Northern technical university
الجامعة التقنية الشمالية

First Cycle – Bachelor's Degree (B.Sc.) – Power Mechanics

Northern Technical University

Eng. Technical College/ Mosul

Department of Power Mechanics Engineering Technologies

Refrigeration and Air-conditioning

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1. Mission & Vision Statement

Vision Statement

The Department of Mechanical Power Engineering Technologies aims to be a national leader in engineering education and applied research. It strives to produce skilled, practice-oriented engineers in renewable energy, refrigeration and air conditioning, production and automation at the preliminary study and postgraduate studies. The department is committed to enhancing innovation, promoting sustainability, and aligning its academic programs with global standards. It aspires to contribute to national development by preparing graduates with the competencies needed to advance Iraq's technological progress and meet the evolving demands of society and the labor market.

Mission Statement

Creating a distinguished theoretical and practical learning environment for students by delivering high quality scientific lectures in specialized fields, providing modern laboratories, workshops, and hands on training to enhance technical proficiency, and continuously updating curricula and programs to keep pace with technological development.

2. Program Specification

Programe code:	**PM-RAC**	**ECTS**	**240**
Duration:	**4 levels, 8 Semesters**	**Method of Attendance:**	**Full Time**

Mechanical engineering is a wide-ranging subject and is different special branches. The emphasis of the program is the materials and their behavior as well as their physical properties to which everything is related, be it the materials formed a separate system or it is a part of the system. The degree is popular–or some it's' the breadth of the subject that appeals, for others it's a path to specialization. All students have the opportunity to transfer onto our specialist degrees in mechanical, renewable energy, heating, ventilating and air conditioning at the end of the second year.

Level 1 exposes students to the fundamentals of mechanics, suitable for progression to all program within the mechanical engineering program group. Program-specific core topics are covered at Level 2 preparing for research-led subject specialist modules at Levels 3 and 4. The University mechanical engineering graduate is therefore trained to appreciate how research informs teaching, according to the University and School Mission statements.

At Levels 3 and 4 students are free to choose more than half of their module credits with the proviso a range of modules are selected that reflect the complexity of the different directions

of the specializations in the mechanical engineering, through modern modules, to ensure the breadth of knowledge expected of a graduate with an engineering degree. This allows students to develop their own wide-ranging interests in mechanical and thermal energy engineering. Decisions on what to study are made with input from personal tutors.

The research ethos is developed and fostered from the start via practical, which are either embedded in lecture modules or taught in dedicated practical modules, research seminars and tutorials. There is a compulsory field course in Level 2 and 3, which students must pass in order to progress into Level 3 and 4. At Level 4 all students carry out an independent research project, which may be a data analysis project, or practical project

3. Program Objectives

This branch aims to:

1- Graduate engineers capable of performing thermal load calculations and system testing, qualifying them to work on engineering systems and conduct feasibility studies for various specialized projects.
2- Diagnose and repair a wide range of thermal systems—including small, combined, separate, and central units, as well as refrigerated and freezing storage systems and steam systems—serving both industrial and service sectors.
3- Develop refrigeration and freezing systems that are adapted to the country's climatic and environmental conditions, while keeping pace with technological advancements in the field.
4- Install, operate, and manage maintenance and repair facilities related to the branch's specialization.
5- Conduct research and investigations, promote energy rationalization, and explore alternative solutions within the field.

4. Student Learning Outcomes

Mechanical engineering is the study of objects and systems in motion. As such, the field of mechanical engineering touches virtually every aspect of modern life, including the human body, a highly complex machine. Graduates obtain information on the historical, technical and social aspects of mechanical and thermal engineering and utilize basic knowledge toward realizing broader concepts. The Department offers a Bachelor of Engineering in Mechanics and thermal energy with a concentration in General mechanics; renewable energy / thermal energy. Additionally, the Department offers courses to a large number of students from other departments and supports pre-professional programs. The mechanical engineering curriculum

and experiences are designed to prepare students, in part, for entry into professional engineering programs, graduate studies, technical careers and education

Outcome 1

Identification of Complex thermodynamic processes

Graduates will be able to illustrate the thermodynamic processes in different thermal systems and they will able to make the heat and mass balance for the complex systems

Outcome 2

Oral and Written Communication

Graduates will be able to formally communicate the results of their research investigations using both oral and written communication skills.

