gravity(Cente of Gravity)	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
11	theore al	Its impact on balance bodies	Centers mass(Centroic	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and video educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
12	theore al	Its impact on balance bodies	Friction (Friction)And its types	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution**	Short tests (Quizzes - homework - Classroom participation

				Issues **-Use of offers** **Visual and video** **educational**	- For reports or presentations
13	theore al	Its impact on balance bodies	Forces Distributed(Distribute Forces)	**-Lectures Theory** **-the explanation** **Using Fees** **Illustrative and plans** **-Discussions** **Theory Solution** **Issues** **-Use of offers** **Visual and video** **educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
14	theore al	Its impact on balance bodies	Applications on bodie solid and the lines and shapes The vehicle	**-Lectures Theory** **-the explanation** **Using Fees** **Illustrative and plans** **-Discussions** **Theory Solution** **Issues** **-Use of offers** **Visual and video** **educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
15	theore al	Its impact on balance bodies	Concepts Other like corner stability and an Friction Great	**-Lectures Theory** **-the explanation** **Using Fees** **Illustrative and plans** **-Discussions** **Theory Solution** **Issues** **-Use of offers** **Visual and video** **educational**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
11. Curriculum Development Plan					
Continuously updating the curriculum to keep pace with developments in the labor market (Curriculum Update Committee, Scientific Committee) such as: **1- Develop curricula that are compatible with the labor market**					

2- Holding scientific seminars and conferences aimed at updating curricula 3- **Follow up on scientific developments in the field of specialization**	
12. infrastructure	
Classrooms, laboratories and workshops	**Available**
1- Required textbooks	**Available**
2- Main References (Sources)	• JL Meriam & LG Kraige • RC Hibbler
A) Recommended books and references (scientific journals, reports, etc.)	-The book of Simplified Engineering Mechanics (Systems) by Ismail Khadir Abdullah Al-Jabouri - yourEngineering Mechanics / Statics by Yakhour and colleagues -The book of engineering mechanics - Statics - Part 1 b Nizar Gabriel Elias,
B)Electronic references, websites,.....	**- https://www.noor-book.com/tag/%D8%AD%D9%84-%D9%85%D8%B3%D8%A7%D8%A6%D9%84-%D8%A7%D9%84%D9%85%D9%8A%D9%83-%D8%A7%D9%86%D9%8A%D9%83-%D8%A7%D9%84%D9%87%D9%86%D8%AF-%D8%B3%D9%8A**

Physics - teck104 - First Level

Course Description

1. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
2. Scientific Department:	
Mechanical Power Techniques Engineering	
3. Course Name / Course Code / Level:	
Physics - teck104 - First Level	
4. Available Attendance Forms:	
Attendance	
5. Semester / Year:	
Second Semester –first level	
6. Number of Credit Hours (Total) / Number of Units (Total):	
125\5	
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025 Name: Intisar Khalaf Saleh Email: Intisarks@ntu.edu.iq	
8. Course Objectives :	
Course Objectives	□ To provide students with a solid foundation in fundamental physics concepts including mechanics, energy, heat, electricity, and magnetism. • To develop students' analytical and problem-solving skills through the application of physical laws to real-world engineering situations. □ To prepare students for advanced technical courses by linking theoretical physics principles to mechanical power systems and engineering applications.
9. Teaching and Learning Strategies :	
Strategy	◇ . Conceptual Understanding with Practical Relevance Emphasize understanding of fundamental physics concepts and relate

	them to mechanical systems and real-life engineering applications (e.g motion in engines, forces in machines). ◇ Integration of Theory and Application Link theoretical lectures with laboratory experiments and industrial examples to strengthen students' ability to apply knowledge in technic fields. ◇ Link theoretical lectures with laboratory experiments and industrial examples to strengthen students' ability to apply knowledge in technical fields.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theoretical	• Differentiate between scalar and vector quantities. • Define the force and its applications.	The force	Lecture, Numerical examples, In-class exercises	H.W Data show
2	2 theoretical	• Define and calculate average speed using distance and time. • Differentiate between average speed and average velocity.	Average speed	Lecture, Numerical examples, In-class exercises	H.W Data show
3	2 theoretical	□ Understand the concept of instantaneous velocity as a limit.	Instantaneous Velocity	Lecture, Numerical examples, In-class	H.W Data show

		□ Interpret velocity from position-time graph		exercises	
4	2 theoretical	• Define acceleration and compute it from velocity-time data. • Analyze motion using acceleration signs and units.	Memorize the three laws of motion	Lecture, Numerical examples, In-class exercises	H.W Data show
5	2 theoretical	• Apply kinematic equations to solve motion problems. • Interpret motion graphs under constant acceleration.	constant acceleration motion	Lecture, Numerical examples, In-class exercises	H.W Data show
6	2 theoretical	• Explain the concept of Newton's laws. • Fields of using Newton's laws.	Newton's three law	Lecture, Numerical examples, In-class exercises	H.W Data show
7	2 theoretical	• Use F= ma to solve force-related problems. • Analyze systems with multiple forces acting.	Newton's second law	Lecture, Numerical examples, In-class exercises	H.W Data show
8	2 theoretical	• Describe static and kinetic friction forces.	The Friction	Lecture, Numerical examples,	H.W Data show

		• Apply friction laws to motion problems.		In-class exercises	
9	2 theoretical	• Define work and relate it to force and displacement. • Understand work as a form of energy transfer.	Work and energy Kinetic energy:	Lecture, Numerical examples, In-class exercises	H.W Data show
10	2 theoretical	• Define gravitational potential energy. • Understand energy storage due to position.	In physics, potential energy	Lecture, Numerical examples, In-class exercises	H.W Data show
11	2 theoretical	• Define power as the rate of doing work. • Calculate power from work and time or force and velocity.	POWER	Lecture, Numerical examples, In-class exercises	H.W Data show
12	2 theoretical	• State the principle of energy conservation. • Solve problems involving energy transformation.	Conservation of energy	Lecture, Numerical examples, In-class exercises	H.W Data show
13	2 theoretical	• Define momentum as p=mv.	Momentum	Lecture, Numerical	H.W Data show

		• Solve linear momentum problems in various systems.		examples, In-class exercises	
14	2 theoretical	• Identify different forms of energy (kinetic, potential, thermal, etc.). • Analyze energy transformations between different types in physical systems.	Conservation of energy type	Lecture, Numerical examples, In-class exercises	H.W Data show
15	2 theoretical	• Apply momentum conservation in collisions. • Differentiate between elastic and inelastic collisions.	Conservation of Momentum	Lecture, Numerical examples, In-class exercises	H.W Data show

11. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	
Main references (sources)	Halliday, Resnick, and Walker "Fundamentals of Physics"
Recommended books and references (scientific journals, reports...)	Sternway and Jewett – "Physics for Scientists and Engineers"
Electronic References, Websites	https://www.youtube.com/watch?v=tWwWwvEr1Hk&list=PLctUENWBJvAaceLW4BCBrpXyFDzcmco3r&index=2

Workshop - teck103 - First Level

Course Description

13. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
14. Scientific Department:
Mechanical Power Techniques Engineering
15. Course Name / Course Code / Level:
Workshop - teck103 - First Level
16. Available Attendance Forms:
Attendance
17. Semester / Year:
Semester
18. Number of Credit Hours (Total) / Number of Units (Total):
19. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
20. Course Objectives :

Course Objectives	• The student is able to acquire the manual skill by carrying out the operation and manufacturing processes using various hand tools and measuring tools. • Introducing the student to gaining the manual skill by implementing the operations and connection of the manual tools and measuring tools for the household refrigeration and air conditioning equipment. • The laboratory material consist of laboratory workshops and refrigeration workshop.

21. Teaching and Learning Strategies :

Strategy	Teaching Method 1 – Asynchronous on-line course materials Description: Podcasts, videos and articles in worhshop Attendance Recorded: yes Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff). Teaching Method 2 - Practical Description: Practical homework assignments Attendance Recorded: Yes Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff).

22. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 Theoretical	Identify and use basic hand tools and measuring instruments (calipers, drills, etc.).		Lecture	Exam
2	1 Theoretical	Measure accurately using micrometers, vernier calipers, height gauges, and use common hand tools (saws, files, hammers).		Lecture	Exam
3	1 Theoretical			Lecture	Exam
4	1 Theoretical	Understand and apply welding techniques including gas and electric arc welding.		Lecture	Exam
5	1 Theoretical			Lecture	Exam
6	1 Theoretical			Lecture	Exam
7	1 Theoretical	Operate a lathe machine and perform basic turning operations (puncturing, external teeth machining).		Lecture	Exam
8	1 Theoretical			Lecture	Exam
9	1 Theoretical			Lecture	Exam
10	1 Theoretical	Learn sand casting techniques, alloy preparation, and heat treatment processes.		Lecture	Exam
11	1 Theoretical			Lecture	Exam

12	1 Theoretical	Use carpentry tools and machinery; recognize wood types and create simple wood structures.		Lecture	Exam
13	1 Theoretical			Lecture	Exam
14	1 Theoretical	Understand basic car engine operation, including fuel systems, spark transfer, and piston motion transmission.		Lecture	Exam
15	1 Theoretical			Lecture	Exam

23. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 Practical	Use and identify various surface preparation tools and dimension measuring devices (e.g., calipers, drills).		Lecture	Report
2	3 Practical	Operate and apply precise measuring tools: steel ruler, vernier caliper, micrometer, height gauges; use hand tools like saws, chisels, and files effectively.		Lecture	Report
3	3 Practical			Lecture	Report
4	3 Practical	Set up and perform oxy-acetylene and arc welding; identify welding tools and apply welding techniques on surfaces and joints.		Lecture	Report
5	3 Practical			Lecture	Report
6	3 Practical			Lecture	Report
7	3 Practical	Operate the lathe machine; perform longitudinal turning, centering, drilling, external thread		Lecture	Report
8	3 Practical			Lecture	Report
9	3 Practical			Lecture	Report

		cutting, and internal/external measurements.			
10	3 Practical	Practice alloying: identify alloying materials, mix sands, pour molten metals, shape molds, and conduct basic heat treatments.		Lecture	Report
11	3 Practical			Lecture	Report
12	3 Practical	Handle carpentry tools and machines; distinguish wood types and fabricate simple structures based on carpentry principles.		Lecture	Report
13	3 Practical			Lecture	Report
14	3 Practical	Disassemble and identify basic components of car engines; understand motion transfer mechanisms and ignition systems.		Lecture	Report
15	3 Practical			Lecture	Report

24. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
25. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	Workshop Manual – Provided by the Department (available in the college library)
Main references (sources)	Basic Workshop Technology and Practice by S.K. Hajra Choudhury
Recommended books and references (scientific journals, reports...)	Manufacturing Processes by Myron L. Begeman & Amstead
Electronic References, Websites	

Human rights and democracy - ntu100 - First Level

Course Description

1. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
2. Scientific Department:	
Mechanical Power Techniques Engineering	
3. Course Name / Course Code / Level:	
Human rights and democracy - ntu100 - First Level	
4. Available Attendance Forms:	
Attendance	
5. Semester / Year:	
Semester	
6. Number of Credit Hours (Total) / Number of Units (Total):	
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025 Name: Email:	
8. Course Objectives :	
Course Objectives	• Increase the student's knowledge of the theoretical and historical development of human rights and democracy. • Develop the student's analytical and critical skills regarding the current and future aspects of human rights and democracy. • Train the student on the importance of active participation in public life as a means to promote respect for human rights and engage in political and cultural activities. • Empower students to understand significance of education and its role in promoting a culture of human rights and democracy, contributing to the building of a

	civilized society based on good governance, faith in human rights education about them, and active participation in governance throu free and fair elections
9. Teaching and Learning Strategies :	
Strategy	1. Understand the historical development of human rights in ancient civilizations and their relevance to contemporary societies. 2. Analyze the positions of divine laws and religious texts on human rights and evaluate their impact on different societies. 3. Critically examine international constitutions and treaties related to human rights and assess their effectiveness in promoting and protecting human rights. 4. Evaluate the role and significance of the United Nations Charter in establishing a framework for the protection of human rights at the international level. 5. Assess the functions and contributions of international organizations in promoting and safeguarding human rights globally. 6. Explore the role of non-governmental organizations (NGOs) in advocating for and protecting human rights in different contexts. 7. Identify and explain the key safeguards and mechanisms in place to ensure the protection of human rights at the national and international levels. 8. Understand the concept of international humanitarian law and its historical evolution, and its significance in times of armed conflict. 9. Analyze the concept, origin, and evolution of democracy, and understand its principles and values. 10. Examine the relationship between Islam and democracy and evaluate different perspectives on the compatibility of these

	concepts. 11. Identify and describe the characteristics and features of a democratic system. 12. Differentiate between various forms and types of democracy and assess their strengths and weaknesses. 13. Analyze the political components of democracy, including the role of political parties and their influence on the democratic process. 14. Understand the relationship between democracy, education, and the role of education in promoting democratic values and citizenship. 15. Evaluate the role of media in a democratic system, including its influence on public opinion and the functioning of democratic institutions

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theoretical	Human rights in ancient civilizations (Greek and Roman civilizations)		Lecture	Exam
2	2 Theoretical	The position of divine laws on human rights.		Lecture	Exam
3	2 Theoretical	Human rights in international constitutions.		Lecture	Exam
4	2 Theoretical	The United Natio Charter and its stance on human rights.		Lecture	Exam
5	2 Theoretical	Human rights in		Lecture	Exam

		international organizations.			
6	2 Theoretical	Human rights in non-governmenta organizations.		Lecture	Exam
7	2 Theoretical	Safeguards for human rights.		Lecture	Exam
8	2 Theoretical	The concept of international humanitarian law and its historical development.		Lecture	Exam
9	2 Theoretical	The concept, orig and evolution of democracy.		Lecture	Exam
10	2 Theoretical	The relationship between Islam an democracy.		Lecture	Exam
11	2 Theoretical	Characteristics of democracy.		Lecture	Exam
12	2 Theoretical	Forms and types democracy.		Lecture	Exam
13	2 Theoretical	Political components of democracy.		Lecture	Exam
14	2 Theoretical	Democracy and education.		Lecture	Exam
15	2 Theoretical	**Preparatory We**		Lecture	Exam

11. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Thermodynamics - mpe104 - First Level

Course Description

1. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
2. Scientific Department:	
Mechanical Power Techniques Engineering	
3. Course Name / Course Code / Level:	
Thermodynamics - mpe104 - First Level	
4. Available Attendance Forms:	
Attendance	
5. Semester / Year:	
Semester	
6. Number of Credit Hours (Total) / Number of Units (Total):	
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025 Name: Email:	
8. Course Objectives :	
Course Objectives	• Understanding energy and its transformation: Thermodynamics deals with the study of energy and its conversion from one form to another. By studying thermodynamics, engineers gain a fundamental understanding of how energy behaves and can be manipulated. • Analyzing and optimizing energy systems: Engineers use thermodynamics to analyze and optimize the performance of energy systems, such as power plants, engines, refrigeration systems, and HVAC systems. They can determine the efficiency, energy transfer rates, and overall performance of these systems, leading to improvements in design and operation. • Designing and improving energy-related devices: Thermodynamics provides engineers with the knowledge necessary to design and improve energy-related devices, including

	combustion engines, turbines, heat exchanger and renewable energy systems. By understanding the principles of thermodynam engineers can enhance the efficiency, reliabili and sustainability of these devices.

9. Teaching and Learning Strategies :

Strategy	Teaching Method 1 – Lectures Description: Attendance Recorded: Yes Teaching Method 2 – Asynchronous on-line course materials Description: Podcasts, videos and articles in thermodynamics Attendance Recorded: No Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff). Teaching Method 3 - Tutorials Description: Attendance Recorded: Yes Teaching Method 4 - Practical Description: Practical homework assignments Attendance Recorded: No Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff).

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Definition of energy – kinetic & potential energies – work – power flow & internal energy – enthalpy-energy	Definition of energy – kinetic & potential energies –work – power flow & internal energy – enthalpy-energy diagram	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations

		diagram		**videos educationa l**	
2	Theoretical	Definition of state – property, process – property diagrams -1st law of thermo dynamic, (P-V) diagram.	Definition of state – property, process – property diagrams -1st law of thermo dynamic, (P-V) diagram.	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentation s
3	Theoretical	Ideal gases – ideal gasses laws (boyle , Charles , Gaylosic), gas constant – Avogadro law specific heat at constant volume &pressure	Ideal gases – ideal gasses laws (boyle , Charles , Gaylosic), gas constant – Avogadro law specific heat at constant volume &pressure	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
4	Theoretical	Energy analysis of closed system , particular closed system processes – constant volume , constant pressure and constant temperature process.	Energy analysis of closed system , particular closed system processes – constant volume , constant pressure and constant temperature process.	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations

				l	
5	Theoretical	Particular closed system processes – adiabatic and polytrophic processes	Particular closed system processes – adiabatic and polytrophic processes	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
6	Theoretical	Mass and energy analysis of control systems	Mass and energy analysis of control systems	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
7	Theoretical	Properties of pure substances and Phase change process of pure substances	Properties of pure substances and Phase change process of pure substances	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
8	Theoretical	Steam	Steam	**-Lectures Theory**	Short tests

		formation process, Dryness fraction ,Liquid line ,Steam line and Wet steam	formation process, Dryness fraction ,Liquid line ,Steam line and Wet steam	**-the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	(Quizzes - homework - Classroom participation - For reports or presentations
9	Theoretical	Calculation of steam ,steam table	Calculation of steam ,steam table	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
10	Theoretical	Steam process with drawing each processes on (P-V)diagram	Steam process with drawing each processes on (P-V)diagram	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
11	Theoretical	Second law of thermodynami c Statement of	Second law of thermodynami c Statement of	**-Lectures Theory -the explanation Using Fees**	Short tests (Quizzes - homework

		(Kelvin, Planck & Clausius statement)	(Kelvin, Planck & Clausius statement)	**Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	- Classroom participation - For reports or presentations
12	Theoretical	Heat engine , Refrigerator and Heat pump	Heat engine , Refrigerator and Heat pump	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
13	Theoretical	Carnot and reverse Carnot cycle	Carnot and reverse Carnot cycle	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations
14	Theoretical	Entropy , Entropy change of ideal gases and isentropic	Entropy , Entropy change of ideal gases and isentropic	**-Lectures Theory -the explanation Using Fees Illustrative and plans**	Short tests (Quizzes - homework - Classroom participation

		process	process	**-Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	- For reports or presentations
15	Theoretical	Entropy change of pure substances and Isentropic efficiencies of steady-flow devices	Entropy change of pure substances and Isentropic efficiencies of steady-flow devices	**-Lectures Theory -the explanation Using Fees Illustrative and plans -Discussions Theory Solution Issues -Use of offers Visual and videos educationa l**	Short tests (Quizzes - homework - Classroom participation - For reports or presentations

11. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	Applied Thermodynamics for engineering technology By T.D. EASTOP
Main references (sources)	Thermodynamics An engineering approach By Yunus A. Cengel
Recommended books and references (scientific journals, reports...)	Fundamentals of engineering thermodynamics By Michael J. Moran
Electronic References, Websites	

English - ntu101 - First Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
English – ntu101 – First Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
5
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	• To develop problem solving skills and understanding of circuit theory through the application of techniques. • Developing strategies to produce more coherent writing and to make clear appropriate, and relevant notes from academic texts. • Encouraging them to adopt varies approaches for dealing with new unknown vocabulary by practicing effective use for dictionaries and through making effective vocabulary records.

	• Exploring and evaluating research technologies and resource and crediting source information. • Promoting learner independence by encourage students to return to earlier study skills to refresh their memories or see how new skills build on and develop those previously presented.

9. Teaching and Learning Strategies :

Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Introduction to the academic English		**Lectures Theory**	Short tests (Quizzes
2	Theoretical	Student life **Reading Skills**, way of reading.		**Lectures Theory**	- homework
3	Theoretical	Student life **Writing skills** punctuation, linking idea. Checking your writing, Writing about		**Lectures Theory**	- Classroom participation

		people. **vocabulary development**., of speech, dictionary yo writing about pe			
4	Theoretical	Daily Routine **Reading Sk** predicting conte skimming		**Lectures Theory**	- For reports or presentations
5	Theoretical	Daily Routine **Writing skills** hand writing , paragraph .linking idea .writing about routine & procedure Vocabulary development colocation ending - in or er		**Lectures Theory**	Short tests (Quizzes
6	Theoretical	People & the environment Reading sk scanning us headings mean from context		**Lectures Theory**	- homework
7	Theoretical	People & the environment Writing skills punctuation talking about frequency writing about study habits		**Lectures Theory**	- Classroom participation

		Research source			
8	Theoretical	Architecture Reading skills making notes Research focus your search		**Lectures** **Theory**	- For reports or presentations
9	Theoretical	Architecture Writing skills linking idea word &phrases writing about building Vocabulary development Dictionary e countable uncountable nou		**Lectures** **Theory**	Short tests (Quizzes
10	Theoretical	Educations Reading skills predicting content linking idea Writing skills greeting and ending in formal letters word and phrases writing a letter or email Vocabulary developments plurals		**Lectures** **Theory**	- homework
11	Theoretical	Technology Reading skills		**Lectures** **Theory**	- Classroom participation

		getting information from web site using visual in websites Writing skills writing definition giving example writing a description for a device Vocabulary development Homophones Research websi			
12	Theoretical	Food drink and culture Reading skills topic sentence writing opinion Writing skills punctuation linking ideas using pronouns writing about		**Lectures Theory**	- For reports or presentations

		food and drink Vocabulary development prefixes			
13	Theoretical	Cites of the word Reading skills looking at data getting facts from text Writing skills comparatives and superlatives linking idea writing about cites Research finding facts and figure Vocabulary development w attack skills		**Lectures Theory**	Short tests (Quizzes
14	Theoretical	Brain power Reading skills in other words making notes Writing skills		**Lectures Theory**	- homework

		common mistake summaries writing a summary Research books			
15	Theoretical	Staying alive Reding skills using what you know using reference to understand text focusing on statics Writing skills linking ideas word and phrases writing about statics Vocabulary development word or figu learning a wo synonyms anatomies		**Lectures Theory**	- Classroom participation

11. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	R. Harrison, *acadmic*

	Skills Level 1 students books. UK: Oxford, 2011.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Computer - ntu102 - First Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
Computer – ntu102 – First Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	• To learn about computer and its characteristics and features, Comparing different types of computers. • To learn about the computer's Hardware, Identify the factors that affect the computer's performance, Learn about the numerical systems and data representation.

	• Learn about the computer's Hardware(2), CPU, Memory • Learn about operating system software • Learn about the utility software programming languages, application software. Learn the Microsoft office2020(Word, Excel, Powerpoint)

9. Teaching and Learning Strategies :

Strategy	The major approach used to offer this module will be to promote student engagement in the exercises while also enhancing and broadening their critical thinking abilities. This will be accomplished through lectures, interactive tutorials, and the consideration of various sorts of easy experiments incorporating some engaging sampling exercises for the students.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Demonstrates knowledge of the Introduction to computer, computer component (hardware, software)		Theoretical	Quizzes
2	Theoretical	Demonstrates knowledge of the Operating system (windows),		Theoretical	Online assignments

		Able to install windows (formatting)			
3	Theoretical	Able to use the following items: Start menu, desktop, taskbar, mouse applications, My computer, My documents, drivers, folders, files, cut, copy, paste, shortcut, right click menu, Setting menu, control panel		Theoretical	Homework
4	Theoretical	Able to use the following items: Start menu, desktop, taskbar, mouse applications, My computer, My documents, drivers, folders, files, cut, copy, paste, shortcut, right click menu, Setting menu, control panel		Theoretical	Quizzes
5	Theoretical	Able to use Microsoft word 2020		Theoretical	Quizzes
6	Theoretical	Able to use Microsoft word 2020		Theoretical	Online assignments
7	Theoretical	Able to use Microsoft excel 2020		Theoretical	Quizzes

8	Theoretical	Able to use Microsoft excel 2020		Theoretical	Homework
9	Theoretical	Able to use Microsoft excel 2020		Theoretical	Reports
10	Theoretical	Able to use Microsoft power point 2020		Theoretical	Online assignments
11	Theoretical	Able to use Microsoft power point 2020		Theoretical	Project
12	Theoretical	Able to use Internet , Internet explorer, starting, menus of internet explorer		Theoretical	Quizzes
13	Theoretical	Able to create and use E-Mail: Yahoo, Hotmail		Theoretical	Reports
14	Theoretical	Able to utilize Search engines Able to use google, yahoo, search information		Theoretical	Project
15	Theoretical	**Preparatory week before the final Exam**		Theoretical	Online assignments

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Demonstrates knowledge of		practical	Lab

		the Introduction to computer, computer component (hardware, software)			
2	Practical	Demonstrates knowledge of the Operating system (windows), Able to install windows (formatting)		practical	Lab
3	Practical	Able to use the following items: Start menu, desktop, taskbar, mouse applications, My computer, My documents, drivers, folders, files, cut, copy, paste, shortcut, right click menu, Setting menu, control panel		practical	Lab
4	Practical	Able to use the following items: Start menu, desktop, taskbar, mouse applications, My computer, My documents, drivers, folders, files, cut, copy, paste, shortcut, right click menu, Setting menu, control panel		practical	Lab
5	Practical	Able to use Microsoft		practical	Lab

		word 2020			
6	Practical	Able to use Microsoft word 2020		practical	Lab
7	Practical	Able to use Microsoft excel 2020		practical	Lab
8	Practical	Able to use Microsoft excel 2020		practical	Lab
9	Practical	Able to use Microsoft excel 2020		practical	Lab
10	Practical	Able to use Microsoft power point 2020		practical	Lab
11	Practical	Able to use Microsoft power point 2020		practical	Lab
12	Practical	Able to use Internet , Internet explorer, starting, menus of internet explorer		practical	Lab
13	Practical	Able to create and use E-Mail: Yahoo, Hotmail		practical	Lab
14	Practical	Able to utilize Search engines Able to use google, yahoo, search information		practical	Lab
15	Practical	**Preparatory week before the final Exam**		practical	Lab

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

13. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Fluid mechanics-static - mpe207 - Second Level

Course Description

14. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
15. Scientific Department:
Mechanical Power Techniques Engineering
16. Course Name / Course Code / Level:
Fluid mechanics–static – mpe207 – Second Level
17. Available Attendance Forms:
Attendance
18.Semester / Year:
Semester
19.Number of Credit Hours (Total) / Number of Units (Total):
20. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Asst. Prf. Hussein Hayder Mohammed Ali

Email:
Hussein_kahia@ntu.edu.iq

21. Course Objectives:

- Introduce fluid mechanics and establish its relative in mechanical Engineering.
- Develop the fundamental principles.
- Demonstrate how these are used in Engineering.

22. Teaching and Learning Strategies:

Strategy	Teaching Method 1 – Lectures Description: Attendance Recorded: Yes Teaching Method 2 – Asynchronous on-line course materials Description: Podcasts, videos and articles in fluid mechanics Attendance Recorded: No Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff). Teaching Method 3 - Tutorials Description: Attendance Recorded: Yes Teaching Method 4 - Practical Description: Practical homework assignments Attendance Recorded: Yes Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff).

23. Course Structure (Theoretical):

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	Theoretical	Fluid and their properti	Fluid and their properties	Visualization	Examinatior
2	Theoretical	Pressure and head	Pressure and head	Visualization	Examinatior
3	Theoretical	Statics of fluid system.	Statics of fluid system	Visualization	Examinatior
4	Theoretical	Static force on surfaces	Static force on surface	Visualization	Examinatior

5	Theoretical	Buoyancy	Buoyancy	Visualization	Examinatior
6	Theoretical	Motion of fluid particle and stream	Motion of fluid par and stream	Visualization	Examinatior
7	Theoretical	Fluid flow in pipes	Fluid flow in pipes	Visualization	Examinatior
8	Theoretical	Laminar and Turbulent flow.	Laminar and Turb flow.	Visualization	Examinatior
9	Theoretical	Continuity of flow	Continuity of flow	Visualization	Examinatior
10	Theoretical	Continuity equation an applications.	Continuity equation a applications.	Visualization	Examinatior
11	Theoretical	The energy equation ar its application.	The energy equation a application.	Visualization	Examinatior
12	Theoretical	Euler s equation of mo along a streamline.	Euler s equation of m along a streamline	Visualization	Examinatior
13	Theoretical	The momentum equati and its application.	The momentum equ and its application	Visualization	Examinatior
14	Theoretical	Laminar and Turbulent flow i bounded system.	Laminar Turbulent flo bounded systen	Visualizatior	Examinatior
15	Theoretical	Steady, incompressible f in series and para pipelines and pip network.	Steady, incomp parallel pipelin	Visualizatior	Examinatic

24. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Densitometry, viscosity measurement of liquids.			Report
2	Practical	Pressure gauge, Borden manometer, simple and differential manometer.			Report
3	Practical	Archimedes principle floating and sinking bodies and equilibrium.			Report
4	Practical	Compressive force on immersion surfaces and center of effect of pressure.			Report
5	Practical	Calculation of volumetric and mass			Report

		flow rate by conventional methods.			
6	Practical	Measuring the velocity of liquid flow in an open duct and air flow in a closed duct by means of a Pitot tube.			Report
7	Practical	Flow measurement via a venturi meter 1.			Report
8	Practical	Flow measurement via a venturi meter 2.			Report
9	Practical	Flow measurement via an orifice flowmeter.			Report
10	Practical	flow through a orifice flowmeter.			Report
11	Practical	Fountain pressure			Report
12	Practical	Friction losses in the pipes.			Report
13	Practical	Losses during pipe joints.			Report
14	Practical	Preparatory week before the final Exam			Report
15	Practical	Preparatory week before the final Exam			Report

25. Course Evaluation:

Formative assessment includes quizzes, assignments, and reports. There are 5 quizzes worth 20% (20 marks) in total, scheduled for weeks 4, 6, 11, and 13, and they address learning outcomes LO1 to LO7. There are also 5 assignments worth 10% (10 marks), due in weeks 2 and 15, covering LO4 and LO6. In addition, students are required to submit 2 reports contributing 10% (10 marks) to the total grade, due in weeks 3 and 11, targeting LO4 and LO12.
Summative assessment consists of three main exams. The first month exam lasts 2 hours, is scheduled in week 6, and carries 15% (15 marks), covering learning outcomes LO1 to LO4. The mid-exam is also 2 hours long, takes place in week 14, and contributes 10% (10 marks), assessing LO5 to LO7. The final exam is 3 hours long, occurs in week 16, and is worth 50% (50 marks), covering all learning outcomes. The total assessment for the course is 100% (100 marks).

26. Learning and Teaching Resources :

“Elementary Fluid Mechanics” by Vennard J.K and R.L streeter	
“Fluid MECHANICS" by Streeter and Wylie	
“Fluid MECHANICS" by J.F Douglas	
“Elementary Fluid Mechanics” by Vennard J.K and R.L streeter	

Fluid mechanics dynamics - MPE208 - Second Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
Fluid mechanics dynamics – mpe208 – Second Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	a. Introduce students to the fundamentals of fluid dynamics. b. Apply key equations: continuity, Bernoulli, momentum, and energy. c. Analyze flow systems in

	practical engineering. d. Use fluid measurement tools and interpret data. • Connect theory to applications in hydraulics and thermal systems.

9. Teaching and Learning Strategies :

Strategy	Method	Description	Attendance
	Lectures	Theory explanation and example solving	Yes
	Lab Practice	Hands-on experiments and measurements	Yes
	e-Learning	Videos, simulations, and articles	No
	Review Sessions	Q&A and concept reinforcement	Yes

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Understand the scope, applications, and basic concepts of fluid dynamics.	Classification of flows	Lecture	Exam
2	Theoretical	Distinguish between types of flow: laminar/turbulent, steady/unsteady, internal/external.	Properties of moving fluids	Lecture	Exam
3	Theoretical	Identify dynamic fluid properties such as viscosity, compressibility,	Continuity equation	Lecture	Exam

		and density.			
4	Theoretical	Apply the continuity equation to determine flow rates and verify mass conservation.	Bernoulli's equation and applications	Lecture	Exam
5	Theoretical	Analyze fluid behavior using Bernoulli's principle in ideal flow conditions.	Energy equation in fluids	Lecture	Exam
6	Theoretical	Relate pressure, velocity, and elevation to energy conservation in fluid systems.	Euler's motion equation	Lecture	Exam
7	Theoretical	Derive and apply Euler's equation to fluid motion along streamlines.	Momentum equation	Lecture	Exam
8	Theoretical	Apply the momentum principle to determine forces due to fluid motion.	Laminar and turbulent flows	Lecture	Exam
9	Theoretical	Understand Reynolds number and its role in characterizing flow regimes.	Pipe flow and head losses	Lecture	Exam
10	Theoretical	Analyze flow through pipes, considering friction and minor losses.	Venturi and Orifice meters	Lecture	Exam

11	Theoretical	Evaluate flow rate using constricted flow devices like Venturi and orifice meters.	Pipe network analysis	Lecture	Exam
12	Theoretical	Solve for flow distribution in series and parallel piping systems.	Compressible vs incompressible flow	Lecture	Exam
13	Theoretical	Compare and analyze effects of compressibility in fluids.	Industrial applications	Lecture	Exam
14	Theoretical	Relate theoretical fluid concepts to real-world applications (e.g., pumps, turbines).	Final review	Lecture	Exam
15	Theoretical	Integrate course concepts to prepare for final examination.	Classification of flows	Lecture	Exam

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Calibrate and interpret readings from Bourdon gauges and manometers.	Calibration of pressure gauges	Lecture	Report
2	Practical	Measure fluid properties and compare results with theoretical	Measurement of density and viscosity	Lecture	Report

		values.			
3	Practical	Determine volumetric flow rates through varying cross-sections.	Applying the continuity equation	Lecture	Report
4	Practical	Validate Bernoulli's principle using a test rig and observe pressure changes.	Bernoulli apparatus experiment	Lecture	Report
5	Practical	Measure flow rate using a Venturi meter and compare with theoretical predictions.	Venturi meter test	Lecture	Report
6	Practical	Use an orifice plate to determine flow characteristics.	Orifice flowmeter test	Lecture	Report
7	Practical	Use a Pitot-static tube to measure flow velocity in a duct.	Pitot tube velocity measurement	Lecture	Report
8	Practical	Identify and quantify major (frictional) losses in a straight pipe.	Head loss in pipe flow	Lecture	Report
9	Practical	Experimentally classify flow regime and compute Reynolds number.	Flow classification using Reynolds number	Lecture	Report
10	Practical	Analyze how pressure changes across multiple	Pressure drop in networks	Lecture	Report

		pipe configurations.			
11	Practical	Measure minor losses from elbows, valves, and junctions.	Losses in fittings	Lecture	Report
12	Practical	Evaluate force generated by a fluid jet impacting a surface.	Momentum change experiment	Lecture	Report
13	Practical	Compare pressure and flow rate in different pipe network configurations.	Series & parallel pipe flow	Lecture	Report
14	Practical	Determine mechanical efficiency and performance of a small pump or blower.	Pump or fan performanc e	Lecture	Report
15	Practical	Demonstrate mastery of experimental techniques and reporting standards.	Final practical review	Lecture	Report

12. Course Evaluation:

Component	Count	Weight	Timing	Covers Outcomes
Quizzes	2	10%	Weeks 5, 11	LO1–LO3
Assignments	2	10%	Weeks 4, 12	LO2, LO5
Lab Reports	4	20%	Ongoing	LO4, LO6
Midterm Exam	1	15%	Week 7	LO1–LO4
Final Theory Exam	1	25%	Week 16	All outcomes
Final Practical Exam	1	20%	Week 16	LO4–LO6

13. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	Fluid Mechanics – Frank M. White
Main references (sources)	Fundamentals of Fluid Mechanics – Munson, Young, Okiishi
Recommended books and references (scientific journals, reports…)	Journal of Fluid Mechanics
Electronic References, Websites	https://nptel.ac.in

Mechanical drawing - mpe205 - Second Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
Mechanical drawing – mpe205 – Second Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
4
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Zhala Azeez Mohammed Email: zhalaaziz@ntu.edu.iq
8. Course Objectives :
Mechanical drawings serve several important goals in engineering and manufacturing: 1. Communicate design intent Mechanical drawings provide a clear and standardized way to communicate the designer's intent for how a part or assembly should be manufactured. They convey critical information about geometry, dimensions, materials, tolerances, and other specifications. 2. Define part geometry and specifications Drawings precisely define the shape, size, and features of parts using

multiple orthographic views, dimensions, and notes. This allows manufacturers to accurately produce the part as designed.

3. Enable manufacturing and inspection
   The information in mechanical drawings enables manufacturers to plan production processes, create tooling, and inspect finished parts to ensure they meet specifications.
4. Serve as a contract document
   Drawings act as a formal specification and contract between designers and manufacturers, clearly defining what needs to be produced.
5. Support assembly and maintenance
   Assembly drawings show how individual parts fit together, while other drawings may provide information to support maintenance and repair.
6. Document the design
   Mechanical drawings serve as an official record of the design that can be referenced, revised, and reused in the future.

9. Teaching and Learning Strategies :

Outcomes	Teaching and Learning Methods	Assessment methods
A-Knowledge A1 - Recognizing the principles and fundamentals of mechanical engineering drawing, including understanding engineering projections (the three views, sections, and engineering perspective). A2 - The ability to read and analyze mechanical drawings, and to understand how to represent and assemble mechanical components. A3 - Knowledge of methods for representing various mechanical parts such as bearings, gears, and assembly systems. A4 - Acquiring the basic skills necessary to prepare accurate engineering drawings used in manufacturing and production processes in workshops and factories.	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation

B - Skills B1 - Develop the ability to use technical drawing tools properly and create industry-standard CAD drawings. B2 - Create 3D models and generate necessary views for production. B3 - Develop drawings using parametric solid modeling technology. B4 - Generate engineering prints and bills of materials (BOM) for proposed.	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
C- Values C1 - Commitment to accuracy and discipline in preparing engineering drawings, reflecting respect for the technical and professional standards required in engineering work. C2 - Fostering a spirit of cooperation and teamwork during the execution of projects and drawings, as coordination among team members is necessary to achieve integrated results. C3 - Taking responsibility and ensuring the quality of work by paying attention to details and striving to produce precise drawings.	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation

10 . Course Structure (Theoretical+ Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1(Theoretical) +3(Practical)	Ability to draw three-dimensional projections of mechanical objects with accurate dimensions	General review	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
2	1(Theoretical) +3(Practical)	Developing skills in interpreting and analyzing cut-out drawings	Sectional views	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
3	1(Theoretical) +3(Practical)	Develop skills in interpreting detailed and assembly drawings	Bolts and nuts	Lecture + Discussion and Q&A Sessions + drawing	Giving exercises and weekly evaluation

		containing bolts and nuts, and linking them to the practical design of mechanical devices.		classwork	
4	1(Theoretical) +3(Practical)	Develop skills in interpreting detailed and assembly drawings containing bolts and nuts, and linking them to the practical design of mechanical devices.	Bolts and nuts	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
5	1(Theoretical) +3(Practical)	Develop skills in interpreting detailed and assembly drawings containing bolts and nuts, and linking them to the practical design of mechanical devices.	Bolts and nuts	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
6	1(Theoretical) +3(Practical)	Identify and draw nail cap types.	Cap Screws	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
7	1(Theoretical) +3(Practical)	Understand the concept of key and its role in mechanical connection and understand the rules for selecting key dimensions based on shaft diameter and design requirements.	Type of Key	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
8	1(Theoretical) +3(Practical)	Developing skills to read and interpret different lip drawings	Shaft couplings	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
9	1(Theoretical) +3(Practical)	Develop skills in reading and understanding industrial and technical drawings of pulleys and associated mechanical systems.	Pulleys	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation

10	1(Theoretical) +3(Practical)	Develop skills in reading and understanding industrial and technical drawings of pulleys and associated mechanical systems.	Pulleys	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
11	1(Theoretical) +3(Practical)	The ability to draw different types of rivets, while applying the correct engineering drawing rules in representing dimensions and sizes.	Single Rivet	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
12	1(Theoretical) +3(Practical)	The ability to draw different types of rivets, while applying the correct engineering drawing rules in representing dimensions and sizes.	Bauble Rivet	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
13	1(Theoretical) +3(Practical)	The ability to draw different types of rivets, while applying the correct engineering drawing rules in representing dimensions and sizes.	Triple Rivet	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
14	1(Theoretical) +3(Practical)	Mastering the drawing of welding symbols on engineering drawings	Welding symbols	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
15	1(Theoretical) +3(Practical)	Know the standard dimensions of bearings and how to represent them on a drawing.	Bearings	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation

10. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

11. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	
Main references (sources)	Machine drawing, K.L. Narayana, P. Kannaiah, K. Venkata Reddy. (2006) 3rd Edition.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://www.youtube.com/watch?v=gwhi51yJ0hk&list=PLE3gBzx1OWUy4LvJZdESvl9urxREUTPuj

Assembly drawing of mechanical parts - mpe206 - Second Level

Course Description

12. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
13. Scientific Department:
Mechanical Power Techniques Engineering
14. Course Name / Course Code / Level:

Assembly drawing of mechanical parts – mpe206 – Second Level
15. Available Attendance Forms:
Attendance
16.Semester / Year:
Semester
17.Number of Credit Hours (Total) / Number of Units (Total):
4
18. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Zhala Azeez Mohammed Email: zhalaaziz@ntu.edu.iq
19. Course Objectives :
The general objectives of the course "Assembly Drawing of Mechanical Parts" in the Power Mechanics Department focus on developing students' abilities in: 1- Understanding the principles and methods of engineering assembly drawing for mechanical parts, enabling the student to accurately and coherently represent mechanical parts and their relationships and assemblies within the assembly drawings. 2- Acquiring skills in reading and interpreting assembly drawings, including the ability to understand assembly details and the method of assembling various mechanical parts, facilitating effective engineering communication between engineers and technicians. 3- Enhancing the ability to prepare engineering drawings according to international standards and specifications (such as ISO or ANSI) related to mechanical and assembly drawing, ensuring accuracy and professionalism in design. 4- Developing technical and practical skills in using traditional engineering drawing tools and modern digital software such as AutoCAD, to draw assembly parts professionally and efficiently. 5- Strengthening skills in technical analysis, logical thinking, and breaking down mechanical parts into components suitable for drawing and assembly, which helps in efficiently designing and implementing mechanical projects.
20. Teaching and Learning Strategies :

Outcomes	Teaching and Learning Methods	Assessment methods
A-Knowledge	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation

A1 - Recognizing the principles and fundamentals of mechanical engineering drawing, including understanding engineering projections (the three views, sections, and engineering perspective). A2 - The ability to read and analyze mechanical drawings, and to understand how to represent and assemble mechanical components. A3 - Knowledge of methods for representing various mechanical parts such as bearings, gears, and assembly systems. A4 - Acquiring the basic skills necessary to prepare accurate engineering drawings used in manufacturing and production processes in workshops and factories.		
B - Skills B1 - Develop the ability to use technical drawing tools properly and create industry-standard CAD drawings. B2 - Create 3D models and generate necessary views for production. B3 - Develop drawings using parametric solid modeling technology. B4 - Generate engineering prints and bills of materials (BOM) for proposed.	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
C- Values C1 - Commitment to accuracy and discipline in preparing engineering drawings, reflecting respect for the technical and professional standards required in engineering work. C2 - Fostering a spirit of cooperation and teamwork during the execution of projects and drawings, as coordination among team members is necessary to achieve integrated results. C3 - Taking responsibility and ensuring the quality of work by paying attention to details and striving to produce precise drawings.	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation

10 . Course Structure (Theoretical+ Practical):

Week	Hours	Required Learning Outcomes	Unit or subject	Learning method	Evaluation method

			name		
1	1(Theoretical) +3(Practical)	Understand the basics of mechanical assembly drawing such as reading shop and detail drawings.	General review	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
2	1(Theoretical) +3(Practical)	Understand the types of gear and how to represent them graphically, and be able to distinguish them in an assembly drawing.	Gears	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
3	1(Theoretical) +3(Practical)	Ability to accurately calculate basic geometric dimensions of gears such as number of teeth, modulus, and pitch diameter using approved engineering equations, to ensure matching of gears upon assembly	Internal Gears and pinion	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
4	1(Theoretical) +3(Practical)	Representing the engagement between the internal and external gears in the assembly drawing, showing their position relative to each other and the clarity of tooth contact between the two gears to ensure accurate mechanical integration	External Gears and pinion	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
5	1(Theoretical) +3(Practical)	Prepare assembly drawings showing the precise locations and interconnections of parts, with general and intermediate dimensions, taking into account engineering drawing rules.	Detailed drawing of advanced mechanical systems	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation

6	1(Theoretical) +3(Practical)	Sectional drawings and illustrations of assembled parts showing how parts are assembled and connecting elements such as screws, rivets, welding, keys, and gears.	Detailed drawing of advanced mechanical systems	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
7	1(Theoretical) +3(Practical)	Accurately write and distribute dimensions on assembly and detail drawings.	Detailed drawing of advanced mechanical systems	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
8	1(Theoretical) +3(Practical)	Ability to interpret drawings and read installation and maintenance instructions using symbols and conventions recognized in mechanical assembly drawings.	Detailed drawing of advanced mechanical systems	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
9	1(Theoretical) +3(Practical)	The ability to analyze and assemble parts in imagination and preliminary planning, and to link dimensions and sizes between different parts	Detailed drawing of advanced mechanical systems	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
10	1(Theoretical) +3(Practical)	The ability to analyze and assemble parts in imagination and preliminary planning, and to link dimensions and sizes between different parts	Detailed drawing of advanced mechanical systems	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
11	1(Theoretical) +3(Practical)	Knowing how to disassemble mechanical parts connected within an assembly system	Disassembly of mechanical parts	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
12	1(Theoretical) +3(Practical)	Adequacy in numbering the disassembled parts and arranging them according to the disassembly sequence	Disassembly of mechanical parts	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
13	1(Theoretical) +3(Practical)	Acquire the skill of drawing each part in detail separately,	Disassembly of mechanical parts	Lecture + Discussion and Q&A Sessions	Giving exercises and weekly

		clarifying its dimensions and geometric characteristics.		+ drawing classwork	evaluation
14	1(Theoretical) +3(Practical)	Ability to read and analyze assembly drawings to determine connection points and separate parts.	Disassembly of mechanical parts	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation
15	1(Theoretical) +3(Practical)	Mastering the use of different types of lines in decomposition drawing (hidden lines, section lines, etc.) in a manner that suits the nature of each part and its decomposition state	Disassembly of mechanical parts	Lecture + Discussion and Q&A Sessions + drawing classwork	Giving exercises and weekly evaluation

21. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

22. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	
Main references (sources)	Machine drawing, K.L. Narayana, P. Kannaiah, K. Venkata Reddy. (2006) 3rd Edition.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://www.youtube.com/watch?v=gwhi51yJ0hk&list=PLE3gBzx1OWUy4LvJZdESvl9urxREUTPuj

Theory of machine - mpe204 - Second Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
Theory of machine - mpe204 - Second Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
165 / 6.60
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Rahell Nasruldeen Mohhammed Rashid Email: rahell.mohamed25@ntu.edu.iq
8. Course Objectives :

Course Objectives	• Understand the fundamental concepts of machines and mechanisms and their role in mechanical power transmission. • Analyze the working principles and design considerations of belt drives for efficient power transmission. • Explain the operation, types, and applications of brakes used for motion control in mechanical systems. • Describe different types of toothed gears, calculate gear ratios, and evaluate their use in power transmission. • Understand the function and working of governors in regulating the speed of engines and machines.
9. Teaching and Learning Strategies :	
Strategy	• **Lectures with Visual Aids:** Use diagrams, animations, and models to explain complex mechanical concepts clearly.