Outcome 3

Laboratory and Field Studies

Graduates will be able to perform laboratory experiments and field studies, by using scientific equipment and computer technology while observing appropriate safety protocols.

Outcome 4

Scientific Knowledge

Graduates will be able to demonstrate a balanced concept of how scientific knowledge develops, including the historical development of foundational theories and laws and the nature of science.

Outcome 5

Data Analysis

Graduates will be able to demonstrate scientific quantitative skills, such as the ability to conduct simple data analysis

Outcome 6

Critical Thinking

Graduates will be able to use critical-thinking and problem-solving skills to develop a research project or paper

5. Academic Staff

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6. Credits, Grading and GPA

Credits

(Northern technical) University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs. student workload, including structured and unstructured workload

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Calculation of the Cumulative Grade Point Average (CGPA)

The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

CGPA of a 4-year B.Sc. degree:

CGPA = [(1st module score x ECTS) + (2nd module score x ECTS) + ……] / 240

7. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
NTU101	English Language Principles	33	17	2.00	S	
PM 100	Engineering Mechanics / Static	78	122	8.00	C	
TEMO 100	Mathematics Principles	93	57	6.00	B	
PM 101	Electrical Technology	63	87	6.00	B	
PM 102	Workshop	93	57	6.00	C	
NTU 100	Human Rights & Democracy	33	17	2.00	S	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PM 103	Thermodynamics Principles	93	107	8.00	C	
NTU 102	Computer Principles	63	12	3.00	S	
NTU 103	Arabic Language	33	17	2.00	S	
PM 104	Engineering Mechanics/ Dynamics	78	122	8.00	C	
TEMO 105	Engineering Drawing	63	112	7.00	B	
PM 106	Occupational Safety	32	18	2.00	S	

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PM 201	Fluid Mechanics	108	92	8.00	C	
NTU 201	English Language	32	18	2.00	S	
TECO 200	Mathematics	63	87	6.00	B	
PM 200	Refrigeration & Air Conditioning Principles	108	92	8.00	C	
PM 202	Mechanical Drawing	63	87	6.00	C	
NTU 200	Crimes of the Baath Party in Iraq	33	17	2.00	B	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PM 203	Strength of Materials	108	92	8.00	C	
PM 204	Engineering Materials	93	107	8.00	C	
PM 205	Thermodynamics	123	52	7.00	C	
NTU 203	Arabic Language	32	18	2.00	S	
NTU 202	Computer	63	12	3.00	B	
PM 206	Electrical Machines	63	87	5.00	B	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	**Pre-request**
PM 300	Machine Design	63	87	6.00	C	
PM 301	Engineering Analysis	63	87	6.00	B	
RAC 300	Refrigeration & Air Conditioning	123	77	8.00	C	
RAC 301	Drawing of Refrigeration & Air Conditioning Systems	63	37	4.00	C	
RAC 302	Theory of Machines	63	87	6.00	C	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PM 302	Heat Transfer	123	77	8.00	c	
RAC 303	Maintenance of Refrigeration & Air Conditioning Systems	63	87	6.00	c	
PM 304	Engineering Computer Applications	63	37	4.00	B	
RAC 304	Vibration	63	87	6.00	B	
PM 304	Numerical analysis	63	87	6.00	C	

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PM 400	Thermal Power Plants	123	77	8.00	C	
RAC 400	Refrigeration Systems	123	77	8.00	C	
PM 401	Engineering and Industrial Management	33	67	4.00	B	
PM 402	Engineering Measurement systems	63	87	6.00	B	
PM 403	Methodology of Scientific Research	32	68	4.00	S	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
RAC 401	Renewable Energy	63	87	8.00	C	
RAC 402	Design of Air Conditioning Systems	123	77	6.00	C	
PM 404	Automatic Control systems	63	87	6.00	B	
PM 405	Computer Aided Design	63	37	4.00	B	
PM 406	Project	62	88	6.00	C	

8. Contact

Program Manager:

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Program coordinator

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9. Course syllabus

Module Information					
Module Title	**Engineering Mechanics/ Statics**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**PM 100**				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	1	
Administering Department	PM		**College**	TEMO	
Module Leader	Tariq Khalid		**e-mail**	tariqaikhalidi@ntu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	M. Sc.	
Module Tutor	Tariq Khalid		**e-mail**	tariqaikhalidi@ntu.edu.iq	
Peer Reviewer Name	Asma Taha		**e-mail**	11smaa.taha@ntu.edu.iq	
Scientific Committee Approval Date	6/10/2024		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Module Objectives for Engineering Mechanics/Statics: 1. Understand the fundamental concepts and principles of Statics, including motion, forces, and acceleration. 2. Apply kinematic equations to analyze the motion of particles and rigid bodies in various scenarios. 3. Determine the relationship between forces, mass, and acceleration using Newton's laws of motion. 4. Apply the principles of work and energy to analyze and solve dynamic problems. 5. Analyze and calculate linear and angular momentum, and apply the principle of impulse and momentum to dynamic systems. 6. Understand and apply the principles of vibrations and oscillations in mechanical systems. 7. Apply principles of balancing rotating masses and vibrations to ensure smooth operation of machinery. 8. Analyze multi-degree of freedom systems and determine their natural frequencies and mode shapes. 9. Apply dynamic principles to real-world engineering problems and systems.
Module Learning Outcomes	1. Apply fundamental concepts of engineering mechanics/statics to analyze and solve problems related to the equilibrium of rigid bodies. 2. Demonstrate a deep understanding of vector mathematics and its application in statics, including vector addition, subtraction, dot product, and cross product. 3. Apply the principles of static equilibrium to solve problems involving forces and moments acting on rigid bodies in two and three dimensions. 4. Analyze and calculate the internal forces, such as axial forces, shear forces, and bending moments, in statically determinate structures using methods such as the method of sections and the method of joints. 5. Utilize free-body diagrams to model and analyze the forces acting on a structure or a rigid body, and determine the resultant forces and moments at

	specific points. 6. Analyze and calculate the centroid and moment of inertia of various two-dimensional shapes, including rectangles, triangles, and circles, and apply these concepts to determine the stability and strength of structures. 7. Apply the concepts of friction and its effects on the equilibrium of bodies in statics, including calculating static and kinetic friction forces and determining the angle of friction. 8. Analyze and calculate the forces in trusses and frames, including the method of joints and the method of sections, and determine the stability and structural integrity of these systems.

Learning and Teaching Strategies	
Strategies	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.

Student Workload (SWL)			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	97	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**175**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction, Fundamental Concepts, Units Conversion, Scalar and Vector Quantities.
Week 2-4	Resultant force Resolution & Composition of Forces. Triangle & parallelogram law
Week 5	Addition of a System of Coplanar Forces: Scalar Notation, Cartesian Vector Notation
Week 6-7	Equilibrium of a Particle
Week 8	Moment of a Force, Vibration Theorem.
Week 9	Moment of a Couple
Week 10-11	Equilibrium of a Rigid Body
Week 12	Distributed loads.
Week 13	Friction
Week 14	Centroid
Week 15	Centroid of area, First moment of area.
Week 16	Area moment of inertia, Second moment of area.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Engineering Mechanics/ Statics, by R.C. Hibbeler	Yes
Recommended Texts	2- Engineering Mechanics, Ferdinand L. Singer 2- Engineering Mechanics, Meriam	No
Websites		

Module Information					
Module Title	**Mathematics Principles**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**TECM 100**			☒ **Lecture**	
ECTS Credits	7			☒ **Lab**	
SWL (hr/sem)	**175**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	1	**Semester of Delivery**			
Administering Department	AM	**College**	TEMO		
Module Leader	Raid Abdulhadi Abdulquader	**e-mail**	raid.alabdullah@ntu.edu.iq		
Module Leader's Acad. Title	Assist. Lecturer	**Module Leader's Qualification**			
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	6/10/2025	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	To let students be able to identify the advanced basic fundamentals in mathematics (differentiation and integration and their different applications) to develop their mentally capability by exercises solution. Also, can be able to correlate the information data in order to solve the scientific problem and how to make use of it in other scientific subjects.
Module Learning Outcomes	1. Students are able to relate the significance of comprehending algebra's structure to a higher-level subject. 2. Within the parameters of the theory of modules, students have the ability to generate consciousness, particularly symbolic thinking. 3. Students are capable of using their understanding and analyzing models of mathematics, science, and technology, as well as other fields that are relevant to those disciplines. 4. Students are able to convey the outcomes of the growth of oral and writing comprehension as well as construct a framework for knowledge that supports mathematics, science, and technology.