	• **Problem-Solving Sessions:** Engage students in solving numerical problems related to gears, brakes, belts, and governors. • **Hands-on Demonstrations:** Use lab experiments and mechanical models to demonstrate real-life functioning of machine components. • **Group Discussions and Presentations:** Encourage collaborative learning through group activities and student-led presentations on key topics. • **Assignments and Case Studies:** Assign real-world case studies and design tasks to develop analytical and application-based thinking.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours Theoretical	Understand the concept of machines and mechanisms and their role in mechanical systems. Identify different types of machines and mechanisms and their applications	Machines and Mechanisms	Theoretical	Quizzes
2	2 hours Theoretical	Analyze and classify various types of mechanical motions, such as rotary, linear, reciprocating, and oscillatory	Machines and Mechanisms:	Theoretical	Online assignments
3	2 hours Theoretical	Apply the principles of kinematics and dynamics to analyze the	Machines and Mechanisms:	Theoretical	Homework

		motion and forces in machines and mechanisms			
4	2 hours Theoretical	Introduction, selection of belt drive, type of belt drives, velocity ratio of belt drive, velocity ratio of a compound belt drive	Belts drives	Theoretical	Quizzes
5	2 hours Theoretical	Slip of belt, creep of belt, length of open and cross belt derives, power transmitted by a belt, Ratio of Driving Tensions for Flat Belt Drive.	Belts drives	Theoretical	Quizzes
6	2 hours Theoretical	Determination of angle of contact, centrifugal force, maximum tension in the belt, condition for the transmission of maximum power.	Belts drives	Theoretical	Online assignments
7	2 hours Theoretical	Brakes, Types of machine brakes, Friction Brakes, Hydraulic Brakes, electrical brake	Brakes	Theoretical	Quizzes
8	2 hours Theoretical	Mechanical Brake, Block brake, Band Brake, Internal and External	Brakes	Theoretical	Homework

		Expanding Shoe Brake			
9	2 hours Theoretical	Single Block or Shoe Brake, Double Block or Shoe Brake, pivoted Block or Shoe Brake	Brakes	Theoretical	Reports
10	2 hours Theoretical	, Classification of Toothed Gears, Terms Used in Gears, Gear Materials, Spur Gear.	Toothed Gearing	Theoretical	Online assignments
11	2 hours Theoretical	Systems of Gear Teeth , Velocity Ratio for Spur Gear, Design of Spur Gears	Toothed Gearing	Theoretical	Project
12	2 hours Theoretical	Gear Trains, Simple Gear Train, Compound Gear Train, Epicyclic Gear Train, Velocity Ratios of Epicyclic Gear Train, Compound Epicyclic Gear Train (Sun and Plant Gear)	Toothed Gearing	Theoretical	Quizzes
13	2 hours Theoretical	Governor, General Types of Governors, Terms Used in Governors, Watt Governor.	Governor	Theoretical	Reports
14	2 hours Theoretical	Porter Governor, Proell Governor, Hartnell Governor,	Governor	Theoretical	Project

15	2 hours Theoretical	Solved examples of each type.	Governor	Theoretical	Online assignments

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours Practical	Understand the concept of machines and mechanisms and their role in mechanical systems. Identify different types of machines and mechanisms and their applications	Machines and Mechanisms	practical	Quizzes
2	2 hours Practical	Analyze and classify various types of mechanical motions, such as rotary, linear, reciprocating, and oscillatory	Machines and Mechanisms:	practical	Online assignments
3	2 hours Practical	Apply the principles of kinematics and dynamics to analyze the motion and forces in machines and mechanisms	Machines and Mechanisms:	practical	Quizzes
4	2 hours Practical	Introduction, selection of belt drive, type of belt drives, velocity ratio of belt drive, velocity ratio of	Belts drives	practical	Lab

		a compound belt drive			
5	2 hours Practical	Slip of belt, creep of belt, length of open and cross belt derives, power transmitted by a belt, Ratio of Driving Tensions for Flat Belt Drive.	Belts drives	practical	Quizzes
6	2 hours Practical	Determination of angle of contact, centrifugal force, maximum tension in the belt, condition for the transmission of maximum power.	Belts drives	practical	Online assignments
7	2 hours Practical	Brakes, Types of machine brakes, Friction Brakes, Hydraulic Brakes, electrical brake	Brakes	practical	Quizzes
8	2 hours Practical	Mechanical Brake, Block brake, Band Brake, Internal and External Expanding Shoe Brake	Brakes	practical	Lab
9	2 hours Practical	Single Block or Shoe Brake, Double Block or Shoe Brake, pivoted Block or Shoe Brake	Brakes	practical	Reports
10	2 hours Practical	, Classification of Toothed Gears, Terms	Toothed Gearing	practical	Online assignments

		Used in Gears, Gear Materials, Spur Gear.			
11	2 hours Practical	Systems of Gear Teeth , Velocity Ratio for Spur Gear, Design of Spur Gears	Toothed Gearing	practical	Project
12	2 hours Practical	Gear Trains, Simple Gear Train, Compound Gear Train, Epicyclic Gear Train, Velocity Ratios of Epicyclic Gear Train, Compound Epicyclic Gear Train (Sun and Plant Gear)	Toothed Gearing	practical	Quizzes
13	2 hours Practical	Governor, General Types of Governors, Terms Used in Governors, Watt Governor.	Governor	practical	Reports
14	2 hours Practical	Porter Governor, Proell Governor, Hartnell Governor,	Governor	practical	Project
15	2 hours Practical	Solved examples of each type.	Governor	practical	Online assignments

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student is:

Quizzes, Homework, Reports, Online assignments, Midterm exam and Final exam

13. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	Theory of Machines, J. M. Shah & Jagdish Lal.
Main references (sources)	Theory of Machines, R. S. KHURMI & L.

	K. GUPTA.
Recommended books and references (scientific journals, reports...)	Mechanics of Machines, J. Hannah & R. C. Stephens
Electronic References, Websites	

Engineering materials - mpe201 - Second Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
Engineering materials – mpe201 – Second Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	• Introduce engineering materials and establish its relative in mechanical Engineering. • Develop the fundamental principles about engineering materials. • Demonstrate how these are used in mechanical and engineering applications
9. Teaching and Learning Strategies :	
Strategy	**Teaching Method 1 – Theory** **Description: Lectures are used to introduce theoretical concepts and to contextualise module content within engineering applications. Opportunities are provided to observe and undertake examples of questions and problems, showing appropriate steps and methods and providing time for interactive learning. The concepts are then discussed, applied and practiced in laboratory practical sessionss to assist with deeper and better understanding.** **Attendance Recorded: Yes** **Teaching Method 2 – Asynchronous on-line course materials** **Description: Podcasts, videos and articles in engineering materials** **Attendance Recorded: No** **Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff).** **Teaching Method 3 - Practical** **Description: Laboratory practical sessions are conducted in smaller groups allowing students hands on experience and the opportunity to observe and measure materials properties and behaviour that are theorised during lectures. Practical homework assignments including reports and related calculations to the listed**

	experiments in the sylibus. **Attendance Recorded: Yes** **Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff).**

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Crystalline structure for engineering materials.	Crystalline structure for engineering materials.	Theoretical	Quizzes
2	Theoretical	Atomic packing factor and its calculation.	Atomic packing factor and its calculation.	Theoretical	Online assignments
3	Theoretical	Crystallographic defects.	Crystallographic defects.	Theoretical	Homework
4	Theoretical	Solidification of ingots and casting defects.	Solidification of ingots and casting defects.	Theoretical	Quizzes
5	Theoretical	Hardness methods measurements.	Hardness methods measurements.	Theoretical	Quizzes
6	Theoretical	Tensile properties.	Tensile properties.	Theoretical	Online assignments
7	Theoretical	Stress-Strain curve.	Stress-Strain curve.	Theoretical	Quizzes
8	Theoretical	Impact strength measurement measurements methods.	Impact strength measurement measurements methods.	Theoretical	Homework
9	Theoretical	Binary alloys systems-Isomorphous system.	Binary alloys systems-Isomorphous system.	Theoretical	Reports
10	Theoretical	Eutectic system-type one.	Eutectic system-type one.	Theoretical	Online assignments
11	Theoretical	Eutectic system-type	Eutectic system-type two.	Theoretical	Project

		two.			
12	Theoretical	Iron-carbide phase diagram.	Iron-carbide phase diagram.	Theoretical	Quizzes
13	Theoretical	Carbon and alloy steels.	Carbon and alloy steels.	Theoretical	Reports
14	Theoretical	Aluminum and its alloys.	Aluminum and its alloys.	Theoretical	Project
15	Theoretical	Copper and its alloys.	Copper and its alloys.	Theoretical	Online assignments

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Lab 1: Vickers hardness method.	Lab 1: Vickers hardness method.	practical	Quizzes
2	Practical	Lab 2: Brinell hardness method.	Lab 2: Brinell hardness method.	practical	Online assignments
3	Practical	Lab 3: Rockwell hardness method.	Lab 3: Rockwell hardness method.	practical	Quizzes
4	Practical	Lab 4: Tensile test.	Lab 4: Tensile test.	practical	Lab
5	Practical	Lab 5: Compression test.	Lab 5: Compression test.	practical	Quizzes
6	Practical	Lab 6: Bending test.	Lab 6: Bending test.	practical	Online assignments
7	Practical	Lab7: Impact test.	Lab7: Impact test.	practical	Quizzes
8	Practical	Lab 8: Specimen preparation for microstructure examination.	Lab 8: Specimen preparation for microstructure examination.	practical	Lab
9	Practical	Lab 9: Mounting of specimens.	Lab 9: Mounting of specimens.	practical	Reports
10	Practical	Lab 10:	Lab 10:	practical	Online

		Metallurgical microscope.	Metallurgical microscope.		assignments
11	Practical	Lab11: Microstructure examination of carbon steels.	Lab11: Microstructure examination of carbon steels.	practical	Project
12	Practical	Lab 12: Microstructure examination of aluminum and its alloys.	Lab 12: Microstructure examination of aluminum and its alloys.	practical	Quizzes
13	Practical	Lab 13: Microstructure examination of copper and its alloys.	Lab 13: Microstructure examination of copper and its alloys.	practical	Reports
14	Practical	Lab 14: Microstructure examination of cast and wrought samples.	Lab 14: Microstructure examination of cast and wrought samples.	practical	Project
15	Practical	Lab 15: Welding defects examination.	Lab 15: Welding defects examination.	practical	Online assignments

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

13. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	"Materials Science and Engineering AN INTRODUCTION" by WILLIAM D. CALLISTER, JR., DAVID G. RETHWISCH
Main references (sources)	"Engineering Materials Technology" by W. Bolton
Recommended books and references (scientific journals, reports…)	"Essentials of Materials Science and Engineering" by Donald R. Askeland, Pradeep P. Fulay
Electronic References, Websites	

Differentiation equations - teck201 - Second Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
Differentiation equations – teck201 – Second Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives :	• Course Objectives
9. **Course Objectives**	Introducing the student to the second part of advanced mathematics, which includes complex numbers, vectors and partial derivatives, double and triple integrations and their applications with polar coordinates and series in order to develop students' intellectual abilities and benefit from their applications in the field of specialization.

Teaching and Learning Strategies :	• Student will show the understanding of impact of Calculus on Mechanical Engineering. • Student will Demonstrate their understanding of mathematical ideas from multiple perspectives. • Using the internal connections between geometry, algebra, and numerical computation. • Applying the connections between theory and applications. • Distinguishing between a formal proof and a less formal argume and understanding the different roles these play in mathematics.

10. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoritical	Vectors and Geometry Space	Vectors and the Geometry of Space	Theoretical	Quizzes
2	Theoritical	Vectors and Geometry Space	Vectors and the Geometry of Space	Theoretical	Online assignmer
3	Theoritical	Complex Numbers	Complex Numbers	Theoretical	Homework
4	Theoritical	Complex Numbers	Complex Numbers	Theoretical	Quizzes
5	Theoritical	Partial Derivatives	Partial Derivatives	Theoretical	Quizzes
6	Theoritical	Partial Derivatives	Partial Derivatives	Theoretical	Online assignmer
7	Theoritical	Multiple Integ	Multiple Integrals	Theoretical	Quizzes
8	Theoritical	Multiple Integ	Multiple Integrals	Theoretical	Homework
9	Theoritical	1- Polar Coordinates	2- Polar Coordinates	Theoretical	Reports
10	Theoritical	Polar Coordina	Polar Coordinates	Theoretical	Online assignmer
11	Theoritical	Polar Coordina	Polar	Theoretical	Project

			Coordinates		
12	Theoritical	Spherical Coordinates	Spherical Coordinates	Theoretical	Quizzes
13	Theoritical	Spherical Coordinates	Spherical Coordinates	Theoretical	Reports
14	Theoritical	Infinite Sequences Series	Infinite Sequences and Series	Theoretical	Project
15	Theoritical	Infinite Sequences Series	Infinite Sequences and Series	Theoretical	Online assignmer

11. Course Evaluation:
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	Lecturer notes + Thomas Calculus 12th Edi Textbook
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	YouTube https://www.coursera.org/learn/introduction-t calculus

English - ntu101 - First Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:

Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
English – ntu101 – First Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	• **Enhance Language Proficiency:** • **Strengthen students' command of upper-intermediate grammar a vocabulary.** • **Develop greater fluency and accuracy in spoken and written English.** • **Integrate the Four Language Skills:** • **Improve the ability to listen, speak, read, and write in English in b academic and real-life contexts.** • **Encourage the simultaneous development of these skills through ta based and interactive activities.** • **Foster Effective Communication:** • **Enable students to express ideas clearly and confidently in discussio debates, and presentations.** • **Support the use of appropriate language in a range of social, acaden and professional settings.** • **Promote Critical Thinking and Cultural Awareness:** • **Engage with texts and topics that stimulate reflection on social issu global concerns, and personal identity.**

	• **Cultivate awareness of different cultures and viewpoints through expos to authentic materials.** • **Build Independent Learning Strategies:** • **Encourage students to monitor their own progress, identify areas improvement, and apply self-correction techniques.** • **Develop habits for lifelong learning and continual improvement of Engl language skills.** • **Prepare for Post-Graduate Use of English:** • **Equip students with language tools and confidence necessary for hig education, job markets, or international engagement.** • **Emphasize academic writing, formal communication, and presentat skills relevant to future goals.**

9. Teaching and Learning Strategies :

Strategy	Lectures 2. Seminars / Workshops 3. Practical Language Sessions 4. Peer Activities 5. Online Components (Blended Learning)

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Unit 1		Theoretical	**Quizzes** (Weekly Biweekly)
2	Theoretical	Unit 2		Theoretical	
3	Theoretical	Seminar		Theoretical	1. **Midterm Exam**
4	Theoretical	Unit 3-4		Theoretical	2. **Final Exam**
5	Theoretical	Exam		Theoretical	3. **Oral Presentations /**

					Speaking Exams
6	Theoretical	Unit 5-6		Theoretical	4. **Writing Assignments**
7	Theoretical	Unit 7		Theoretical	5. **Surveys / Projects**
8	Theoretical	Survey		Theoretical	
9	Theoretical	Unit 8-9		Theoretical	
10	Theoretical	Unit 10-11		Theoretical	
11	Theoretical	Exam 2		Theoretical	
12	Theoretical	Seminar		Theoretical	
13	Theoretical	Unit 12		Theoretical	
14	Theoretical	Oral Exam		Theoretical	
15	Theoretical	Preparations for the final exam		Theoretical	

11. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources :

Main references (sources) Required textbooks (curric books, if any)	○ Focus on vocabulary, grammar, reading comprehension, and listening skills. Used for continuous assessment.
Recommended books and references (scientific journals, reports…)	○ Covers all language skills, focusing on application of grammar and vocabulary in reading, writing, and listening.
Electronic References, Websites	○ Comprehensive test assessing all four skills (reading, writing, listening, speaking), including longer writing tasks and oral interviews.

Crimes of Ba'ath Party - ntu200 - Second Level

Course Description

1. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
2. Scientific Department:	
Mechanical Power Techniques Engineering	
3. Course Name / Course Code / Level:	
Crimes of Ba'ath Party – ntu200 – Second Level	
4. Available Attendance Forms:	
Attendance	
5. Semester / Year:	
Semester	
6. Number of Credit Hours (Total) / Number of Units (Total):	
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025 Name: Email:	
8. **Course Objectives**	• Increase the student's knowledge of the theoretical and historical

	development of human rights and democracy. • Develop the student's analytical and critical skills regarding the current and future aspects of human rights and democracy. • Train the student on the importance of active participation in public life as a means to promote respect for human rights and engage in political and cultural activities. • Empower students to understand the significance of education and its role promoting a culture of human rights and democracy, contributing to the building of a civilized society based good governance, faith in human rights, education about them, and active participation in governance through free and fair elections
9. Teaching and Learning Strategies :	
Strategy	Understand the historical development of human rights in ancient civilizations and their relevance to contemporary societies. Analyze the positions of divine laws and religious texts on human rights and evaluate their impact on different societies. Critically examine international constitutions and treaties related to human rights and assess their effectiveness in promoting and protecting human rights. Evaluate the role and significance of the United Nations Charter in establishing a framework for the protection of human rights at the international level. Assess the functions and contributions of international organizations in promoting and safeguarding human rights globally. Explore the role of non-governmental organizations (NGOs) in advocating for and protecting human rights in different contexts. Identify and explain the key safeguards and mechanisms in place to ensure the protection of human rights at the national and international levels. Understand the concept of international humanitarian law and its historical

	evolution, and its significance in times of armed conflict. Analyze the concept, origin, and evolution of democracy, and understand its principles and values. Examine the relationship between Islam and democracy and evaluate different perspectives on the compatibility of these concepts. Identify and describe the characteristics and features of a democratic system. Differentiate between various forms and types of democracy and assess their strengths and weaknesses. Analyze the political components of democracy, including the role of political parties and their influence on the democratic process. Understand the relationship between democracy, education, and the role of education in promoting democratic values and citizenship. Evaluate the role of media in a democratic system, including its influence on public opinion and the functioning of democratic institutions

Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theoretical	Human rights in ancient civilizations (Greek and Roman civilizations)		Lecture	Exam
2	2 Theoretical	The position of div laws on human rig		Lecture	Exam
3	2 Theoretical	Human rights in international constitutions.		Lecture	Exam
4	2 Theoretical	The United Nation Charter and its star on human rights.		Lecture	Exam
5	2 Theoretical	Human rights in international organizations.		Lecture	Exam
6	2 Theoretical	Human rights in nc		Lecture	Exam

		governmental organizations.			
7	2 Theoretical	Safeguards for hun rights.		Lecture	Exam
8	2 Theoretical	The concept of international humanitarian law a its historical development.		Lecture	Exam
9	2 Theoretical	The concept, origir and evolution of democracy.		Lecture	Exam
10	2 Theoretical	The relationship between Islam and democracy.		Lecture	Exam
11	2 Theoretical	Characteristics of democracy.		Lecture	Exam
12	2 Theoretical	Forms and types of democracy.		Lecture	Exam
13	2 Theoretical	Political componer of democracy.		Lecture	Exam
14	2 Theoretical	Democracy and education.		Lecture	Exam
15	2 Theoretical	**Preparatory Weel**		Lecture	Exam

11. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Steam & gas power plants - mpe203 - Second Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering
3. Course Name / Course Code / Level:
Steam & gas power plants – mpe203 – Second Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	• Understanding the principles of converting thermal energy of combusted fuel to mechanical works and illustrate how such power cycles can be modeled thermodynamically. • Re-reminding to the Carnot cycle which is present highest efficiency power cycle operating between two temperature level. • Understanding the Rankin cycle and its components • Viewing the Rankine cycle improving method to increase the thermal efficiency.

9. Teaching and Learning Strategies :	
Strategy	Teaching Method 1 – Lectures Description: Attendance Recorded: Yes Teaching Method 2 – Asynchronous on-line course materials Description: Podcasts, videos and articles in thermodynamics Attendance Recorded: No Unscheduled Directed Student Hours (time spent away from timetabled sessions but directed by the teaching staff). Teaching Method 3 - Tutorials Description: Attendance Recorded: Yes Teaching Method 4 - Practical Description: Practical homework assignments Attendance Recorded: No Unscheduled Directed Student Hours (time spent away from timetabled sessions but directed by the teaching staff).