Learning and Teaching Strategies	
Strategies	to accommodate varied talents, skills, learning rates, and learning styles, teaching and learning strategies might involve a variety of whole class, group, and individual activities. This enables every student to engage and succeed. Incorporating visual aids, hands-on tasks, real-life applications, and technology enhances understanding, motivation, and retention of mathematical concepts. Regular feedback, peer collaboration, and differentiated instruction help address individual needs and foster deeper comprehension and problem-solving skills. Encouraging critical thinking, promoting discussion, and connecting topics to students' interests enrich the learning experience and support active, meaningful participation.

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	
Unstructured SWL (h/sem)	112	**Unstructured SWL (h/w)**	
Total SWL (h/sem)	**175**		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	To let students be able to identify the advanced basic fundamentals in mathematics (differentiation and integration and their different applications) to develop their mentally capability by exercises solution. Also can be able to correlate the information data in order to solve the scientific problem and how to make use of it in other scientific subjects.
Week 2	Trigonometric functions, trigonometric relations, graphic drawing, applications
Week 3	Limits of algebraic and trigonometric functions, limit near, applications
Week 4	Theory of derivatives, derivative of algebraic and trigonometric and empirical functions
Week 5	Chain rules, applications
Week 6	Inverse functions and inverse of trigonometric functions, applications
Week7	Derivatives of logarithmic and exponential functions, hyperbolic and its derivatives, relation and drawing, applications
Week 8	Integration theory, indefinite and definite integration, trigonometric and its inverse
Week 9	Integration of logarithmic and exponential functions, integration of hyperbolic functions, other integrations
Week 10	Methods of integrations, integration by parts
Week 11	Integration by partial fractions
Week 12	Area under a curve, area between two curves
Week 13	Volumes by revolutions, length of a curve
Week 14	Simple differential equations
Week 15	Approximate area by trapezoidal and Simpson rule, numerical integration, applications
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text
Required Texts	" Calculus " , Ford , S.R. and Ford , J.R. , (1963) McGraw-Hill
Recommended Texts	“Principles of Mathenatics”, Katherine A. Loop., (2015)
Websites	https://web.math.ucsb.edu/~agboola/teaching/2021/winter/122A/rudin.pdf

Module Information					
Module Title	**Electrical technology**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**PM 101**			☐ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial**	
				☒ **Practical**	
				☐ **Seminar**	
Module Level		1	**Semester of Delivery**		1
Administering Department		PM	**College**		TEMO
Module Leader	Safwan Assaf Hamoodi		**e-mail**		Safwan79azb@ntu.edu.iq
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		M. Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Preparing the student to study the different calculations in alternating current and direct current circuits, and to get acquainted with the various theories to study these calculations. 2. Understanding electrical principles and concepts: The module aims to provide students with a clear understanding of electrical principles and concepts, including voltage, current, resistance, and power. Students will learn how these concepts are applied in electrical circuits and systems. 3. Developing practical skills in electrical measurements and testing: The module aims to equip students with practical skills in using electrical instruments and equipment for measurements and testing. Students will learn how to perform accurate measurements, interpret the results, and troubleshoot electrical systems. **4.** Applying knowledge to electrical machines and power systems: The module aims to enable students to apply their knowledge of electrical technology to the operation and maintenance of electrical machines, such as motors and generators. Students will also gain an understanding of power systems and their components, including power generation, transmission, and distribution.
Module Learning Outcomes	1. Understanding electrical circuit theory: Students will gain knowledge of fundamental electrical circuit theory, including concepts such as voltage, current, resistance, and power. They will be able to apply this understanding to analyze and solve basic electrical circuits. 2. Proficiency in electrical measurements and testing: Students will develop skills in using electrical instruments and equipment to measure and test electrical parameters. They will learn how to interpret measurement results and troubleshoot electrical systems to identify faults. 3. Application of electrical machines and power systems: Students will learn about electrical machines, such as motors and generators, and their operating principles. They will understand the characteristics and applications of these machines.

Learning and Teaching Strategies	
Strategies	1. Active Engagement: Actively engage with the subject matter by participating in class discussions 2. Practice Problem Solving: Electrical Technology involves problem-solving skills. 3. Hands-on Experience: Gain practical experience by participating in laboratory sessions and hands-on projects. 4. Collaborative Learning: Engage in group discussions and study sessions with classmates. 5. Utilize Resources: Take advantage of resources such as textbooks, online tutorials, video lectures, and educational websites to supplement your learning. 6. Time Management: Create a study schedule and allocate dedicated time for studying Electrical Technology.

Student Workload (SWL)			
Structured SWL (h/sem)	78	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	**150**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Symbols and abbreviations, electric circuit and its elements
Week 2	The direct-current network (kerchief's law & their use in network analysis
Week 3	Conversion of delta-connected resistance into an equivalent Wye connection & vice versa
Week 4	Power sources connected in parallel, node voltage method
Week 5	Loop current method.
Week 6	Super position method.
Week7	Thevenin's theorem and Norton's theorem.
Week 8	Maximum power transfer.
Week 9	Reciprocity theorem
Week 10	Sinusoidal excitation, average, effective values and their steady- state analysis
Week 11	Generation of alternating current, sinusoidal current
Week 12	The mean values of current and voltage
Week 13	Complex Frequency, s-Plane, Poles and Zeros, Response Function, Bode Plots
Week 14	Frequency Response of Series/Parallel Resonances, High-Q Circuits
Week 15	Mutual Inductance, Linear and Ideal Transformers, Circuits with Mutual Inductance
Week 16	Final Examination

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Electric Machinery and Power System Fundamentals" by Stephen J. Chapman	Yes
Recommended Texts	Electricity and Electronics for HVAC" by Rex Miller and Mark R. Miller	No
Websites	(www.allaboutcircuits.com)/ (www.electrical4u.com) /(www.khanacademy.org)	

Module Information					
Module Title	**Workshop**			**Module Delivery**	
Module Type	Core			☒ **Theory**	
Module Code	PM 102			☒ **Lecture**	
ECTS Credits	6			☒ **Lab**	
SWL (hr/sem)	150			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level		1	**Semester of Delivery**		1
Administering Department		PM	**College**	TEMO	
Module Leader	Abdullah Adel Badr		**e-mail**	abdulladel06@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	**Module Leader's Qualification**		M. Sc.
Module Tutor	Mohamed Nazar Yahya		**e-mail**	mohammed.nazar.yahya@ntu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	Maintenance of Refrigeration & Air Conditioning Systems	**Semester**	6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Teach students the basic principles of the compression refrigeration cycle. 2. Identify the tools used in the field of refrigeration and air-conditioning in general. 3. Training students on the operations carried out on pipes used in the field of refrigeration and air-conditioning. 4. Teaching students the basic operations of refrigeration and air-conditioning equipment. 5. Introducing students to the main parts that make up refrigeration and air-conditioning equipment of all kinds. 6. Teaching students about the electrical and mechanical parts of household refrigeration and air-conditioning devices. 7. Learn about the types of furnaces for melting metals, and how to pour molten metal into sand molds. 8. Identify the types of filings and their shapes. 9. Learn about all types of lathes and how to use them. 10. Learn how to deal with sheet metal. 11. Learn about the most important methods of welding and the machines and tools needed for that.
Module Learning Outcomes	1. The student learned the processes of cutting, flaring and expanding pipes. 2. The student learned the processes of welding pipes of all kinds. 3. The student learned about the processes that take place on refrigeration and air-conditioning equipment, such as checking for leaks, vacuum and charging. 4. Students' ability to know the refrigerant fluids used in refrigeration and air-conditioning devices. 5. The student learned to connect electrical circuits for refrigeration and air-conditioning equipment. 6. The student's ability to distinguish the pressures used in the field of refrigeration and air conditioning from leakage checks, discharge and charging of all devices. 7. The student's ability to melt metals, how to pour the molten metal into sand

	molds, how to deal with the mold and fix it with sand, and how to get it out of the sand.