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Reviewing to the second law of thermodynamics and heat engine		Theoretical	Quizzes
2	Theoretical	The Carnot vapor cycle		Theoretical	Online assignments
3	Theoretical	Rankine cycle: the ideal cycle for vapor power cycles		Theoretical	Homework
4	Theoretical	Deviation of actual vapor power cycles from idealized ones		Theoretical	Quizzes

5	Theoretical	How can we increase the efficiency of the Rankine cycle?		Theoretical	Quizzes
6	Theoretical	The ideal Rankine cycle with super heat		Theoretical	Online assignments
7	Theoretical	The ideal Rankine cycle with reheat		Theoretical	Quizzes
8	Theoretical	The ideal regenerative Rankine cycle: one open feedwater heater		Theoretical	Homework
9	Theoretical	The ideal regenerative Rankine cycle: two open feedwater heater		Theoretical	Reports
10	Theoretical	The ideal regenerative Rankine cycle: one closed feedwater heater		Theoretical	Online assignments
11	Theoretical	The ideal regenerative Rankine cycle: two closed feedwater heater		Theoretical	Project
12	Theoretical	The complex Rankine cycle with more one improvement in the same cycle		Theoretical	Quizzes
13	Theoretical	Second-law analysis of vapor power cycles		Theoretical	Reports
14	Theoretical	Cogeneration		Theoretical	Project
15	Theoretical	Combined gas–vapor power cycles		Theoretical	Online assignments

11. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	Applied Thermodynamics for engineering technology By T.D. EASTOP
Main references (sources)	Thermodynamics An engineering approach By Yunus A. Cengel
Recommended books and references (scientific journals, reports…)	Fundamentals of engineering thermodynamics By Michael J. Moran
Electronic References, Websites	

Strength of materials - mpe202 - Second Level

Course Description

13. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
14. Scientific Department:
Mechanical Power Techniques Engineering
15. Course Name / Course Code / Level:
Strength of materials – mpe202 – Second Level
16. Available Attendance Forms:
Attendance
17.Semester / Year:
Semester
18.Number of Credit Hours (Total) / Number of Units (Total):
19. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025

Name:
Email:

20. Course Objectives :

Course Objectives	1) To know different types of the stresses which may subjected to the mechanical elements and their expected effects such as strain. 2) To study the shear forces and bending moment diagrams with essential stresses…

21. Teaching and Learning Strategies :

Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

22. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Simple stress	Simple stress	Theoretical	Quizzes
2	Theoretical	Shearing stress, Bearing stress	Shearing stress, Bearing stress	Theoretical	Online assignments
3	Theoretical	Thin wall cylinders	Thin wall cylinders	Theoretical	Homework
4	Theoretical	Simple strain, stress-strain diagram, Hook's law	Simple strain, stress-strain diagram, Hook's law	Theoretical	Quizzes
5	Theoretical	Thermal stress	Thermal stress	Theoretical	Quizzes

6	Theoretical	Welded connection	Welded connection	Theoretical	Online assignments
7	Theoretical	Riveted joints	Riveted joints	Theoretical	Quizzes
8	Theoretical	Torsion	Torsion	Theoretical	Homework
9	Theoretical	Spring	Spring	Theoretical	Reports
10	Theoretical	Shear and moment in Beam	Shear and moment in Beam	Theoretical	Online assignments
11	Theoretical	Beam deflection	Beam deflection	Theoretical	Project
12	Theoretical	Deflection cantilever Beam	Deflection cantilever Beam	Theoretical	Quizzes
13	Theoretical	Deflection of simply supported Beam	Deflection of simply supported Beam	Theoretical	Reports
14	Theoretical	Combined stresses	Combined stresses	Theoretical	Project
15	Theoretical	Stress at a point /Mohr circle	Stress at a point /Mohr circle	Theoretical	Online assignments

23. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Lab 1: Introduction to Mechanical Tests	Lab 1: Introduction to Mechanical Tests	practical	Lab
2	Practical	Lab 2: Brinell Hardness Test	Lab 2: Brinell Hardness Test	practical	Reports
3	Practical	Lab 3: Rockwell Hardness Test	Lab 3: Rockwell Hardness Test	practical	Online assignments
4	Practical	Lab 4: Vickers Hardness	Lab 4: Vickers Hardness Test	practical	Project

		Test			
5	Practical	Lab 5: Impact Test	Lab 5: Impact Test	practical	Quizzes
6	Practical	Lab 6: Tensile Test	Lab 6: Tensile Test	practical	Reports
7	Practical	Lab 7: Compression Test	Lab 7: Compression Test	practical	Project
8	Practical	Lab 8: Spring Stiffness Test	Lab 8: Spring Stiffness Test	practical	Online assignments
9	Practical	Lab 9: Torsion Test	Lab 9: Torsion Test	practical	Lab
10	Practical	Lab 10: Deflection in Cantilever Beam Test	Lab 10: Deflection in Cantilever Beam Test	practical	Reports
11	Practical				
12	Practical				
13	Practical				
14	Practical				
15	Practical				

24. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

25. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	Strength of Materials, Ferdinand L. Sir and Andrew Pytel.
Main references (sources)	Schaum's Outline of Strength of Materials

Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://www.coursera.org/learn/mechanics-1

Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
27. Scientific Department:
Mechanical Power Techniques Engineering
28. Course Name / Course Code / Level:
Computer-2 – ntu202 – Second Level
29. Available Attendance Forms:
Attendance
30. Semester / Year:
Semester
31. Number of Credit Hours (Total) / Number of Units (Total):
3hr
32. Description Preparation Date / Course administrator's name (mention all, if more than one name)
1/7/2025 Name: Email:
. Course Objectives :

Course Objectives	1. Enhancing basic computer knowledge

	o Enabling students to understand computer components (hardware and software) and their functions. 2.Developing basic programming skills o Training students to write simple programs to solve engineering problems. 3. Application of computers in mechanical engineering o Using computers to process data and analyze engineering results. o Linking programming concepts to mechanical calculations (such as heat transfer, dynamics, and forces). 4. Learn basic engineering software o Learn engineering tools such as: ♣ AutoCAD for engineering drawing ♣ MATLAB for numerical processing ♣ Excel for organizing and analyzing data 5. Prepare students for advanced stages o Prepare students to use programming and computer analysis in future projects, such as design and thermal or hydraulic analysis. 6. Link theory to practice o Translate theoretical concepts into practical applications using appropriate software.
. Teaching and Learning Strategies :	
Strategy	A- Knowledge A1 - The student knows the basic components of a computer. • Distinguishes between input, processing, output, and storage units A2 - The student understands the types of software and their uses. • Distinguishes between operating systems, application software, compilers. A3 - The student learns the basics of programming. • Understands the concepts of variables, data types, loops, conditi and functions. A4- Familiarize yourself with engineering tools and software, such

	AutoCAD, MATLAB, and Excel, and how to use them in mechan engineering. A5- Understand the relationship between programming and phys and engineering systems. • Link engineering laws to the programs that perform these calculati

Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Explanation of the topic of network security	Network Security	Lecture explanations Videos	Midterm and daily exams Reports
2	Theoretical	Explanation of the topic of network security	Network Security	Presentations and class discussions	topic and discussion
3	Theoretical	Explanation of the topic of e-commerce	E-Commerce	Video presentations	Daily exams
4	Theoretical	Explanation of the topic of computer errors	Computer Troubleshooting	Explanatory presentations	Presentations
5	Theoretical	Explanation of the topic of computer errors (continuation)	Computer Troubleshooting	Images and illustrative clips	Daily exams
6	Theoretical	Explanation of the topic of artificial intelligence	Introduction to Artificial Intelligence	Theoretical lectures	Daily exams
7	Theoretical	Explanation of the topic of artificial intelligence	Introduction to Artificial Intelligence	Video presentations and class discussions	Homework
8	Theoretical	Explanation of the role of artificial intelligence	The Role of Artificial Intelligence in Modern Smartphones	Theoretical lectures	Daily and mont exams

9	Theoretical	Continuing the explanation of the role of artificial intelligence	The Role of Artificial Intelligence in Modern Smartphones	Explanatory videos	Tests
10	Theoretical	Explaining the applications of artificial intelligence	Artificial Intelligence Applications and Tools	Lectures and videos	Tests
11	Theoretical	Continuing the explanation of applications	Artificial Intelligence Applications and Tools	Class discussion	Presentation
12	Theoretical	Continuing the explanation of applications	Artificial Intelligence Applications and Tools	Mini projects to discuss a topic	Tests
13	Theoretical	Explaining the topic of society and artificial intelligence	Artificial Intelligence and Society	Theoretical lecture	Reports and discussi
14	Theoretical	Explaining the ethical challenges of artificial intelligence	Ethical Challenges in Artificial Intelligence	Theoretical lectures	Tests
15	Theoretical	Explaining the future	Artificial Intelligence in the Future	Videos and lectures	Tests

Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Setting up a simple local area network using Cisco Packet Tracer or Wireshark	Introduction to Networks and Security	Project-Based Learning	Short tests
2	Practical	Practical experience scanning TCP/IP and DNS using Wireshark	Basic Network Protocols	Video Presentati	Mini projects
3	Practical	Setting up a	Firewalls	Simulation	Presentations

		firewall using pfSense or Windows Firewall			
4	Practical	Using tools like Cryptool to understand encryption and decryption	Basic Encryption	Labs	Group assessment
5	Practical	Simulating simple attacks using a secure learning environment like Kali Linux and Metasploitable	Types of Cyber Attacks	Labs	Lab reports
6	Practical	Creating and analyzing strong passwords using password analyzers	Password Protection	Labs	Presentations
7	Practical	Using Snort or Wireshark to analyze packets and identify unusual activity	Intrusion Detection Tools	lab	Group assessment
8	Practical	A tutorial on AI examples using simple applications like ChatGPT or Google Teachable Machine.	Introduction to Artificial Intelligence	Video Presentatic	Tests
9	Practical	Using AI-based smartphone applications (such as translation and image recognition	Artificial Intelligence in Everyday Life	Video Presentatic	Mini-projects
10	Practical	Implementing a simple Python program using libraries like NumPy and Pandas	Python Programming for Artificial Intelligence	Videos	Lab reports
11	Practical	Building a simple neural network	Simplified Neural	Computer Labs	Lab reports

		using TensorFlow or Keras in Google Colab	Networks		
12	Practical	Training a simple model to distinguish between two types of data (e.g., images of cats/dogs)	Classification and Discrimination	Labs and Gr Work	Mini-projects
13	Practical	AI applications in mechanics – Demonstration project presentation (e.g., fault prediction)	Artificial Intelligence in Industry	Labs and Gr Work	Group assessment
14	Practical	Implementation of a small application project such as: "Designing an AI system for image classification" or "Simulating intrusion detection	Review and Mini-Project	Small Projects	Final exams
15	Practical				

. Course Evaluation:
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Conduction heat transfer and radiation – MPE-302 - Third Level

Course Description

39. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
40. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch

41. Course Name / Course Code / Level:
Conduction and Radiation Heat Transfer – mpe302 – Third Level
42. Available Attendance Forms:
Attendance
43.Semester / Year:
Semester
44.Number of Credit Hours (Total) / Number of Units (Total):
5 hours (8 units)
45. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Professor: Ehsan Fadhil Abbas Email: ehsanfadhil@ntu.edu.iq
46. Course Objectives:

Course Objectives	• **Introduce the student to the Basic Concepts of Heat Transfer, Heat Transfer Mechanisms, Thermal conductivity and convection heat transfer.** • **Introducing the student to the main scientific principles in the field of heat transfer and its application in the Renewable Energy, Refrigeration, Cooling, and air conditioning fields, and power plants.** • **Introduce the student to the Basic Concepts of heat transfer, physical mechanisms** • **Introduce the student by convection heat transfer.**

47. Teaching and Learning Strategies:

Strategy	• **Theoretical and practical lectures** • **Weekly tests (written and practical)** • **Submission of reports** • **Asking questions during lectures**

48. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	**3**	The student	Introduction to Heat	Theoretical	Report

		understands the lesson.	Transfer and Heat Transfer Methods	lecture	
2	**3**	The student understands the lesson.	Conduction Heat transfer Equation for Wall (Single & Multilayers)	Theoretical lecture	Homework
3	**3**	The student understands the lesson.	Conduction Heat transfer Equation for Cylinders and Spheres (single and multilayers)	Theoretical lecture	Quiz
4	**3**	The student understands the lesson.	Overall heat transfer coefficient	Theoretical lecture	Homework
5-6	**3**	The student understands the lesson.	One-dimensional heat transfer equation with heat source, application of boundary conditions	Theoretical lecture	Homework
7-8	**3**	The student understands the lesson.	Design of fins and It applications	Theoretical lecture	Homework Report Quiz
9-10	**3**	The student understands the lesson.	Multi-dimension heat conduction equation (numerical method)	Theoretical lecture	Homework Quiz
11	**3**	The student understands the lesson.	Mid term examination	Theoretical lecture	Written
12	**3**	The student understands the lesson.	Introduction to radiation heat transfer	Theoretical lecture	Report
13	**3**	The student understands the lesson.	Configuration or view factor calculation for known geometry	Theoretical lecture	Homework
14-15	**3**	The student understands the lesson.	Heat exchange between black bodies and none black bodies	Theoretical lecture	Homework Quiz
49. Course Structure (Practical):					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	The student gains the skill	Writing practical test reports and analyzing results	Practical lecture	Report
2	2	The student gains the skill	Training on the use of measurement devices	Practical lecture	Report
3	2	The student gains the skill	Calibration training for measuring instruments	Practical lecture	Report Quiz
4	2	Student training	Identify the components of the	Practical	Report

		on experiments conducting	thermal conductivity instrument and the procedure for conducting experiments.	lecture	+ Discussion
5	2	The student learns how to conduct the experiment	Finding the relationship between temperature distribution and heat transfer in metals	Practical lecture	Report
6	2	The student learns how to conduct the experiment	Finding the relationship between heat transfer and cross-sectional area in various metals	Practical lecture	Report
7	2	The student learns how to conduct the experiment	Calculating the thermal resistance between two metals in contact	Practical lecture	Report
8	2	The student learns how to conduct the experiment	Determining the thermal conductivity of an unknown material	Practical lecture	Report
9	2	The student learns how to conduct the experiment	Determining the thermal conductivity of building materials	Practical lecture	Report
10	2	The student learns how to conduct the experiment	Determining the thermal conductivity of insulating materials	Practical lecture	Report
11	2		Mid term examination		Written Oral
12	2	Student training on experiments conducting	Identify the components of the radiation instrument and the procedure for conducting experiments	Practical lecture	Report
13	2	The student learns how to conduct the experiment	Calculating the emissivity between two materials: black and non-black	Practical lecture	Report
14	2	The student learns how to conduct the experiment	Calculating the emissivity between two materials: black and non-black, in different directions	Practical lecture	Report
15	2	The student learns how to conduct the experiment	Calculating heat transfer between two materials: black and non-black	Practical lecture	Report

50. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily

preparation, daily oral, monthly, or written exams, reports .... etc	
51. Learning and Teaching Resources:	
Required textbooks (curricular books, if any)	Heat Transfer, J.P. Holman
Main references (sources)	Heat Transfer, J.P. Holman
Recommended books and references (scientific journals, reports…)	Heat and Mass Transfer: Fundamentals and Applications, Yunus A. Çengel
Electronic References, Websites	https://ocw.mit.edu/

Convection heat transfer and heat exchangers - mpe306 - Third Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
Convection heat transfer and heat exchangers – mpe306 – Third Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
5 hours (8 Units)
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Ehsan Fadhil Abbas Email: ehsanfadhil@ntu.edu.iq
8. Course Objectives:

Course Objectives	• **Introduce the student to the Basic Concepts of Convection Heat Transfer.** • **Introduce the student to the fundamental concepts of continuity, momentum, and energy equations.** • **Introduce the student to identify the viscous and thermal boundary layers.** • **Introduce the concept of determining the convection heat transfer coefficient.**

	• **Introduce the student to the basic concepts of heat exchangers.** • **Introduce the student to the fundamental concepts of heat exchanger design.**

9. Teaching and Learning Strategies:

Strategy	• **Theoretical and practical lectures** • **Weekly tests (written and practical)** • **Submission of reports** • **Asking questions during lectures**

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	The student understands the lesson	Principles of convection heat transfer	Theoretical lecture	Report
2	3	The student understands the lesson	Forced convection heat transfer equations under steady-state conditions and one dimension	Theoretical lecture	Homework Quiz
3-4	3	The student understands the lesson	Analytical solution for laminar and turbulent forced convection heat transfer	Theoretical lecture	Home work
5	3	The student understands the lesson	Bulk temperature and non-dimensional quantities	Theoretical lecture	Homework Quiz
6-7	3	The student understands the lesson	Empirical relations for laminar and turbulent forced convection heat transfer	Theoretical lecture	Report Homework
8	3	The student understands the lesson	Natural convection heat transfer	Theoretical lecture	Report
9	3	The student understands the lesson	Empirical relations for natural convection	Theoretical lecture	Homework
10	3		Mid-Term Examination		Written
11	3	The student understands the lesson	Introduction to heat exchangers, their types and features	Theoretical lecture	Report
12	3	The student understands the lesson	Overall heat transfer coefficient and fouling factor	Theoretical lecture	Homework
13	3	The student	Log mean temperature	Theoretical	Homework

		understands the lesson	difference (LMTD) method	lecture	Quiz
14 -15	3	The student understands the lesson	Effectiveness – NTU method	Theoretical lecture	Homework Quiz

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Student training on experiments conducting	Identify the components of the convection heat transfer instrument and the procedure for conducting experiments	Practical lecture	Report
2	2	The student learns how to conduct the experiment	Finding the relationship between the viscous boundary layer thickness on the vertical plane	Practical lecture	Report + Discussion
3	2	The student learns how to conduct the experiment	Investigation of the velocity distribution in the boundary layer under forced convection	Practical lecture	Report
4	2	The student learns how to conduct the experiment	Investigation of the velocity and temperature distribution in the boundary layer under forced convection	Practical lecture	Report Quiz
5	2	The student learns how to conduct the experiment	Investigation of the velocity distribution in the boundary layer under constant heat flux	Practical lecture	Report
6	2	The student learns how to conduct the experiment	Determining the local and average convection heat transfer coefficients over a vertical plate.	Practical lecture	Report Quiz
7	2	The student learns how to conduct the experiment	Determining the boundary layer flow over the tube bundle	Practical lecture	Report
8	2	The student learns how to conduct the experiment	Determining the local convection heat transfer coefficient of a cylinder	Practical lecture	Report Quiz
9	2		Mid term examination	Practical lecture	Written Oral
10	2	The student learns how to conduct the experiment	Analyzing the thermal performance of a parallel flow heat exchanger	Practical lecture	Report
11	2	The student learns how to conduct the	Analyzing the thermal performance of a cross-	Practical lecture	Report Quiz

		experiment	flow heat exchanger		
12	2	The student learns how to conduct the experiment	Analyzing the thermal performance of a pin heat sink	Practical lecture	Report
13	2	The student learns how to conduct the experiment	Analyzing the thermal performance of a plate heat sink	Practical lecture	Report Quiz
14-15	2	The student learns how to conduct the experiment	Analyzing the thermal performance of an annular heat sink	Practical lecture	Report Discussion

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

13. Learning and Teaching Resources:

Required textbooks (curricular books, if any)	Heat Transfer, J.P. Holman
Main references (sources)	Heat Transfer, J.P. Holman
Recommended books and references (scientific journals, reports…)	Heat and Mass Trans Fundamentals and Applicatio Yunus A. Çengel
Electronic References, Websites	https://ocw.mit.edu/

Electrical machines - mpe309 - Third Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
Electrical machines – mpe309 – Third Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
First Semester\Third Year
6. Number of Credit Hours (Total) / Number of Units (Total):
125\5
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Intisar Khalaf Saleh Email: intisarks@ntu.edu.iq
8. Course Objectives :

Course Objectives	• Understand **the principles of operation of AC and DC machines.** • Analyze **performance characteristics and efficiency of electric machines.** • Apply **machine knowledge in power systems and mechanical applications**

9. Teaching and Learning Strategies :	
Strategy	• Interactive lectures to enhance student engagement. • Hands-on lab experiments for practical understanding. • Group projects to develop teamwork and problem-solving skills.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	People Learning Structure of DC motor	What is DC motor	Explain Operating DC motor device	H.W C.W
2	Theoretical	To distinguish Types of DC motors	Types of DC motors	Display Types of DC motors on White bored By data show	H.W C.W
3	Theoretical	The relationship between E.F.E &velocity speed control	Applications of Electromotive force equalization velocity speed control	Display The law of E.F.E	H.W C.W
4	Theoretical	The effect of DC motor torque	DC motor torque	Display The law of DC motor torque	H.W C.W
5	Theoretical	The effect of Torque	Torque and	Display the Law of	H.W C.W

		And speed on DC motor	speed	Torque and speed	
6	Theoretical	Distinguish between the connection	characteristics of all types of DC motors	Characteristic of each type	H.W C.W
7	Theoretical	LEARINGTHE DRAW	single motors	How many phase single motor	H.W C.W
8	Theoretical	LEARINGTHE DRAW	Three-phase starter	How many phase three motor	H.W C.W
9	Theoretical	Distinguish the connection	star	The difference Between connection	H.W C.W
10	Theoretical	Distinguish the connection	triangle	The difference Between connection	H.W C.W
11	Theoretical	Display The law of Velocity	Electromotive force equalization velocity	The effect of velocity	H.W C.W
12	Theoretical	The relationship between E.F.E &velocity speed control	Applications of Electromotive force equalization velocity speed control	Display the law of E.F.E	H.W C.W

13	Theoretical	Connection on the board And distinguish Between them	Conventional diode and Zener diode in forward bias and back bias	Draw the curve according to result	H.W C.W
14	Theoretical	Connection on the board	transistor	Observe the application	H.W C.W
15	Theoretical	Connection on the board	half wave	Observe the curve	H.W C.W

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Student learning structure of DC motor	What is DC motor	Operating DC motor device in laboratory	Compare between theoretical results
2	Practical	To distinguish Types of DC motors	ypes of DC motors	Display Types of DC Motors on laboratory	Compare between theoretical results
3	Practical	The relationship between E.F.E &velocity speed control	Applications of Electromotive force equalization velocity speed control	Show the effect of velocity speed control	Compare between theoretical results
4	Practical	The effect of DC motor torque	DC motor torque	Operate the device and calculation	Compare between theoretical results

				the torque	
5	Practical	The effect of Torque and speed on DC motor	Torque and speed	Operate the device	Compare between theoretical results
6	Practical	Distinguish between the connection	characteristics of all types of DC motors	Made compacter between types	Compare between theoretical results
7	Practical	LEARINGTHE DRAW	single motors	Operating the device in laboratory	Compare between theoretical results
8	Practical	LEARINGTHE DRAW	Three-phase starter	Operating the device in laboratory	Compare between theoretical results
9	Practical	Distinguish the connection	star	Connection and operation the device in laboratory	Compare between theoretical results
10	Practical	Distinguish the connection	le	Connection and operation the device in laboratory	Compare between theoretical results
11	Practical	Display the law of Velocity	Electromotive force equalization	Connection and operation the device	Compare between theoretical results

			velocity	in laboratory	
12	Practical	The relationship between E.F.E &velocity speed control	Applications of Electromotive force equalization velocity speed control	Connection and operation the device in laboratory	Compare between theoretical results
13	Practical	Connection on on the board And distinguish Between them	Conventional diode and Zener diode in forward bias and back bias	Observe the difference between them	Compare between theoretical results
14	Practical	Connection on on the board	transistor	Observe the form of transistor	Compare between theoretical results
15	Practical	Connection on on the board	half wave	Observe the form of diode	Compare between theoretical results

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

13. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	"Basic Electrical Engineering", THERAJA.Bird
Main references (sources)	"Electrical and Electronic Principles and Technology", John
Recommended books and references (scientific journals, reports…)	"Electrical and Electronic Principles and Technology", John Bird
Electronic References, Websites	https://www.youtube.com/watch?v=OoUFCB8zrd0

Gas dynamics – mpe308 – Third Level

Course Description

14. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
15. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
16. Course Name / Course Code / Level:
Gas dynamics – mpe308 – Third Level
17. Available Attendance Forms:
Attendance
18.Semester / Year:
Semester
19.Number of Credit Hours (Total) / Number of Units (Total):
4
20. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Zhala Azeez Mohammed Email: zhalaaziz@ntu.edu.iq
21. Course Objectives :
Gas dynamics is a field that focuses on the behaviour of compressible fluids, especially gases, under different flow conditions. The general objectives of this course include several main themes: **Understanding compressible flow.** This science deals primarily with flow in which there are noticeable changes in density, called compressible flow. For air, this effect becomes significant at Mach numbers greater than 0.3. Key objectives in this area include: • Analysing subsonic and supersonic flow.