Learning and Teaching Strategies	
Strategies	Strategies include teaching core refrigeration and air-conditioning principles, familiarizing students with tools and components, and providing hands-on training in pipework, lathes, sheet metal, and welding. Emphasis is placed on mechanical and electrical systems, metal casting, and woodworking techniques to develop comprehensive technical skills and practical experience across multiple trades

Student Workload (SWL)			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	57	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**150**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction - Difference the basic principles of the compression refrigeration cycle.
Week 2	Learn about the types of furnaces for melting metals, and how to pour molten metal into sand molds.
Week 3	Identify the tools used in the field of refrigeration and air-conditioning in general.
Week 4	Identify the types of filings and their shapes
Week 5	Training students on the operations carried out on pipes used in the field of refrigeration and air-conditioning.
Week 6	Learn about all types of lathes and how to use them.
Week7	Mid-term Exam
Week 8	Learn how to deal with sheet metal.
Week 9	Introducing students to the main parts that make up refrigeration and air-conditioning equipment of all kinds.
Week 10	Learn about the most important methods of welding and the machines and tools needed for that.
Week 11	Teaching students the basic operations of refrigeration and air-conditioning equipment.
Week 12	Learn about the most important tools and machines for dealing with wood, in addition to identifying the most popular and common types of wood.
Week 13	Teaching students about the electrical and mechanical parts of household refrigeration and air-conditioning devices.
Week 14	Carrying out operations to find and repair leakages and charge gas for air-conditioning devices.
Week 15	Conducting a practical exercise chosen by the course Lecturer as a test before the final exam
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Modern Refrigeration and Air-conditioning.	Yes
Recommended Texts	Hand Book Of Air Condition and Refrigeration.	No
Websites		

Module Information			
Module Title	**Democracy and Human Rights**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**NTU 100**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		

Module Level	1	**Semester of Delivery**	
Administering Department	PM	**College**	TEMO
Module Leader	Dr. Mohmmed Abd Almojod	**e-mail**	dr.mohmmed67@ntu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	6/10/2024	**Version Number**	1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Increase the student's knowledge of the theoretical conceptual aspect and historical development of the subject of human rights and democracy. 2. Develop the student's analytical and critical skills regarding the reality and future of human rights and democracy. 3. Train the student on the importance of active participation in aspects of public life such as enhancing respect for the principles of general human rights and active participation in political and cultural life. 4. Enabling students to understand the importance of education and its role in spreading the culture of human rights and democracy in building a civilized society based on good governance, the most important components of which are belief in human rights, education on them, and active participation in governance through free and fair elections
Module Learning Outcomes	1. Human rights, their definition, their objectives 2. Human rights in contemporary and modern history 3. Regional recognition of human rights 4. Modern human rights 5. Guarantees of respect and protection of human rights at the national level 6. The term democracy

Learning and Teaching Strategies	
Strategies	

Student Workload (SWL)			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	
Unstructured SWL (h/sem)	14	**Unstructured SWL (h/w)**	
Total SWL (h/sem)	**50**		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Human rights, their definition, their objectives
Week 2	Human rights in ancient civilizations, especially the civilization of Mesopotamia
Week 3	Human rights in divine laws with a focus on human rights in Islam
Week 4	Human rights in contemporary and modern history: International recognition of human rights since World War I and the League of Nations
Week 5	Regional recognition of human rights: European Convention on Human Rights 1950, American Convention on Human Rights 1969, African Charter on Human Rights 1981, Arab Charter on Human Rights 1994
Week 6	Modern human rights: facts in development, the right to a clean environment, the right to solidarity, the right to religion Human rights, national human rights organizations)
Week7	Human rights in Iraqi constitutions between theory and reality
Week 8	Mid-term Exam
Week 9	Economic, social and cultural human rights and civil and political human rights
Week 10	Modern human rights: facts in development, the right to a clean environment, the right to solidarity, the right to religion
Week 11	Guarantees of respect for and protection of human rights at the national level, guarantees in the constitution and laws
Week 12	Guarantees in constitutional oversight, guarantees in freedom of the press and public opinion, the role of non-governmental organizations in respecting and protecting rights Human
Week 13	Guarantees, respect and protection of human rights at the international level:
Week 14	The role of the United Nations and its specialized agencies in providing guarantees
Week 15	The role of regional organizations (the Arab League, the European Union, the African Union, the Organization of American States, the ASEAN Organization)
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text
Required Texts	Human Rights and Democracy by Dr. Muhammad Abd al-Jabri 2006
Recommended Texts	Human Rights and Democracy prepared by Asst. Prof. Dr. Ghassan Karim Mujthab and Asst. Prof. Amjad Zain al-Abidin Taama for the year 2018
Websites	**”Methods, Education and Culture of Human Rights”, published on the Internet at http://ghrorg-learning.blogspot.com**