- Studying shock waves and expansion waves.
- Exploring the behaviour of gases at different velocities and pressures.

Applications in various fields

The knowledge gained from gas dynamics is essential for solving issues in many fields, such as:

- High-speed aerodynamics: Understanding the behaviour of gases at high speeds is fundamental to the design of aircraft and spacecraft.
- Propulsion systems: The principles of gas dynamics are applied in the design and operation of aircraft and rocket engines.
- Combustion engines: Gas dynamics plays a role in optimising the performance of internal combustion engines.
- Specialised technologies: The principles of gas dynamics are used in dynamic gas lasers and some medical technologies.

Research and analysis

Research in gas dynamics focuses on:

- Studying mixing and combustion processes.
- Exploring turbulence in gas flows.
- Analysing heat and mass transfer in gases.
- Studying turbulent flow in gas streams.

22. Teaching and Learning Strategies :

Outcomes	Teaching and Learning Methods	Assessment methods
Knowledge A1 – Understand the basic equations of motion of compressible flow. A2 – Describe the characteristic physical properties of different flow fields (infrasonic, transonic, transitional, supersonic and hypersonic). A3 – Understand basic principles such as Mach numbers, shock waves, and acoustic noise. A4 – Provide students with the basic knowledge required to understand and apply the principles of thermodynamics and fluid mechanics in the field of power mechanics techniques.	Lectures, discussions, presentations and question and answer sessions	Optional tests and quizzes
B – Skills B1 – Calculate the basic properties of gases such as temperature, pressure, flow velocity, and gas stresses. B2 – Apply compressible flow equations and multiphase flow relationships.	Lectures, discussions, presentations and question and answer sessions	Optional tests and quizzes

B3 – Develop modelling equations for different systems and demonstrate the ability to solve models for various processes/operating units. B4 – Analyse industrial issues using appropriate approximations and boundary conditions.		
C- Values C1- Study the movement of gases and the effect of forces on them, which helps in understanding the behaviour of gases in different engineering systems. C2- Apply physical and mechanical laws to gases to analyse and design systems such as air conditioning, refrigeration and combustion engines. C3-Develop analytical skills to solve dynamic proble related to gas flow, pressure and heat within mechan devices.	Lectures, discussions, presentations and question and answer sessions	Optional tests and quizzes

23. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand the concept of compressible fluid flow and distinguish between compressible and incompressible flow	Introduction to Compressible Flow	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
2	2	Understand and apply the basic equation of compressible flow and understand the relationship between the state variables of gases (pressure, volume, temperature)	Basic Equation of Compressible Flow	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
3	2	Understand the basic principles of wave propagation in gases and be able to analyse the behaviour of waves in compressible media, and use mathematical equations to describe wave propagation	Wave Propagation	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
4	2	Understand the fundamentals of compressible flow, including the continuity	Fundamental Aspects of Compressible Flow	Lectures, discussions, presentations, question and	Tests and quizzes

		equation that relates density, cross-sectional area, and velocity		answer sessions	
5	2	be able to analyse the relationship between the change of cross-sectional area, flow velocity, pressure and density in isentropic flow	Isentropic flow of a perfect gas in varying area duct	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
6	2	Understand the basic differences between subsonic and supersonic flow	Subsonic and Supersonic Flow through a Varying Area Channels	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
7	2	Conversion of energy from pressure to kinetic energy while keeping entropy constant	Isentropic Flow in Converging Nozzles	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
8	2	understand the nature of a normal shock wave, which is 170haracterized by a sudden increase in pressure, temperature, and density with a decrease in flow velocity and Mach number after the wave	Stationary Normal Shock Waves; part 1	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
9	2	Understand the nature of a normal shock wave, which is 170haracterized by a sudden increase in pressure, temperature, and density with a decrease in flow velocity and Mach number after the wave.	Stationary Normal Shock Waves; part 2	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
10	2	Understanding and analysing the phenomenon of natural shock and its effect on gas flow in convergent and divergent nozzles	Normal shock in converging–diverging nozzles	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes

11	2	Understand the basic principles of convergent and divergent ultrasonic diffusers and their effect on ultrasonic wave propagation in gases	Converging–Diverging Supersonic Diffusers	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
12	2	Understand the definition and basic characteristics of moving natural shock waves, including how they form and propagate in gases	Moving Normal Shock Waves	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
13	2	Ability to apply the principles of aerodynamics and Mach and sound speed calculations to analyse airflow over wings at hypersonic speeds	Supersonic Airfoils	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
14	2	Understand the properties of Fano flow which includes the effects of friction and heating in gas flow through channels, with the ability to analyse how pressure, temperature, and velocity change	Fanno flow-Part 1	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes
15	2	Understand the properties of Fano flow which includes the effects of friction and heating in gas flow through channels, with the ability to analyse how pressure, temperature, and velocity change	Fanno flow-Part 2	Lectures, discussions, presentations, question and answer sessions	Tests and quizzes

24. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understand the basic principles of gases	Study the behaviour of gases	Conduct experiments and integrate practical lectures with theoretical explanations, practical	Practical tests and evaluation of students' performance in

				problems, and class discussions to reinforce understanding	the laboratory through reports and discussion of the results
2	2	Understanding the basic principles of gases	Discuss the results	Presentation of seminars	Discuss the report
3	2	Understanding experimentation	Experiments on ideal gas and gas laws	Conducting experiments and integrating practical lectures with theoretical explanations, practical problems, and class discussions to reinforce understanding	Practical tests and evaluation of students' performance in the lab through reports and discussion of results
4	2 2	Understanding the conduct of experiments	Discussing the results	Presentation of seminars	Discuss the report
5	2	Training students in the use of pressure gauges	Measuring pressure	Conduct experiments and integrate practical lectures with theoretical explanations, practical problems, and class discussions to enhance understanding.	Practical tests and evaluation of students' performance in the lab through reports and discussion of results
6	2	Train students in the use of manometers	Discussion of the results	Presentation of seminars	Discuss the report
7	2	Training students in the use of speedometers	Measuring speed	Conduct experiments and integrate practical lectures with theoretical explanations, practical problems, and class discussions to enhance understanding	Practical tests and evaluation of students' performance in the lab through reports and discussion of results
8	2	Train students in the use of velocity	Discuss the results	Presentation of seminars	Discuss the report

		measuring devices			
9	2	Training students in the use of temperature measuring devices	Temperature Measurement	Conduct experiments and integrate practical lectures with theoretical explanations, practical problems, and class discussions to enhance understanding	Practical tests and evaluation of students' performance in the lab through reports and discussion of results
10	2	Train students in the use of temperature measuring devices	Discussion of the results	Presentation of the thermometers	Discuss the report
11	2	Working principle of the Bernoulli equation and experiments	Experiments to prove Bernoulli's equation for gases	Conduct experiments and integrate practical lectures with theoretical explanations, practical problems, and class discussions to reinforce understanding.	Practical tests and evaluation of students' performance in the laboratory through reports and discussion of results.
12	2	Working principle to prove the equation and conduct experiments	Discuss the results	Presentation of seminars	Discussion of the report
13	2	Recognise the relationship between losses and gas properties (density, viscosity) and pipe properties (diameter, surface roughness)	Measurement of losses in pipes	Conduct experiments and integrate practical lectures with theoretical explanations, practical problems, and class discussions to enhance understanding	Practical tests and evaluation of students' performance in the laboratory through reports and discussion of results
14	2		Discuss the	Demonstration of	Discussion of the

		Recognise the relationship between losses and gas properties (e.g. density, viscosity), and pipe properties (diameter, surface roughness).	results	salamanders	report
15	2	Recognise phenomena associated with compressible flow, such as shock formation (oblique and vertical) and supersonic and infrasound flow	Compressible flow of gases	Conduct experiments and integrate practical lectures with theoretical explanations, solving practical problems, and class discussions to enhance understanding	Practical tests and evaluation of students' performance in the laboratory through reports and discussion of the results

25. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports …. etc

26. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	**Available**
Main references (sources)	1- Gas Dynamics, Robert D. Zucker, Oscar Biblarz, P. Kannaiah. Department of Mechanical and Aerospace Engineering, Naval Postgraduate School, Monterey, California, USA (2002) 3(rd)Edition. **2-** Gas Dynamics, James E. John, Theo G. Keith, Oscar Biblarz, P. Kannaiah. Department of Mechanical and Manufacturing Engineering, University of Toledo, ohio, USA (2006).
Recommended books and references (scientific journals, reports…)	

Electronic References, Websites	https://www.youtube.com/watch?v=dAmLg5EWk7s&list=PLWNdELaQhV2QSvqjdC7TjyNDvFqm6EwpB

renewable energy-MPE305- Third level

Course Description

1.	Educational institution
Northern Technical UniversityEngineering .Technical College/Kirkuk	
2.	Sectionscientific
Mechanical Power Engineering / Renewable Energy Branch	
3.	Course Name/Code/ Level
renewable energy–MPE305–Level 3	
4.	Available attendance forms
My presence	
5.	semester/year
Semester system	
6.	Number of study hours(kidney)
4 hour	
7.	Date this description was prepared
1-7-2025	
8.	Course objectives (general objectives of the course)

- **Keeping pace with global development**The study aims to track scientific and technological progr in renewable energy, including solar energy, to ensure that educational and research institutions always keeping up with the latest innovations.
- **Providing the community with expertise**The study aims to enhance knowledge and skills in the f of renewable energy among students and the community, thus contributing to the developmen scientific, health, and environmental institutions.
- **Raising the level of academic performance**It aims to improve the quality of education and resea at universities and ensure the graduation of qualified personnel capable of addressing contempo challenges in the energy sector.
- **Encouraging scientific research**It seeks to find alternatives to conventional energy by searching innovative and sustainable solutions, thus contributing to addressing environmental and social iss related to energy.

- **Community service**It aims to support community activities by organizing workshops and seminar raise awareness of the importance of renewable energy and its positive impact on the environm and public health.
- **Promoting energy independence**By developing solar energy technologies, dependence on fo resources can be reduced and countries can become more energy independent.
- These goals are essential to ensure sustainable development and meet society's energy needs in efficient and environmentally friendly manner.

9. OutputsThe decisionTeaching, learning and assessment methods

Course outcomes

identificationIt is a set of knowledge, skills and values that the course seeks to achieve in students.

Its importanceIt provides the learner with a clear idea of what they will be able to do after completing the course, and helps in designing and evaluating courses.

How is it determined?The course outcomes are determined based on the objectives of the academic program to which the course belongs.

Outputs	Teaching and learning methods	Evaluation methods
i- knowledge A1- Knowledge of renewable energy sources and their types A2- Understanding the physical and engineering principles underlying renewable energy technologies. A3 – Analysis of the economic feasibility of renewable energy projects and comparison with traditional energy sources A4- Understanding the fundamental	-Theoretical lectures. -Practical application and field training -Panel discussions and workshops. -Use of modern display methods. -Self-education -Field visits	- Written tests - For practical and applied reports - Practical or design projects - For practical training and field reports -Discussion

differences between traditional and renewable energy sources in terms of sustainability and environmental impact.		
B -Skills B1- Fthey are renewable energy technologies and systems. B2 – The ability to apply the principles of engineering, science, and mathematics to solve complex problems related to renewable energy. B3 – Use programming tools and control systems to monitor the performance of power systems and analyze data. B4- Linking renewable energy sciences with other engineering sciences	-Practical application and field training -Panel discussions and workshops. -Use of modern display methods. -Self-education -Field visits	-For practical and applied reports -Practical or design projects -For practical training and field reports -Discussion
C-values A1- Environmental Responsibility and Sustainability A2- Effective participation in community development through awareness and scientific research A3- Respecting biodiversity and being careful in using technology	-Field training -Panel discussions and workshops. -Use of modern display methods. -Self-education -Field visits	-For practical and applied reports -Practical or design projects -For practical training and field reports -Discussion

10. Course structure **(Theoretical Vocabulary)**

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
1	theoreal	Solar radiation within atmosphere Solar radiation outside atmosphere Types of solar radiation	solar radiation	a lecture My theory	**Discussion exam**
2	theoreal	Definition of so angles The importance of so angles	angles Solar	a lecture My theory	**exam**

		ideal angles			**discussion**
3	theoretical	Geographical location Time and seasons The effect of angles on received radiation	factors Influential on Angles Solar	a lecture My theory	**exam** **discussion**
4	theoretical	identification importance Its uses Advantages Disadvantages	Energy complexes Solar	a lecture My theory	**exam** **discussion**
5	theoretical	Main parts Applications Working conditions Advantages Disadvantages Improvements	**Complexes withroofsFlat Panels (FPCs)**	a lecture My theory	**Discussion exam**
6	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**energy winds**	a lecture My theory	**Discussion exam**
7	theoretical	Main parts Applications Working conditions Advantages Disadvantages Improvements	**turbine The wind**	a lecture My theory	**Discussion exam**
8	theoretical	Parts Home Applications conditions the job Advantages Disadvantages	**energy water**	a lecture My theory	**Discussion exam**

		Improvements			
9	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Reflectors surfa Reward(PDRs)**	a lecture My theory	**Discussion exam**
10	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**energy Dams**	a lecture My theory	**Discussion exam**
11	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	energy waves	a lecture My theory	**Discussion exam**
12	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Tidal energy**	a lecture My theory	**Discussion exam**
13	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	Ocean energy	a lecture My theory	**Discussion exam**

14	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Earth's inter energy**	a lecture My theory	**Discussion exam**
15	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	fuel Vital	a lecture My theory	**Discussion exam**

11. Course structure **(Practical Vocabulary)**

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
1	practic	Measuring devices us	solar radiation	Application pra and training Field -Episodes Discus Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
2	practic	Practical calculation angles	angles Solar	Application pra and training Field -Episodes Discus Workshops a job. -Use means the Modern.	- Afor practical and applied reports -Practical or design projects -Afor

				-education Self -Visits Field	practical training and reportsHan dsintention
3	practi	Study the impact these factors	factors Influential on Angles Solar	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHan dsintention
4	practi	Its components Its working principle Maintain it	Energy complexes Solar	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHan dsintention
5	practi	Its components Its working principle Maintain it	**Complexes withroofsFlat Panels (FPCs)**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self	- Afor practical and applied reports -Practical or design projects

				-Visits Field	-Afor practical training and reportsHandsintention
6	practi	Its components Its working principle Maintain it	**energy winds**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
7	practi	Its components Its working principle Maintain it	**turbine The wind**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
8	practi	Its components Its working principle Maintain it	**energy water**	Application practical training Field -Episodes Discu Workshops a job.	- Afor practical and applied reports -Practical or

				-Use means the Modern. -education Self -Visits Field	design projects -Afor practical training and reportsHandsintention
9	practic	Its components Its working principle Maintain it	**Reflectors surfa Reward(PDRs)**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
10	practic	Its components Its working principle Maintain it	**energy Dams**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
11	practic	Its components Its working principle Maintain it	energy waves	Application practical training Field -Episodes Discu Workshops a job.	- Afor practical and applied reports

				-Use means the Modern. -education Self -Visits Field	-Practical or design projects -Afor practical training and reportsHandsintention
12	practi	Its components Its working principle Maintain it	**Tidal energy**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
13	practi	Its components Its working principle Maintain it	Ocean energy	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
14	practi	Its components Its working principle	**Earth's inter energy**	Application practical training Field -Episodes Discu	- Afor practical and applied

		Maintain it		Workshops a job. -Use means the Modern. -education Self -Visits Field	reports -Practical or design projects -Afor practical training and reportsHan dsintention
15	practi	Its components Its working principle Maintain it	fuel Vital	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHan dsintention

12. Curriculum Development Plan

Continuously updating the curriculum to keep pace with developments in the labor market (Curriculum Update Committee, Scientific Committee) such as:

1- **Develop curricula that are compatible with the labor market**

2- **Holding scientific seminars and conferences aimed at updating curricula**

3- **Follow up on scientific developments in the field of specialization**	
13. infrastructure	
Classrooms, laboratories a workshops	**Available**
1- Required textbooks	**Available**
2- Main References (Sources)	**-"Renewable Energy: Physi Engineering, Environmental Impac Economics And Planning." -**
A)Recommended books and references (scientific journals, reports, etc.)	**-Sustainable Energy Transformatic Power and Politics *-Sustainable Energy Systems Planni Integration, and Managers***
B)Electronic references, websites,…..	**https://www.noor-book.com/tag/%D8%A7%D8%A8%D%AD%D8%A7%D8%AB-%D8%A7%D9%84%D8%B7%D8%A%D9%82%D8%A9-%D8%A7%D9%84%D9%85%D8%A%D8%AC%D8%AF%D8%AF%D8%A**

renewable energy-MPE313- Third level

Course Description

1.	Educational institution
Northern Technical UniversityEngineering Technical CollegeKirkuk	
2.	Sectionscientific
Mechanical Power Engineering / Renewable Energy Branch	
3.	Course Name/Code/ Level
solar energy systems–MPE313–Level 3	
4.	Available attendance forms
My presence	
5.	semester/year
Semester system	
6.	Number of study hours(kidney)
4 hour	
7.	Date this description was prepared
1-7-2025	
8.	Course objectives (general objectives of the course)

- **Keeping pace with global development**The study aims to track scientific and technological progr in renewable energy, including solar energy, to ensure that educational and research institutions always keeping up with the latest innovations.
- **Providing the community with expertise**The study aims to enhance knowledge and skills in the f of renewable energy among students and the community, thus contributing to the developmen scientific, health, and environmental institutions.
- **Raising the level of academic performance**It aims to improve the quality of education and resea at universities and ensure the graduation of qualified personnel capable of addressing contempo challenges in the energy sector.
- **Encouraging scientific research**It seeks to find alternatives to conventional energy by searching innovative and sustainable solutions, thus contributing to addressing environmental and social iss related to energy.

- **Community service**It aims to support community activities by organizing workshops and seminar raise awareness of the importance of renewable energy and its positive impact on the environm and public health.
- **Promoting energy independence**By developing solar energy technologies, dependence on fo resources can be reduced and countries can become more energy independent.
- These goals are essential to ensure sustainable development and meet society's energy needs in efficient and environmentally friendly manner.

9. OutputsThe decisionTeaching, learning and assessment methods

Course outcomes

identificationIt is a set of knowledge, skills and values that the course seeks to achieve in students.

Its importanceIt provides the learner with a clear idea of what they will be able to do after completing the course, and helps in designing and evaluating courses.

How is it determined?The course outcomes are determined based on the objectives of the academic program to which the course belongs.

Outputs	Teaching and learning methods	Evaluation methods
i- knowledge A1- Knowledge of renewable energy sources and their types A2- Understanding the physical and engineering principles underlying renewable energy technologies. A3 – Analysis of the economic feasibility of renewable energy projects and comparison with traditional energy sources A4- Understanding the fundamental	-Theoretical lectures. -Practical application and field training -Panel discussions and workshops. -Use of modern display methods. -Self-education -Field visits	- Written tests - For practical and applied reports - Practical or design projects - For practical training and field reports -Discussion

differences between traditional and renewable energy sources in terms of sustainability and environmental impact.		
B -Skills B1- Fthey are renewable energy technologies and systems. B2 – The ability to apply the principles of engineering, science, and mathematics to solve complex problems related to renewable energy. B3 – Use programming tools and control systems to monitor the performance of power systems and analyze data. B4- Linking renewable energy sciences with other engineering sciences	-Practical application and field training -Panel discussions and workshops. -Use of modern display methods. -Self-education -Field visits	-For practical and applied reports -Practical or design projects -For practical training and field reports -Discussion
C-values A1- Environmental Responsibility and Sustainability A2- Effective participation in community development through awareness and scientific research A3- Respecting biodiversity and being careful in using technology	-Field training -Panel discussions and workshops. -Use of modern display methods. -Self-education -Field visits	-For practical and applied reports -Practical or design projects -For practical training and field reports -Discussion

10. Course structure **(Theoretical Vocabulary)**

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
1	theoretical	Solar radiation within atmosphere Solar radiation outside atmosphere Types of solar radiation	solar radiation	a lecture My theory	**Discussion exam**
2	theoretical	Definition of so angles The importance of so angles	angles Solar	a lecture My theory	**exam**

		ideal angles			**discussion**
3	theoretical	Geographical location Time and seasons The effect of angles on received radiation	factors Influential on Angles Solar	a lecture My theory	**exam** **discussion**
4	theoretical	identification importance Its uses Advantages Disadvantages	Energy complexes Solar	a lecture My theory	**exam** **discussion**
5	theoretical	Main parts Applications Working conditions Advantages Disadvantages Improvements	**Complexes withroofsFlat Panels (FPCs)**	a lecture My theory	**Discussion exam**
6	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Compound Parabolic Collectors (CPCs)**	a lecture My theory	**Discussion exam**
7	theoretical	Main parts Applications Working conditions Advantages Disadvantages Improvements	**Evacuated Tube Collectors (ETCs)**	a lecture My theory	**Discussion exam**
8	theoretical	Parts Home Applications conditions the job Advantages Disadvantages	**Parabolic Trough Collectors (PTCs)**	a lecture My theory	**Discussion exam**

		Improvements			
9	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Parabolic Dish Reflectors (PDRs)**	a lecture My theory	**Discussion exam**
10	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Heliostat Field Collectors (HFCs)**	a lecture My theory	**Discussion exam**
11	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Solar water heating systems**	a lecture My theory	**Discussion exam**
12	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Integrated Collector Storage Systems**	a lecture My theory	**Discussion exam**
13	theoretical	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Heat storage systems**	a lecture My theory	**Discussion exam**

14	theore al	Parts Home Applications conditions the job Advantages Disadvantages Improvements	**Thermal Analysis of Stora Systems**	a lecture My theory	**Discussi on exam**
15	theore al	Parts Home Applications conditions the job Advantages Disadvantages Improvements	General review	a lecture My theory	**Discussi on exam**

11. Course structure **(Practical Vocabulary)**

week	watc hes	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
1	practi	Measuring devices us	solar radiation	Application pra and training Field -Episodes Discus Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHan dsintention
2	practi	Practical calculation angles	angles Solar	Application pra and training Field -Episodes Discus Workshops a job. -Use means the Modern.	- Afor practical and applied reports -Practical or design projects -Afor

				-education Self -Visits Field	practical training and reportsHan dsintention
3	practi	Study the impact these factors	factors Influential on Angles Solar	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHan dsintention
4	practi	Its components Its working principle Maintain it	Energy complexes Solar	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHan dsintention
5	practi	Its components Its working principle Maintain it	**Complexes withroofsFlat Panels (FPCs)**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self	- Afor practical and applied reports -Practical or design projects

				-Visits Field	-Afor practical training and reportsHandsintention
6	practi	Its components Its working principle Maintain it	**energy winds**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
7	practi	Its components Its working principle Maintain it	**turbine The wind**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
8	practi	Its components Its working principle Maintain it	**energy water**	Application practical training Field -Episodes Discu Workshops a job.	- Afor practical and applied reports -Practical or

				-Use means the Modern. -education Self -Visits Field	design projects -Afor practical training and reportsHandsintention
9	practic	Its components Its working principle Maintain it	**Reflectors surfa** **Reward(PDRs)**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
10	practic	Its components Its working principle Maintain it	**energy Dams**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
11	practic	Its components Its working principle Maintain it	energy waves	Application practical training Field -Episodes Discu Workshops a job.	- Afor practical and applied reports

				-Use means the Modern. -education Self -Visits Field	-Practical or design projects -Afor practical training and reportsHandsintention
12	practi	Its components Its working principle Maintain it	**Tidal energy**	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
13	practi	Its components Its working principle Maintain it	Ocean energy	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHandsintention
14	practi	Its components Its working principle	**Earth's inter energy**	Application practical training Field -Episodes Discu	- Afor practical and applied

		Maintain it		Workshops a job. -Use means the Modern. -education Self -Visits Field	reports -Practical or design projects -Afor practical training and reportsHan dsintention
15	practi	Its components Its working principle Maintain it	fuel Vital	Application practical training Field -Episodes Discu Workshops a job. -Use means the Modern. -education Self -Visits Field	- Afor practical and applied reports -Practical or design projects -Afor practical training and reportsHan dsintention

12. Curriculum Development Plan

Continuously updating the curriculum to keep pace with developments in the labor market (Curriculum Update Committee, Scientific Committee) such as:

1- **Develop curricula that are compatible with the labor market**

2- **Holding scientific seminars and conferences aimed at updating curricula**

3- **Follow up on scientific developments in the field of specialization**	
13. infrastructure	
Classrooms, laboratories a workshops	**Available**
1- Required textbooks	**Available**
2- Main References (Sources)	**-"Renewable Energy: Physi Engineering, Environmental Impac Economics And Planning." -**
أ) Recommended books and references (scientific journals, reports, etc.)	**-Sustainable Energy Transformatic Power and Politics** ***-Sustainable Energy Systems Plannir Integration, and Managers***
ب) Electronic references, websites,.....	**https://www.noor-book.com/tag/%D8%A7%D8%A8%I %AD%D8%A7%D8%AB-%D8%A7%D9%84%D8%B7%D8%A %D9%82%D8%A9-%D8%A7%D9%84%D9%85%D8%A %D8%AC%D8%AF%D8%AF%D8%A**

vibrations – mpe310 – Third Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
vibrations – mpe310 – Third Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	• To establish an understanding of the fundamental concepts of mechanical vibrations, and how to estimate the mechanical vibration characteristics, natural frequencies mode shapes and damping ratio. Estimate the effect of boundary condition on the vibration properties. • To study one, two, and three degree of freedom of vibrated body. • To study the free and forced vibration of body. • To study the description of flexible body by a system of mass, spring, dumber.

9. Teaching and Learning Strategies :

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and some activities that are interesting to the students.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Basic Concepts of Mechanical Vibration, Classification of Mechanical Vibration		Theoretical	Quizzes
2	Theoretical	Vibration Analysis Procedure, Spring Element, Mass or Inertia Elements, Damping Elements		Theoretical	Online assignments
3	Theoretical	Harmonic Motion, Harmonic Analyses		Theoretical	Homework
4	Theoretical	Introduction to Free Vibration of Single-Degree- of Freedom Systems		Theoretical	Quizzes
5	Theoretical	Introduction to Free Vibration of Single-Degree- of Freedom Systems		Theoretical	Quizzes
6	Theoretical	Introduction to Free Vibration of Single-		Theoretical	Online assignments

		Degree- of Freedom Systems			
7	Theoretical	Free Vibration of an Un-damped Translation System		Theoretical	Quizzes
8	Theoretical	Free Vibration of an Un-damped Translation System		Theoretical	Homework
9	Theoretical	Free Vibration of an Un-damped Torsional System		Theoretical	Reports
10	Theoretical	Free Vibration of an Un-damped Torsional System		Theoretical	Online assignments
11	Theoretical	Response of First-Order Systems and Time Constant		Theoretical	Project
12	Theoretical	Response of First-Order Systems and Time Constant		Theoretical	Quizzes
13	Theoretical	Response of First-Order Systems and Time Constant		Theoretical	Reports
14	Theoretical	Rayleight's Energy Method, Equation of Motion		Theoretical	Project
15	Theoretical	Rayleight's Energy Method, Equation of Motion		Theoretical	Online assignments
11. Course Structure (Practical):					
Week	**Hours**	**Required Learning**	**Unit or subject**	**Learning method**	**Evaluation method**

		Outcomes	name		
1	Practical	Lab 1: Tensile and Compression Test		practical	Quizzes
2	Practical	Lab 2: Torsion and Bending Test		practical	Online assignments
3	Practical	Lab 3: Fatigue Test		practical	Quizzes
4	Practical	Lab4: Screw and Rivet Failure Test		practical	Lab
5	Practical	Lab5: Power Screw Test		practical	Quizzes
6	Practical	Lab6: Shaft Torsion and Bending Test		practical	Online assignments
7	Practical	Lab7: Flange Coupling Test		practical	Quizzes
8	Practical				
9	Practical				
10	Practical				
11	Practical				
12	Practical				
13	Practical				

14	Practical				
15	Practical				

12. Course Evaluation:
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports …. etc

13. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	Machine Design (R. S. Khurmi and J. K. Gupta)
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

mechanical design – mpe303 – Third Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
mechanical design – mpe303 – Third Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:

Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:

8. Course Objectives :	
Course Objectives	• To establish an understanding of the fundamental concepts of mechanical systems parts shape and dimensions, and how to select the suitable shape, dimensions, and materials to produce the parts. • To study the loads and stresses effects on the mechanical parts. • To select the suitable method to transfer power, torque and motion between mechanical systems. • To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.

9. Teaching and Learning Strategies :	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and some activities that are interesting to the students.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Introduction – Simple Stress and Strain in machine Parts		Theoretical	Quizzes
2	Theoretical	Torsional and Bending Stress in Machine Parts		Theoretical	Online assignments
3	Theoretical	Combined Stress in		Theoretical	Homework

		Machine Parts			
4	Theoretical	Variable Stress in Machine Parts		Theoretical	Quizzes
5	Theoretical	Fatigue Theories		Theoretical	Quizzes
6	Theoretical	Design of Screw Joints		Theoretical	Online assignments
7	Theoretical	Design of Riveted Joints		Theoretical	Quizzes
8	Theoretical	Design of Power Screw		Theoretical	Homework
9	Theoretical	Design of Shafts under Torsion		Theoretical	Reports
10	Theoretical	Design of Shafts under Bending		Theoretical	Online assignments
11	Theoretical	Design of Shafts under Combined Torsion and Bending		Theoretical	Project
12	Theoretical	Design of Shaft Key		Theoretical	Quizzes
13	Theoretical	Design of Pressure Vessel		Theoretical	Reports
14	Theoretical	Design of Flange Coupling		Theoretical	Project
15	Theoretical	Design of Flange Coupling		Theoretical	Online assignments

Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Lab 1: Tensile and Compression		practical	Quizzes

		Test			
2	Practical	Lab 2: Torsion and Bending Test		practical	Online assignments
3	Practical	Lab 3: Fatigue Test		practical	Quizzes
4	Practical	Lab4: Screw and Rivet Failure Test		practical	Lab
5	Practical	Lab5: Power Screw Test		practical	Quizzes
6	Practical	Lab6: Shaft Torsion and Bending Test		practical	Online assignments
7	Practical	Lab7: Flange Coupling Test		practical	Quizzes
8	Practical				
9	Practical				
10	Practical				
11	Practical				
12	Practical				
13	Practical				
14	Practical				

15	Practical				

12. Course Evaluation:
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports …. etc

13. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	Machine Design (R. S. Khurmi and J. K. Gupta)
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Computer applications - mpe301 - Third Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
Computer applications – mpe301 – Third Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025

Name:
Email:

8. Course Objectives :

Course Objectives	develop problem solving skills and understanding of computer skillsthrough the application of techniquesin Matlab.• To be competent using the most common features in MATLAB• To understand how to use MATLAB to solve engineering problems• To introduce MATLAB as a tool for technical computing •

9. Teaching and Learning Strategies :

Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Introduction - What is Matlab,		Theoretica	Quizzes
2	Theoretical	MATLAB environment		Theoretica	Online assignments
3	Theoretical	Local Environment Setup(Setting up		Theoretica	

		MATLAB environment)			Homework
4	Theoretical	Commands for Managing a Session Matla		Theoretica	Quizzes
5	Theoretical	Vector, Matrix and Array Commands		Theoretica	Quizzes
6	Theoretical	Plotting Commands		Theoretica	Online assignments
7	Theoretical	MATLAB - M-Files		Theoretica	Quizzes
8	Theoretical	MATLAB - Data Types		Theoretica	Homework
9	Theoretical	MATLAB – Operators(Arithmetic Operators, Relational Operators, Logical Operators)		Theoretica	Reports
10	Theoretical	MATLAB Decision Making(MATLAB - L		Theoretica	Online assignments

		Types, MATLAB - L Types)			
11	Theoretical	MATLAB – Vectors(Vector Operations)		Theoretica	Project
12	Theoretical	MATLAB – Matrix (Matrix Operations)		Theoretica	Quizzes
13	Theoretical	Common utilitMATLAB – Arrays (Multidimensional Arrays		Theoretica	Reports
14	Theoretical	MATLAB - Algebra		Theoretica	Project
15	Theoretical	MATLAB - Graphics		Theoretica	Online assignment

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Introduction - What is Matlab,		practical	Lab

2	Practical	MATLAB environment		practical	Lab
3	Practical	Local Environment Setup(Setting up MATLAB environment)		practical	Lab
4	Practical	Commands for Managing a Session Matla		practical	Lab
5	Practical	Vector, Matrix and Array Commands		practical	Lab
6	Practical	Plotting Commands		practical	Lab
7	Practical	MATLAB - M-Files		practical	Lab
8	Practical	MATLAB - Data Types		practical	Lab
9	Practical	MATLAB – Operators(Arithmetic Operators,		practical	Lab

		Relational Operators, Logical Operators)			
10	Practical	MATLAB Decision Making(MATLAB - L Types, MATLAB - L Types)		practical	Lab
11	Practical	MATLAB – Vectors(Vector Operations)		practical	Lab
12	Practical	MATLAB – Matrix (Matrix Operations)		practical	Lab
13	Practical	Common utilitMATLAB – Arrays (Multidimensional Arrays		practical	Lab
14	Practical	MATLAB - Algebra		practical	Lab
15	Practical	MATLAB - Graphics		practical	Lab

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation,

daily oral, monthly, or written exams, reports .... etc	
13. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	David McMahon - MATLAB Demystified - Prentice Hall Vinay K. Ingle and John G. Proakis - Digital Signal Processing Using MATLAB - Cengage- Engineering; 2 edition (August 10, 2006)
Main references (sources)	
Recommended books and references (scientific journals, reports…)	++ Andr © Quinquis Digital Signal Processing Using Matlab (Hardcover) - Wiley-ISTE; 1 edition (April 4, 2008)
Electronic References, Websites	

Engineering analytics - mpe304 - Third Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
Engineering analytics – mpe304 – Third Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):

7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :

1/7/2025

Name:

Email:

8. Course Objectives :

Course Objectives	i)To develop logical understanding of the subject. ii)To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields. iii)To make aware students about the importance and symbiosis between Mathematics and Engineering

9. Teaching and Learning Strategies :

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and some activities that are interesting to the students.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Ordinary Differential Equations (ODEs)		Theoretical	Quizzes
2	Theoretical	Ordinary Differential Equations (ODEs)		Theoretical	Online assignments
3	Theoretical	First-Order ODE		Theoretical	Homework
4	Theoretical	First-Order ODE		Theoretical	Quizzes

5	Theoretical	Second - Order ODE		Theoretical	Quizzes
6	Theoretical	Second - Order ODE		Theoretical	Online assignments
7	Theoretical	Fourier Serise		Theoretical	Quizzes
8	Theoretical	Fourier Serise		Theoretical	Homework
9	Theoretical	Gamma function		Theoretical	Reports
10	Theoretical	Laplace transform		Theoretical	Online assignments
11	Theoretical	Laplace transform		Theoretical	Project
12	Theoretical	Complex variable		Theoretical	Quizzes
13	Theoretical	Complex variable		Theoretical	Reports
14	Theoretical	Power series		Theoretical	Project
15	Theoretical	Power series		Theoretical	Online assignments

11. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	Lecturer notes + Thomas Calculus 12th Edition Textbook
Main references (sources)	
Recommended books and references (scientific journals,	

reports…)	
Electronic References, Websites	YouTube + https://www.coursera.org/learn/introduction-to-calculus

Internal combustion engine - mpe300 - Third Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Power plants Branch
3. Course Name / Course Code / Level:
Internal combustion engine – mpe300 – Third Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	1. To understand the operation of internal combustion engines. 2. To perform theoretical calculations to obtain thermodynamic efficiencies and then assess operating losses. 3. To calculate engine operating parameters.

	4. To understand the implications of a tradeoff between performance, efficiency, emissions. 5. To assess the relation between engine power output to the required power for vehicle propulsion. To discuss and evaluate the design of engine components.

9. Teaching and Learning Strategies :

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. The full details are shown below: 1.Teaching Method 1 – Lectures Description: Explain in details the theory of ICE materials. Attendance Recorded: Yes 2.Teaching Method 2 – Asynchronous on-line course materials Description: Podcasts, videos and articles in ICE Attendance Recorded: No 3.Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff). 4.Teaching Method 3 – Tutorials Description: learn about the calculations and solve different examples. Attendance Recorded: Yes 5.Teaching Method 4 – Practical Description: Practical homework assignments Attendance Recorded: No 6. Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff).

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	**Introduction** - Introduction internal combustion Engine		Theoretical	Quizzes

2	Theoretical	H**eat Engines Classification** - Internal combustion engine classifications on bases of : Design Valve location Method ignition		Theoretical	Online assignments
3	Theoretical	**I.C.E. Terminology** - TDC & BDC - Stroke & swept volume - Compression ratio		Theoretical	Homework
4	Theoretical	**Air Standard Cycles** - General review - Comparison between Otto, Diesel and dual cycl		Theoretical	Quizzes
5	Theoretical	**Air Standard Cycles** - General review - Comparison between Otto, Diesel and dual cycles		Theoretical	Quizzes
6	Theoretical	**Ideal Engines** - Intake process - Exha process		Theoretical	Online assignments
7	Theoretical	**Actual Cycles** - Effect of ignition - Effect of inlet and exhaust valve closing - Effect of f air ratio		Theoretical	Quizzes
8	Theoretical	**Actual Cycles** - Effect of ignition		Theoretical	Homework

		- Effect of inlet and exhaust valve closing - Effect of fi air ratio			
9	Theoretical	**Fuel-Air Cycles** - Effect of worki medium constituents - Specific h variation effec		Theoretical	Reports
10	Theoretical	**Fuel-Air Cycles** - Effect of worki medium constituents - Specific h variation effect		Theoretical	Online assignments
11	Theoretical	**Fuel** - Sources of fuel - Types - Properties		Theoretical	Project
12	Theoretical	**Combustion** - Basic chemistry - Stoichiometry - Exhaust gas analysis - Dissociation number		Theoretical	Quizzes
13	Theoretical	- Calorific value of fuel - Internal energy, enthalpy of combustion and		Theoretical	Reports

		enthalpy of formation - Combustion in gasoline engines - Octane			
14	Theoretical	- Combustion in Diesel engines - Cetane number		Theoretical	Project
15	Theoretical	- Combustion in Diesel engines - Cetane number		Theoretical	Online assignments

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	"Engine components" and "Otto and Diesel cycles"		practical	Lab
2	Practical	"Calculating the consumption amount of air and fuel in internal combustion engines"		practical	Lab
3	Practical	"Flash & Fire Point"		practical	Lab
4	Practical	"Carbon Residue"		practical	Lab
5	Practical	"Ash Content"		practical	Lab
6	Practical	"Aniline Point and Diesel index"		practical	Lab
7	Practical	"Measure the viscosity of the liquid oil"		practical	Lab
8	Practical				

9	Practical				
10	Practical				
11	Practical				
12	Practical				
13	Practical				
14	Practical				
15	Practical				

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

13. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

control circuits - mpe402 - Fourth Level

Course Description

14. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
15. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
16. Course Name / Course Code / Level:
control circuits – mpe402 – Fourth Level
17. Available Attendance Forms:
Attendance
18.Semester / Year:
Semester
19.Number of Credit Hours (Total) / Number of Units (Total):
5

20. Description Preparation Date / Course administrator's name (mention all, if more than one name) :

1/7/2025

Name: Ihsan Mohammed Khudhur
Email: ihsan.m.khudhur@ntu.edu.iq

21. Course Objectives :

Course Objectives : aims to provide students with ba knowledge about the design and analysis of cont systems used in mechanical and industrial syster with a focus on applications in the field of power a energy.	**1- Identify the theoretical principles of qualitative control systems, including clos and open systems.** **2 -Understand the concept of time frequency response of engineering syster** **3-Analyze models of mechanical syst using mathematical and engineering meth**

22. Teaching and Learning Strategies :

Strategy	1 - Develop teamwork skills through laboratory projects and teamwork. 2 - Ability to write accurate and clear technical reports. 3 - Make informed engineering decisions based on data and performance analys 4 - Improve engineering problem-solving skills related to control circuits.

23. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	The student understands concept of control sys and their types. - Abl distinguish between o loop and closed-loop syst	Introduction to Control Systems Open and Close Loop Systems	Presentations using PowerPo slides, Solving complex mathematical problems	Quiz
2	Theoretical	- The student is able to create mathematical mo for physical systems. - Understands how to ana systems using mathemat models.	Mathematical Modeling of Physical System and Transfer Functions	Presentations using PowerPo slides, Solving complex mathematical problems	Quiz
3	Theoretical	- Understands how to m DC Servo Motors.- Able t calculate transfer functi	Mathematical Modeling of DC Servo Motor	Presentations using PowerPo slides, Solving complex mathematical problems	Quiz

4	Theoretical	- Able to simplify block diagrams. - Understands how to dr and analyze control syst block diagrams.	Open and Closed -Loop Block Diagrams	Presentations using PowerPo slides, Solving complex mathematical problems	Quiz
5	Theoretical	- Understands how to analyze systems in the ti domain.- Able to perforn error analysis in closed-loop systems.	TimeDomain Analysis of Clo Loop Cor Systems and E Analysis	Presentations using PowerP slides, Sol complex mathematical problems	Quiz
6	Theoretical	Understands how to des control loops using feedback types (P, PI, PD PID).	Feedback Contro Modes: P, PI, PD, PID	Presentations using PowerPo slides, Solving complex mathematical problems	Quiz
7	Theoretical	Understands how to implement PID controlle using active and passive components.	Implementing a Controller Using Active and Passi Components	Presentations using PowerPo slides, Solving complex mathematical problems	Quiz
8	Theoretical	- Understands the role o these devices in prevent fire spread and controlli smoke.- Distinguishes between fire detection a suppression systems.	Fire and Smoke Control: Automa fire and smoke dampers are use isolate fires, con and remove smo	Presentations using PowerPo slides, Solving complex mathematical problems	Quiz
9	Theoretical	Understands how to ana basic system component such as:<b– Mechanical:masses, springs,dampersbr>– Electrical:resistors, inductors,capacitors<– Thermal:thermal conductivity,thermal capacity	Representation of Control System Components: Stud different types of control system components and t mathematical representation for mechanical, electr thermal, and fluid systems	Presentations using PowerPoint slides, Solving complex mathematical problems	Quiz
10	Theoretical	Understands the differer between return air and outside air.- Learns how analyze outdoor air control:– Identifying typ of outdoor air control ur (e.g., dampers, VAV syste ERVs/HRVs)– Understar how to regulate the amo of outside air using sens and automatic control systems	Outdoor Air Controls and Stratification of Return Air and Outside Air Strea	Presentations using PowerPoint slides, Solving complex mathematical problems	Quiz
11	Theoretical			Presentations	Quiz

		Understands how to analyze system stability using Routh's Stability Criterion	Stability Anal and Routh's Stab Criterion	using PowerPoint slides, Solving complex mathematical problems	
12	Theoretical	- Understands how to analyze control systems the frequency domain	Frequency Doma Analysis of Cont Systems and Bod Plots	Presentations using PowerPoint slides, Solving complex mathematical problems	Quiz
13	Theoretical	Understands how to use Z-transform in digital systems	Z-Transform and Properties of Z-Transform	Presentations using PowerPoint slides, Solving complex mathematical problems	Quiz
14	Theoretical	- Understands how to us the inverse Z-transform	Inverse Z-Transform	Presentations using PowerPoint slides, Solving complex mathematical problems	Quiz
15	Theoretical	- Understands how to analyze system stability	Jury's Stability Test	Presentations using PowerPoint slides, Solving complex mathematical problems	Quiz

24. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	- Define a control system Distinguish between ope loop and closed-loop system	Introduction to Control Systems and Their Types	Lecture + Presentation	Short Oral Quiz
2	Practical	Identify types of sensors Measure analog and digi signals	Transducers	Using different sensors	Practical Report

3	Practical	Understand how analog circuits work - Construct a simple op-a circuit	Basic OP-Amp Circuits	Breadboard application	Implementation a Effort Measureme
4	Practical	Operating a control valv	Control Valves	- Identify valve types - Operate and adjust a control valve	Practical Performance Evaluation
5	Practical	Operating an air dam	Dampers	- Understand th role of valves in HVAC system - Operate valves manually and automatically	Small Practical Project
6	Practical	Using a link card	Interface Cards	- Identify DAC/ADC gates Interface the system with a computer	Small Practical Project
7	Practical	Practical: Using STEP7 o C++	Programmable Logic Controller (PLC)	- Identify the ba structure of a P Write a simple ON/OFF progra	Practical Report
8	Practical	Practical: Programming PLC to control a motor o light	PLC Programmin (Control Circuits	- Write simple programs for industrial applications - U logic componen	Program Implementation and Testing
9	Practical	Practical: Operating a DI unit in a cooling system	Direct Digital Control Systems (DDC)	- Identify DDC components - Operate a DDC	Operation Report
10	Practical	Practical: Operating and analyzing an FCU	Fan Coil Units	- Understand th installation and operation of an FCU - Measure temperatures a airflow	Comparison of Results with Specifications
11	Practical	Field visit or lab practice	Central Cooling Systems	- Identify the components of central systems Measure syster efficiency	Visit or Analysis Report
12	Practical	Using BAS software to control lighting and air conditioning	Building Automation Systems (BAS)	- Identify the concept of BAS Use a systems management program	Practical Project
13	Practical	Implementing a project using a PLC	Design of a Pract Project Using PL	- Design and implement a simple control system using a	Presentation + Evaluation
14	Practical	Practical: Implementing DDC project	Design of a Pract Project Using DI	Design a projec using DDC - Interface the	Project Presentat and Evaluation

				project with sensors and actuators	
15	Practical	Group presentation from each group	Final Presentatio of Practical Proje	Present the projects compl during the semester	Project Evaluatio

25. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

26. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	
Main references (sources)	**K. Ogata, Modern Control Engineering, 3rd** **K. Warwick, An Introduction to Con SYSTEM**
Recommended books and references (scientific journals, reports…)	IEEE Transactions on Automatic Cor Automatica (IFAC Journal) Journal of Process Control International Journal of Control Provides a set of standards related to indus control and sensors. ISA (International Society of Automat Standards such as IEC 61131 (programmable l controllers PLCs) and IEC 61508 (safety electronic systems). IEC (International Electrotechnical Commiss Standards such as IEEE Std 1584 (for the study of ele arcs) and IEEE Std 515 (thermal control syste IEEE Standards Related to Control Systems
Electronic References, Websites	**https://ocw.mit.edu/**

Store and recover energy - mpe408 - Fourth Level
Course Description

1. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
2. Scientific Department:	
Mechanical Power Techniques Engineering / Renewable Energy Branch	
3. Course Name / Course Code / Level:	
Store and recover energy – mpe408 – Fourth Level	
4. Available Attendance Forms:	
Attendance	
5. Semester / Year:	
Semester	
6. Number of Credit Hours (Total) / Number of Units (Total):	
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025	
8. Course Objectives :	
Course Objectives 1- Understand the basic principles of energy storage and recovery systems, including elect thermal, mechanical, and chemical energy. 2- Distinguish between types of storage technologies (such as batteries, supercapaci thermal energy storage, hydrogen storage, compressed air systems, etc.). 3- Analyze the performance of different storage systems in terms of efficiency, capacity, and environmental sustainability. 4- Appreciate the role of storage in enhancing the efficiency and stability of renewable en systems such as solar and wind energy.	• ..... • ..... • .....
9. Teaching and Learning Strategies :	
Strategy	Definition: It is a set of knowledge, skills, and values that a course seeks to achieve in student importance: It provides the learner with a clear idea of what they will be able to do after compl the course, and it helps in designing and evaluating courses. How it is determined: Course outc are determined based on the objectives of the academic program to which the course belongs.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Explaining the concepts of e storage	Introduction, Fundamental Properties Quantities	Open-ended questions stimulate thinking.	For class activities participation
2	Theoretical	Evaluating	Importance	Quizzes	Quiz

		economic environmental impacts of er storage	energy storage		
3	Theoretical	Types of energy sto methods	Energy sto methods	Interaction Method	For classr activities participation
4	Theoretical	The concept chemical er storage and its re energy sto systems	Chemical er storage	Interaction Method	Quiz
5	Theoretical	The student understand working princip a battery and h stores and con chemical energy electrical energy	Types of batt (lead acid) & N – Cadmium	Open-ended questions stimulate thinking.	For classr activities participation
6	Theoretical	The student understand working princip a battery and h stores and con chemical energy electrical energy	Types of batt (Lithium - Sodium sulfur	Quizzes	Quiz
7	Theoretical	The concept chemical heat p and how it ca used to store transfer heat	Chemical heat p storage	Interaction Method	For classr activities participation
8	Theoretical	The concept mechanical er storage and importance modern er systems	Mechanical er storage	Open-ended questions stimulate thinking.	Quiz
9	Theoretical	The wo principle of pumped storage system	Pumped H storage	Quizzes	For classr activities participation
10	Theoretical	The wo principle of compressed storage system	Compressed storage	Interaction Method	Quiz
11	Theoretical	The wo principle of energy sto system rotating wheels	Fly wheels	Open-ended questions stimulate thinking.	For classr activities participation
12	Theoretical	The concept thermal er storage and importance modern er systems	Thermal er storage	Quizzes	Quiz
13	Theoretical	The concept sensory heat sto and its physical	Sensible the energy storage	Interaction Method	For classr activities participation
14	Theoretical	The wo principle of a water heating sy	Solar domestic water	Open-ended questions stimulate thinking.	Quiz
15	Theoretical	Explaining the concepts of er	A complete re of previous lectu	Quizzes	For classr activities

		storage			participation
11. Course Structure (Practical):					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	Practical	Understanding basic principle different er storage technolo	Introduction Laboratory & Sa	A brief theore presentation before experiment clarify the principles.	Report Writin
2	Practical	Understanding basic principle different er storage technolo	Discussion Results	Seminar Presentation	Report Discus
3	Practical	The wo principle of electric battery its redox reactio	Battery Characteristics S	A ...Field Vis	Report Writin
4	Practical	The wo principle of electric battery its redox reactio	Discussion Results	A brief theore presentation before experiment clarify the principles.	Report Discus
5	Practical	The wo principle of lithium-ion batt	Lithium-Ion Bat	Seminar Presentation	Report Writin
6	Practical	The wo principle of lithium-ion batt	Discussion Results	A ...Field Vis	Report Discus
7	Practical	The wo principle of er storage using rotating wheel	Energy Sto Using a Flywhe	A brief theore presentation before experiment clarify the principles.	Report Writin
8	Practical	The wo principle of er storage using rotating wheel	Discussion Results	Seminar Presentation	Report Discus
9	Practical	The wo principle of pur water storage	Pumped V Energy Storage	A ...Field Vis	Report Writin
10	Practical	The wo principle of pur water storage	Discussion Results	A brief theore presentation before experiment clarify the principles.	Report Discus
11	Practical	The wo principle hydrogen fuel c	Hydrogen Fuel C	Seminar Presentation	Report Writin
12	Practical	The wo principle hydrogen fuel c	Discussion Results	A ...Field Vis	Report Discus
13	Practical	The wo principle of a plate solar colle	Sensible Storage	A brief theore presentation before experiment clarify the principles.	Field Visit
14	Practical	The wo principle of a plate solar colle	Flat Plate Collector	Seminar Presentation	Report Writin

15	Practical	Field visit	Discussion Results	A ...Field Vis	Report Discus

12. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
13. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	ibrahim D. M. A.Rosen, *thermal energy storage and application*, Second. united kingdum: Wiley, 2011.
Main references (sources)	Advances in thermal energy storage systems: Methods applications. In *Advances in Thermal Energy Storage Syst Methods and Applications*. LTD. https://doi.org/10.1016/B9 12-819885-8.00002-4
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Store and recover energy - mpe408 - Fourth Level
Course Description

1. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
2. Scientific Department:	
Mechanical Power Techniques Engineering / Renewable Energy Branch	
3. Course Name / Course Code / Level:	
Store and recover energy – mpe408 – Fourth Level	
4. Available Attendance Forms:	
Attendance	
5. Semester / Year:	
Semester	
6. Number of Credit Hours (Total) / Number of Units (Total):	
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025	
8. Course Objectives :	
Course Objectives 1- Understand the basic principles of energy storage and recovery systems, including electr thermal, mechanical, and chemical energy. 2- Distinguish between types of storage technologies (such as batteries, supercapacitors, the energy storage, hydrogen storage, compressed air systems, etc.). 3- Analyze the performance of different storage systems in terms of efficiency, capacity, cost, environmental sustainability. 4- Appreciate the role of storage in enhancing the efficiency and stability of renewable energy syst such as solar and wind energy.	• ..... • ..... • .....
9. Teaching and Learning Strategies :	
Strategy	Definition: It is a set of knowledge, skills, and values that a course seeks to achieve in students importance: It provides the learner with a clear idea of what they will be able to do after completing course, and it helps in designing and evaluating courses. How it is determined: Course outcomes determined based on the objectives of the academic program to which the course belongs.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Explaining the princ and methods underground the energy storage	Underground the energy storage	Open-ended questions stimulate thinl	For class activities participation
2	Theoretical	Explaining the princ	Underground the	Quizzes	Quiz

		and methods underground the energy storage	energy st integrated to heat p		
3	Theoretical	Consolidating theore understanding with prac applications	Applied problems	Interaction Method	For class activities participation
4	Theoretical	The concept of a pool and its mecha of operation	Solar ponds	Interaction Method	Quiz
5	Theoretical	The concept of the storage using media	Solid storage medi	Open-ended questions stimulate thinl	For class activities participation
6	Theoretical	Consolidating theoretical understanding practical applicatior	Applied problems	Quizzes	Quiz
7	Theoretical	The principle of st latent heat throug change of (melting/freezing)	Latent heat the energy storage	Interaction Method	For class activities participation
8	Theoretical	The concept of p change materials their role in storing l heat	Phase change mate	Open-ended questions stimulate thinl	Quiz
9	Theoretical	Consolidating theoretical understanding practical applicatior	Applied problems	Quizzes	For class activities participation
10	Theoretical	Consolidating theoretical understanding practical applicatior	Applied problems	Interaction Method	Quiz
11	Theoretical	The concept of exer	Exergy balance	Open-ended questions stimulate thinl	For class activities participation
12	Theoretical	The concept of the energy storage an importance in mo energy systems	Thermal energy st	Quizzes	Quiz
13	Theoretical	The concept of cher thermal storage an mechanism of oper through cher reactions	Thermochemical energy storage	Interaction Method	For class activities participation
14	Theoretical	The concept of thermal energy st and its role refrigeration and conditioning system	Cold thermal er storage	Open-ended questions stimulate thinl	Quiz
15	Theoretical	Exam preparation	Comprehensive re of previous lecture	Quizzes	For class activities participation

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Understanding the principles of diff energy st technologies	Introduction Laboratory & Safe	A brief theore presentation before experiment clarify the principles.	Report Writin
2	Practical	Understanding the principles of diff	Discussion of Resu	Seminar Presentation	Report Discus

		energy st technologies			
3	Practical	The working princi an electric battery a redox reactions	Battery Character Study	A ...Field Visi	Report Writin
4	Practical	The working princi an electric battery a redox reactions	Discussion of Res	A brief theor presentation before experiment clarify the principles.	Report Discus
5	Practical	The working princi a lithium-ion batter	Lithium-Ion Batte	Seminar Presentation	Report Writin
6	Practical	The working princi a lithium-ion batter	Discussion of Res	A ...Field Visi	Report Discus
7	Practical	The working princi energy storage usi rotating wheel	Energy Storage Us Flywheel	A brief theor presentation before experiment clarify the principles.	Report Writin
8	Practical	The working princi energy storage usi rotating wheel	Discussion of Res	Seminar Presentation	Report Discus
9	Practical	The working princi pumped water stora	Pumped Water E Storage	A ...Field Visi	Report Writin
10	Practical	The working princi pumped water stora	Discussion of Res	A brief theor presentation before experiment clarify the principles.	Report Discus
11	Practical	The working princi hydrogen fuel cells	Hydrogen Fuel Ce	Seminar Presentation	Report Writin
12	Practical	The working princi hydrogen fuel cells	Discussion of Res	A ...Field Visi	Report Discus
13	Practical	The working princi a flat-plate collector	Sensible Heat Stor	A brief theor presentation before experiment clarify the principles.	Field Visit
14	Practical	The working princi a flat-plate collector	Flat Plate Collector	Seminar Presentation	Report Writin
15	Practical	Field visit	Discussion of Res	A ...Field Visi	Report Discus

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

13. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	ibrahim D. M. A.Rosen, *thermal energy storage and application*, Second. united kingdum: Wiley, 2011.
Main references (sources)	Advances in thermal energy storage systems: Methods applications. In *Advances in Thermal Energy Storage Syst Methods and Applications*. LTD. https://doi.org/10.1016/B9 12-819885-8.00002-4
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Store and recover energy - mpe408 - Fourth Level
Course Description

1. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
2. Scientific Department:	
Mechanical Power Techniques Engineering / Renewable Energy Branch	
3. Course Name / Course Code / Level:	
Store and recover energy – mpe408 – Fourth Level	
4. Available Attendance Forms:	
Attendance	
5. Semester / Year:	
Semester	
6. Number of Credit Hours (Total) / Number of Units (Total):	
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025	
8. Course Objectives :	
Course Objectives 1- Understand the basic principles of energy storage and recovery systems, including electr thermal, mechanical, and chemical energy. 2- Distinguish between types of storage technologies (such as batteries, supercapacitors, the energy storage, hydrogen storage, compressed air systems, etc.). 3- Analyze the performance of different storage systems in terms of efficiency, capacity, cost, environmental sustainability. 4- Appreciate the role of storage in enhancing the efficiency and stability of renewable en systems such as solar and wind energy.	• ..... • ..... • .....
9. Teaching and Learning Strategies :	
Strategy	Definition: It is a set of knowledge, skills, and values that a course seeks to achieve in students. Its importa It provides the learner with a clear idea of what they will be able to do after completing the course, and it h in designing and evaluating courses. How it is determined: Course outcomes are determined based or objectives of the academic program to which the course belongs.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Explaining the concepts of en storage	Introduction, Fundamental Prope and Quantities	Open-ended questions to stim thinking.	For classi activities participation
2	Theoretical	Evaluating economic	Importance of en storage	Quizzes	Quiz

		environmental im of energy storage			
3	Theoretical	Types of energy storage metho	Energy storage met	Interaction Meth	For class activities participation
4	Theoretical	The concept of cher energy storage an role in energy st systems	Chemical er storage	Interaction Meth	Quiz
5	Theoretical	The student understand the wo principle of a ba and how it stores converts cher energy into elec energy	Types of batteries acid) & Nicke Cadmium	Open-ended questions to stim thinking.	For class activities participation
6	Theoretical	The student understand the wo principle of a ba and how it stores converts cher energy into elec energy	Types of batt (Lithium - Ion) So sulfur	Quizzes	Quiz
7	Theoretical	The concept o chemical heat pump how it can be us store and transfer h	Chemical heat p storage	Interaction Meth	For class activities participation
8	Theoretical	The concept mechanical er storage and importance in mo energy systems	Mechanical er storage	Open-ended questions to stim thinking.	Quiz
9	Theoretical	The working prin of a pumped storage system	Pumped Hydro stor	Quizzes	For class activities participation
10	Theoretical	The working prin of a compressed storage system	Compressed air sto	Interaction Meth	Quiz
11	Theoretical	The working prin of an energy st system using rot wheels	Fly wheels	Open-ended questions to stim thinking.	For class activities participation
12	Theoretical	The concept of the energy storage an importance in mo energy systems	Thermal energy sto	Quizzes	Quiz
13	Theoretical	The concept of sen heat storage and physical basis	Sensible thermal er storage	Interaction Meth	For class activities participation
14	Theoretical	The working prin of a solar water he system	Solar domestic water	Open-ended questions to stim thinking.	Quiz
15	Theoretical	Explaining the concepts of er storage	A complete revie previous lectures	Quizzes	For class activities participation

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Understanding the principles of diff energy st technologies	Introduction Laboratory & Safet	A brief theore presentation b each experimer clarify the principles.	Report Writin

2	Practical	Understanding the principles of diff energy st technologies	Discussion of Resu	Seminar Presenta	Report Discus
3	Practical	The working prin of an electric batter its redox reactions	Battery Character Study	A ...Field Visit	Report Writin
4	Practical	The working prin of an electric batter its redox reactions	Discussion of Resu	A brief theore presentation b each experimer clarify the principles.	Report Discus
5	Practical	The working prin of a lithium-ion bat	Lithium-Ion Batter	Seminar Presenta	Report Writin
6	Practical	The working prin of a lithium-ion bat	Discussion of Resu	A ...Field Visit	Report Discus
7	Practical	The working prin of energy storage a rotating wheel	Energy Storage Us Flywheel	A brief theore presentation b each experimer clarify the principles.	Report Writin
8	Practical	The working prin of energy storage a rotating wheel	Discussion of Resu	Seminar Presenta	Report Discus
9	Practical	The working prin of pumped storage	Pumped Water Er Storage	A ...Field Visit	Report Writin
10	Practical	The working prin of pumped storage	Discussion of Resu	A brief theore presentation b each experimer clarify the principles.	Report Discus
11	Practical	The working prin of hydrogen fuel ce	Hydrogen Fuel Cel	Seminar Presenta	Report Writin
12	Practical	The working prin of hydrogen fuel ce	Discussion of Resu	A ...Field Visit	Report Discus
13	Practical	The working prin of a flat-plate collector	Sensible Heat Stora	A brief theore presentation b each experimer clarify the principles.	Field Visit
14	Practical	The working prin of a flat-plate collector	Flat Plate Collector	Seminar Presenta	Report Writin
15	Practical	Field visit	Discussion of Resu	A ...Field Visit	Report Discus

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

13. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	ibrahim D. M. A.Rosen, *thermal energy storage and application*, Second. united kingdum: Wiley, 2011.
Main references (sources)	Advances in thermal energy storage systems: Methods applications. In *Advances in Thermal Energy Storage Systems: Met and Applications*. LTD. https://doi.org/10.1016/B978-0-12-819 8.00002-4
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Turbo machines - mpe407 - Fourth Level
Course Description

1. Educational Institution:	
Northern Technical University / Technical Engineering College/ Kirkuk	
2. Scientific Department:	
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch	
3. Course Name / Course Code / Level:	
Turbo machines – mpe407 – Fourth Level	
4. Available Attendance Forms:	
Attendance	
5. Semester / Year:	
Semester	
6. Number of Credit Hours (Total) / Number of Units (Total):	
4 hours	
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :	
1/7/2025	
8. Course Objectives :	
Course Objectives	• **Understand the basic principles of mechanical en and energy conversion** • **Distinguish between types of turbomachinery** • **Analyze the performance of turbomachinery** • **Apply the laws of thermodynamics and fluid mecha**
9. Teaching and Learning Strategies :	
Strategy	Definition: It is a set of knowledge, skills, and values that a course seeks to achieve in students importance: It provides the learner with a clear idea of what they will be able to do after completing course, and it helps in designing and evaluating courses. How it is determined: Course outcomes determined based on the objectives of the academic program to which the course belongs.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoret	Learn the basics of turbomachine	Introduction	Open-ended questions to stim thinking.	For Classroo Activities Participat
2	Theoret	Understand the laws of dynamics	The momentum equatio its applications: mome and dynamic f applications of momentum equation	Quizzes	Quiz
3	Theoret	Solve questions	Tutorial and solve probl	Interaction Meth	Quiz
4	Theoret	Know Bernoulli's law	velocity diagram, Berno law of relative motion.	Interaction Meth	For Classroo Activities Participat
5	Theoret	Hydraulic turbine machines	• Hydraulic mach introduction, hydr turbines, pumps, hydr power plants,	Open-ended questions to stim thinking.	Quiz
6	Theoret	Hydraulic turbine machines	• Hydraulic mach	Quizzes	For

			introduction, hydr turbines, pumps, hydr power plants,		Classroo Activities Participat
7	Theoret	Hydraulic turbine machines	• Hydraulic mach introduction, hydr turbines, pumps, hydr power plants,	Interaction Meth	Quiz
8	Theoret	Know the types of turbine machi	• Impulse turbines	Open-ended questions to stim thinking.	For Classroo Activities Participat
9	Theoret	Know the types of turbine machi	: Turbine parts, P turbine theory, s regulation mechanics, and propulsion system.	Quizzes	Quiz
10	Theoret	Know the types of turbine machi	• Impulse turbines	Interaction Meth	For Classroo Activities Participat
11	Theoret	Know the types of turbine machi	Tutorial and solve probl	Open-ended questions to stim thinking.	Quiz
12	Theoret	Know the types of turbine machi	Turbo reaction	Quizzes	For Classroo Activities Participat
13	Theoret	Know the types of turbine machi	Types, construction turbines, theory of r turbines, necessary, flow through the turbine, high of rise, dryness, net, wo characteristics, p regulator mechanics, and pull systems	Interaction Meth	Quiz
14	Theoret	Know the types of turbine machi	Turbo reaction	Open-ended questions to stim thinking.	For Classroo Activities Participat
15	Theoret	Know the types of turbine machi	Review previous lectur preparation for the exam	Quizzes	Seminars

11. Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
	Practica	Report Writing	Report Writing	Report Writ	Report Writin
	Practica	Report Discussion	Report Discussion	Report Discussion	Report Discus n
	Practica	Report Writing	Report Writing	Report Writ	Report Writin
	Practica	Report Discussion	Report Discussion	Report Discussion	Report Discus n
	Practica	Report Writing	Report Writing	Report Writ	Report Writin
	Practica	Report Discussion	Report Discussion	Report Discussion	Report Discus n

	Practica	Report Writing	Report Writing	Report Writ	Report Writin
	Practica	Report Discussion	Report Discussio	Report Discussion	Report Discus n
	Practica	Report Writing	Report Writing	Report Writ	Report Writin
	Practica	Report Discussion	Report Discussio	Report Discussion	Report Discus n
	Practica	Report Writing	Report Writing	Report Writ	Report Writin
	Practica	Report Discussion	Report Discussio	Report Discussion	Report Discus n
	Practica	Report Writing	Report Writing	Report Writ	Report Writin
	Practica	Field Visit	Field Visit	Field Visit	Field Visit
	Practica	Oral Questions	Oral Questions	Oral Questi	Oral Questi

12. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
13. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	[1][1] R. S. R. Gorla and A. A. Khan, *Turbomachinery*. UniversNEW YORK . BASE: THE UNITED STATES OF AMERICA, 2003. [2] Y. A. J. M. C. ÇENGEL, *FLUID MECHANICS*. 2006.
Main references (sources)	[1][1] R. S. R. Gorla and A. A. Khan, *Turbomachinery*. UniversNEW YORK . BASE: THE UNITED STATES OF AMERICA, 2003. [2] Y. A. J. M. C. ÇENGEL, *FLUID MECHANICS*. 2006.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Engineering project management - mpe401 - Fourth Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
Engineering project management – mpe401 – Fourth Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:

8. Course Objectives :	
Course Objectives	The student can be able to: 1. Understand the information about industrial projects and units' management for engineers. 2. Evaluate the optimum solutions using known methods in operations research. Acquainting the principle of statistic.
9. Teaching and Learning Strategies :	
Strategy	Description: In the beginning, we use project definition to help develop the language of project management. Then we use the project planning phase to develop competency in application of project planning techniques. In the Execution phase a project manager will require strong skills in analysis and evaluation, and we develop these through team-based learning activities. In

	the final stages of a real project, evaluation and the giving (and receiving) of feedback are essential abilities for a project manager and related responsible engineers and persons. Attendance Recorded: Yes Teaching Method 2 – Asynchronous on-line course materials Description: Podcasts, videos and articles in engineering materials Attendance Recorded: No Unscheduled Directed Student Hours (time spent away from the timetabled sessions but directed by the teaching staff).

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introduction and general definition of engineering project management.	Lecture	Presentation, Discussion and Q&A Sessions	Short questions
2	3	Plant Location definition and types	Lecture + Problem Solving	Presentation, Discussion and Q&A Sessions	MCQ question quiz
3	3	Plant Location selection	Lecture + Problem Solving	Presentation, Discussion and Q&A Sessions	Short questions
4	3	Project Planning (Plant Layout)	Lecture	Presentation, Discussion and Q&A Sessions	MCQ question quiz

5	3	Project Planning (Plant Layout)	Lecture	Presentation, Discussion and Q&A Sessions	Quiz
6	3	Work Study	Lecture + Problem Solving	Presentation, Discussion and Q&A Sessions	Quiz
7	3	Work Study	Lecture + Problem Solving	Presentation, Discussion and Q&A Sessions	Quiz
8	3	Feasibility Study and Methods	Lecture + Problem Solving	Presentation, Discussion and Q&A Sessions	Group Project
9	3	Feasibility Study and Methods	Lecture + Problem Solving	Presentation, Discussion and Q&A Sessions	Group Project
10	3	Operation researches methods and applications.	Lecture + Problem Solving	Presentation, Discussion and Q&A Sessions	Quiz
11	3	Operation researches methods and applications.	Lecture + Problem Solving	Presentation, Discussion and Q&A Sessions	Quiz
12	3	Maintenance and replacement methods.	Lecture	Presentation, Discussion and Q&A Sessions	Quiz
13	3	Maintenance and replacement methods.	Lecture	Presentation, Discussion and Q&A Sessions	Quiz
14	3	Introduction to material Management.	Lecture	Presentation, Discussion and Q&A Sessions	Reports
15	3	Material management importance and methods.	Lecture	Presentation, Discussion and Q&A Sessions	Reports

11. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Refrigeration and air conditioning - mpe405 - Fourth Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
Refrigeration and air conditioning – mpe405 – Fourth Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Assist. Prof. Dr. Afrah Turki Awad Email: afrah.turki@ntu.edu.iq
8. Course Objectives :

Course Objectives	**General goals** • To provide students with a solid understanding of air conditioning equipment and systems. • To enable students to apply theoretical knowledge in practical settings for system design, operation, and maintenance. • To introduce energy-efficient and sustainable air conditioning practices. **Private goals** • Develop skills to diagnose and troubleshoot common air conditioning system issues. • Learn to design and size air conditioning systems based on building requirements. • Gain an understanding of environme impact and energy-saving technologie

9. Teaching and Learning Strategies :

Strategy	1. **Lecture-based learning**. 2. **Hands-on practical sessions** 3. **Group discussions and case studies.** 4. **Blended learning (online and in-person)**

5. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Introduction to Refrigeration Systems Overview of refrigeration systems and their applications		**Presentation, Discussion and Q&A Sessions**	**Short questions**

		Basic principles of heat transfer and thermodynamics			
2	Theoretical	Refrigeration Cycle and Components Vapor compression refrigeration cycle and its components Compressors: Types, working principles, and selection		**Presentation, Discussion and Q&A Sessions**	**MCQ question quiz**
3	Theoretical	Condensers and Evaporators Types of condensers and their design considerations Types of evaporators and their design considerations		**Presentation, Discussion and Q&A Sessions**	**Short questions**
4	Theoretical	Expansion Devices and Refrigerant Properties Expansion devices: Types, operation, and selection Properties and characteristics of		**Presentation, Discussion and Q&A Sessions**	**MCQ question quiz**

		refrigerants			
5	Theoretical	Refrigeration System Design Load calculations and determining refrigeration requirements Sizing and selection of components for a specific application		**Presentation, Discussion and Q&A Sessions**	**Quiz**
6	Theoretical	Refrigeration System Controls and Instrumentation Control systems in refrigeration systems Temperature, pressure, and flow sensors and their applications		**Presentation, Discussion and Q&A Sessions**	**Quiz**
7	Theoretical	**Mid-term Exam**		**Presentation, Discussion and Q&A Sessions**	**Quiz**
8	Theoretical	Introduction to Air Conditioning Overview of air conditioning systems and their applications Basic principles of air conditioning and comfort parameters		**Presentation, Discussion and Q&A Sessions**	**Group Project**

9	Theoretical	Psychrometrics and Air Properties Psychrometric charts and properties of air Calculation of air properties and psychrometric processes		**Presentation, Discussion and Q&A Sessions**	**Group Project**
10	Theoretical	Cooling Load Calculation Factors influencing cooling load and heat gain/loss Methods for calculating cooling load requirements		**Presentation, Discussion and Q&A Sessions**	**Quiz**
11	Theoretical	Air Distribution Systems Types of air distribution systems (e.g., ducted, ductless) Duct design principles and sizing calculations		**Presentation, Discussion and Q&A Sessions**	**Quiz**
12	Theoretical	Air Conditioning Equipment Types of air conditioning equipment (e.g., window units, split systems) Selection criteria		**Presentation, Discussion and Q&A Sessions**	**Quiz**

		and energy efficiency considerations			
13	Theoretical	Air Conditioning Controls and Automation Control systems and components (e.g., thermostats, sensors) Control strategies and automation for efficient operation		**Presentation, Discussion and Q&A Sessions**	**Quiz**
14	Theoretical	HVAC System Commissioning and Testing Commissioning procedures and quality control measures Testing and balancing of HVAC systems		**Presentation, Discussion and Q&A Sessions**	**Reports**
15	Theoretical	Maintenance and Troubleshooting Maintenance schedules and tasks for air conditioning systems Troubleshooting common issues and problem-solving techniques		**Presentation, Discussion and Q&A Sessions**	**Reports**
Course Structure (Practical):					
Week	**Hours**	**Required**	**Unit or**	**Learning**	**Evaluation**

		Learning Outcomes	subject name	method	method
1	Practical	Lab 1: P-H diagram for vapor compression refrigeration cycle		A brief theoretical presentation before each experiment to clarify the basic principles.	Report Writing
2	Practical	Lab 2: vapor compression refrigeration cycle with heat exchanger		Seminar Presentation	Report Discussion
3	Practical	Lab 3: COP for vapor compression refrigeration cycle		A ...Field Visit	Report Writing
4	Practical	Lab 4: Sizing and selection of components for a specific application		A brief theoretical presentation before each experiment to clarify the basic principles.	Report Discussion
5	Practical	Lab 5: Cooling Load Calculation by HAP		Seminar Presentation	Report Writing
6	Practical	Lab 6: Duct sizing calculations by Duct sizer program		A ...Field Visit	Report Discussion
7	Practical	Lab 7: Project		A brief theoretical presentation before each experiment to clarify the basic principles.	Report Writing
8	Practical				
9	Practical				

10	Practical				
11	Practical				
12	Practical				
13	Practical				
14	Practical				
15	Practical				

7. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

8. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	ASHRAE
Main references (sources)	ASHRAE
Recommended books and references (scientific journals, reports...)	- - Helping resources (secondary books) - The Internet, self educati websites, reputable internatio university websites, and Ir university websites

Electronic References, Websites	

Heat system simulation - mpe403 - Fourth Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
Heat system simulation – mpe403 – Fourth Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	1. Understanding role of the computer in the development of the finite elem method.

	2. To present the general steps used in the finite element method. 3. To illustrate the various types of elements used in the finite element method. 4. To show typical applications of the finite element method. 5. Understand the types of Thermal analysis 6. Understand the Mechanical interface used for Thermal analysis. 7. Understand different terms used in Thermal analysis. 8. Perform Steady-State Thermal analysis. 9. Perform Transient Thermal analysis. 10. Understand temperature distribution.

9. Teaching and Learning Strategies :

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials Examples, Movies, Pictures, Books, and by considering type of simple experiments involving some sampling activities that are interesting to the students.The course aims to provide students with the ability to understand and deal with the Modal analysis system, Set the analysis parameters, Analyze the model for optimization,Understand modes and mode shapes and Generate mode shapes.This course introduces students to the Understand the types of Thermal analysis,Understandthe Mechanical interface used for Thermal analysis,Understand different terms used in Thermal analysis, Perform Steady-State Thermal analysis, Perform Transient Thermal analysis,and Understand temperature distribution.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Introduction to CAE-Characteristics of CAE and its importance		Theoretical	Quizzes

2	Theoretical	Introduction to Modeling - Dealing with real physical objects - Treating them as CAE models		Theoretical	Online assignments
3	Theoretical	Modeling of 3-Dimensional Problems - Some examples of solid objects of real problems		Theoretical	Homework
4	Theoretical	Modeling of 3-Dimensional Problems- Loads & boundary conditions- Utilization of symmetry to simplifyproblems modeling		Theoretical	Quizzes
5	Theoretical	Reduction to Plane Problems - Importance & conditions of reduction to plane problems		Theoretical	Quizzes
6	Theoretical	Reduction to Plane Problems - Reduction to axi-symmetrical models - Modeling 2-D plane stress,		Theoretical	Online assignments

		plane strain, and fluid flow			
7	Theoretical	Mid-term Exam		Theoretical	Quizzes
8	Theoretical	Bar, Beam, Problems - Analysis of bar, beam problems		Theoretical	Homework
9	Theoretical	Plate Problems - Condition of reduction to plate model - Load, Symmetry		Theoretical	Reports
10	Theoretical	Meshing; 2-D - Types of mesh - Methods of meshing		Theoretical	Online assignments
11	Theoretical	Meshing 3-D - Types of mesh - Methods of meshing		Theoretical	Project
12	Theoretical	Load – Structural - Types & implementation of structural loads		Theoretical	Quizzes
13	Theoretical	Load – Thermal - Types & implementation of thermal loads		Theoretical	Reports

14	Theoretical	Load – Fluid - Types & implementation of fluid- flow loads		Theoretical	Project
15	Theoretical	Preparatory week before the final Exam		Theoretical	Online assignments

Course Structure (Practical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Practical	Introduction to Principles of drawing Using ANSYS		practical	Lab
2	Practical	2-D - drawing Using ANSYS		practical	Lab
3	Practical	3-D - drawing Using ANSY		practical	Lab
4	Practical	Importing Geometry - Types & standards of solid geometry - Importing from CAD systems Heat transfer problems		practical	Lab

5	Practical	Fluid flow problems		practical	Lab
6	Practical	Mid-term Exam		practical	Lab
7	Practical	Report Generation - Software-dependent generation of eng. Reports of analyzed problems		practical	Lab
8	Practical	Static 3D stress analysis problem		practical	Lab
9	Practical	Steady- state heat transfer problem		practical	Lab
10	Practical	Laminar flow problem		practical	Lab
11	Practical	Modal analysis problem		practical	Lab
12	Practical	Contact Problems - Introduction to contact problems - Software-specific implementation		practical	Lab
13	Practical	Plastic		practical	Lab

		Deformation - Non-linear material behavior and solution			
14	Practical	Preparatory week before the final Exam		practical	Lab
15	Practical	Final Exam		practical	Lab

12. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

13. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	Fundamentals of the Finite Element Method for Heat and Fluid Flow. Roland W. Lewis,Perumal Nithiarasu Kankanhalli N. Seetharamu
Main references (sources)	FINITE ELEMENT ANALYSIS Guide through to ANSYS Workbench . Stefanos Syllignakis Petr Vosynek
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	http://www.ansys.com

station economics - mpe404 - Fourth Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power plants Branch
3. Course Name / Course Code / Level:
station economics – mpe404 – Fourth Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	• Understanding and maintaining the correct relationship between engineering design and economic costs should be .

	• The engineer must have some understanding of economic concepts to make appropriate design decisions. • presents economic concepts that will allow the engineer to select the least expensive option among the alternatives. • When signing and constructing a power plant, efforts should be made to achieve total economy so that the cost of production per unit is as low as possible. • Many factors affect the cost of production, such as cost of land and equipm depreciation of equipment, interest on capital investment, etc.

9. Teaching and Learning Strategies :

Strategy	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Introduction		Theoretical	Quizzes
2	Theoretical	Terms and Definitions (Economics Factors) , The Principles of Power Plant Design, . Cost Analysis		Theoretical	Online assignments
3	Theoretical	Economics of Power Generation		Theoretical	Homework
4	Theoretical	cost of Electrical Energy , Expressions for Cost of		Theoretical	Quizzes

		Electrical Energy, expressions for Cost of Electrical Energy			
5	Theoretical	Methods of Determining Depreciation , (i)Straight line method ; (ii) Diminishing value method ;		Theoretical	Quizzes
6	Theoretical	(III) Sinking fund method		Theoretical	Online assignments
7	Theoretical	Importance of High Load Factor		Theoretical	Quizzes
8	Theoretical	Role of economic evaluation in power plant design & planning		Theoretical	Homework
9	Theoretical	Role of economic evaluation in power plant design & planning		Theoretical	Reports
10	Theoretical	Economic and financial concept		Theoretical	Online assignments
11	Theoretical	Economic and financial concept		Theoretical	Project
12	Theoretical	Utility cost		Theoretical	Quizzes
13	Theoretical	Utility cost		Theoretical	Reports
14	Theoretical	Economic analysis method		Theoretical	Project

15	Theoretical	Economic analysis method		Theoretical	Online assignments

11. Course Evaluation:	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources :	
Required textbooks (curricular books, if any)	B. &Veatch, *Power Plant Engineering*. united state of america: springer, 1996.
Main references (sources)	Chakrabarti, A., Soni, M.L., Gupta, P.V. and Bhatnagar, U.S., a Text Book on Arora, S.C and Domkundawar, S., a course in Power Plant Engineering, DhanpatRai (2002).
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Maintenance and operation of stations - mpe409 - Fourth Level

Course Description

1. Educational Institution:
Northern Technical University / Technical Engineering College/ Kirkuk
2. Scientific Department:
Mechanical Power Techniques Engineering / Renewable Energy Branch – Power

plants Branch
3. Course Name / Course Code / Level:
Maintenance and operation of stations – mpe409 – Fourth Level
4. Available Attendance Forms:
Attendance
5. Semester / Year:
Semester
6. Number of Credit Hours (Total) / Number of Units (Total):
7. Description Preparation Date / Course administrator's name (mention all, if more than one name) :
1/7/2025 Name: Email:
8. Course Objectives :

Course Objectives	The objectives of the Maintenance and Operation of Stations module are as follows: 1. Develop Knowledge: The module aims to provide students with a comprehensive understanding of the principles, practices, and techniques involved in the maintenance and operation of stations. Students gain knowledge about various components, equipment, and systems specific to different types of stations, enabling them to comprehend the intricacies of station operations. 2. Enhance Skills: The module aims to develop practical skills necessary for maintaining and operating stations. Students acquire skills in maintenance planning, inspection, troubleshooting, repair, and equipment operation. They also learn about safety protocols, compliance requirements, and asset management techniques, enabling them to efficiently manage and operate stations. 3. Promote Safety: Safety is a paramount concern in station operations. The module aims to educate students about safety procedures, risk assessment, hazard identification, and emergency response in the context of station maintenance and operation. Students understand

	the importance of maintaining a safe working environment and learn how to mitigate potential risks. 4. Optimize Performance: The module focuses on optimizing station performance through efficient maintenance and operation practices. Students learn about energy efficiency, load management, process optimization, and the integration of advanced control systems. They acquire skills to enhance station performance, reduce energy consumption, and maximize system reliability. 5. Encourage Continuous Improvement: The module emphasizes the importance of continuous improvement in station maintenance and operation. Students learn about performance monitoring, data analysis, and benchmarking to identify opportunities for enhancement. They gain knowledge of methodologies such as Six Sigma, lean principles, and quality management systems to drive continuous improvement in station operations. 6. Develop Professional Skills: The module aims to enhance students' professional skills, including project planning, teamwork, communication, and problem-solving abilities. Students may engage in group projects, case studies, or real-world simulations, allowing them to apply their knowledge and skills in practical scenarios and develop professional competencies.
9. Teaching and Learning Strategies：	
Strategy	The strategies for the Maintenance and Operation of Stations module aim to provide students with a comprehensive understanding of station maintenance and operation practices. These strategies focus on practical skill development, application of theoretical knowledge, and fostering a mindset of continuous improvement. Here are some common strategies employed in this module: 1. Theoretical Instruction: The module typically includes theoretical lectures and presentations to provide students with a solid foundation of knowledge. Instructors cover essential concepts, principles, and theories related to station maintenance and operation, ensuring students have a comprehensive understanding of the subject matter. 2. Hands-on Practical Training: Practical training is a key aspect of the module. Students engage in hands-on activities such as equipment inspection, troubleshooting, and

repair. They work with real or simulated station equipment to apply their theoretical knowledge, develop technical skills, and gain practical experience.

3. Case Studies: Case studies allow students to analyze real-world scenarios and challenges in station maintenance and operation. They examine existing stations, identify problems, and propose effective solutions. Case studies help students develop critical thinking and problem-solving skills by applying their knowledge to practical situations.
4. Simulations and Virtual Laboratories: The use of simulations and virtual laboratories provides a simulated environment where students can practice station maintenance and operation tasks. These tools allow students to gain hands-on experience, experiment with different scenarios, and develop skills in a controlled and safe setting.
5. Industry Collaboration and Guest Lectures: Collaboration with industry professionals and guest lectures from experts in the field provide students with valuable insights into current industry practices and emerging trends. This exposure enhances students' understanding of the real-world applications of station maintenance and operation and provides networking opportunities.
6. Project-Based Learning: Implementing project-based learning approaches allows students to work on real or simulated projects related to station maintenance and operation. This strategy promotes teamwork, problem-solving, and project management skills. Students can apply their knowledge and skills to complete projects and develop comprehensive solutions.
7. Continuous Assessment and Feedback: Regular assessments, including quizzes, assignments, and practical evaluations, help measure students' understanding and progress. Providing timely feedback allows students to identify areas for improvement and make necessary adjustments to enhance their learning experience.
8. Integration of Technology: The integration of technology, such as computer-aided design (CAD) software, simulation tools, and data analytics platforms, enhances students' learning experience. It allows them to simulate maintenance scenarios, analyze data, and optimize station performance using advanced tools and techniques.
9. Continuous Improvement Mindset: The module emphasizes the importance of a continuous improvement mindset. Students are encouraged to explore innovative approaches, adopt best practices, and keep abreast of technological advancements in station maintenance and operation. This mindset fosters a commitment to lifelong learning and professional development.

10. Course Structure (Theoretical):

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	Theoretical	Introduction to Station Operations		**Lectures Theory**	Short tests (Quizzes
2	Theoretical	Maintenance Strategies and Techniques		**Lectures Theory**	- homework
3	Theoretical	Safety in Station Maintenance and Operation		**Lectures Theory**	- Classroom participation
4	Theoretical	Safety in Station Maintenance and Operation		**Lectures Theory**	- For reports or presentations
5	Theoretical	Asset Management		**Lectures Theory**	Short tests (Quizzes
6	Theoretical	Asset Management		**Lectures Theory**	- homework
7	Theoretical	Energy Efficiency and Optimization		**Lectures Theory**	- Classroom participation
8	Theoretical	Energy Efficiency and Optimization		**Lectures Theory**	- For reports or presentations
9	Theoretical	Systems		**Lectures**	Short tests

		Integration and Control		**Theory**	(Quizzes
10	Theoretical	Systems Integration and Control		**Lectures Theory**	- homework
11	Theoretical	Systems Integration and Control		**Lectures Theory**	- Classroom participation
12	Theoretical	Performance Monitoring and Analysis		**Lectures Theory**	- For reports or presentations
13	Theoretical	Case Studies and Industry Practices		**Lectures Theory**	Short tests (Quizzes
14	Theoretical	Case Studies and Industry Practices		**Lectures Theory**	- homework
15	Theoretical	Professional Skills and Ethics		**Lectures Theory**	- Classroom participation

11. Course Evaluation:

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	Nag P.K. (2014). Power Plant Engineering (4th Edition). McGraw Hill. ISBN (13): 978-93-3920-404-4 ISBN (10): 93-3920-404-2
Main references (sources)	Yadav R. (2004). Steam & Gas Turbines Power Plant Engineering [7 ed.]. Cen Publishing House
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://www.amazon.com/Power-Plant-

	Engineering-P-Nag/dp/9339204042