Module Information					
Module Title	**English Language**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**NTU 101**			☐ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial**	
				☐ **Practical**	
				☒ **Seminar**	
Module Level	1	**Semester of Delivery**	1		
Administering Department	PM	**College**	TEMO		
Module Leader	Sundus Falah Mohammed	**e-mail**	sundus.falah@ntu.edu.iq		
Module Leader's Acad. Title	Assist. Lecturer	**Module Leader's Qualification**	M. Sc.		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	6/10/2024	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop problem solving skills mainly speaking, reading, writing and listening skills and to understand the English language as a foreign language through the application of many techniques. 2. To understand the general principles of the English language. 3. This course deals with the basic concepts of learning the main rules of English grammar and English vocabularies. 4. This is the basic subject for writing and speaking English well. 5. To understand how to build a correct English sentence
Module Learning Outcomes	1. To recognize how to use the main and auxiliary verbs in addition to the possessive pronouns. 2. To list the various words associated with questions and many subject pronouns. 3. To talk about social expressions and personal information mainly about jobs by using affirmative, negative and interrogative sentences. 4. To discuss how to use adjectives and their positions in the sentence. 5. To construct the simple present sentence by using I/ we/ you and they and to define the articles. 6. To describe the present simple tense with using he/ she and to discuss adverbs of frequency. 7. To identify the basic question words and demonstrative pronouns and their applications. 8. To discuss the use of there is/ are and many prepositions. 9. To discuss the structure of simple past sentences and various irregular verbs. 10. To explain the negative and interrogative structure of the simple past tense sentence in addition to the adverbs of the past tense. 11. To identify the use of many adverbs and the use of can/ can't in the sentence and to explain requests and offers. 12. To elaborate the use of like and would you like and the use of some and any in many expressions.

	13. To discuss the use of the present continuous and the difference between present simple and present continuous sentences. 14. To explain the structures that are used to refer to future plants.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in this module is associated with the communicative approach which will be applied to develop students' skills to learn English and to enable students to use English in communication, therefore, using authentic materials in the class is so necessary. This approach is important to encourage students' participation in the class and to highlight their motivation in learning English, while at the same time refining and expanding their interactions and skills to achieve at least more success.

Student Workload (SWL)			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Unit one: Hello Am/are/is. my/your This is with practice in work
Week 2	Unit two: Your world He/she/they, his/her Questions
Week 3	Unit three: All about you Personal information/ social expressions
Week 4	Unit four: Family and friends Possessive adjectives/ possessive 's Have/has , adjective + noun
Week 5	Unit five: The way i live Present simple l/we/you/they An/a , adjective + noun
Week 6	Unit six: Every day
Week7	Present simple he/she
Week 8	Negatives and questions, adverbs of frequency
Week 9	Unit seven: My favorites
Week 10	Question words, pronouns, this/that
Week 11	Unit eight: Where l live There is/ are, prepositions
Week 12	Unit nine: Times past Was/ were born, past simple and irregular verbs
Week 13	Unit ten: We had a great time
Week 14	Past simple, regular and irregular
Week 15	Questions, negatives, ago
Week 16	Unit eleven: l can do that! Can/can't, adverbs, requests

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	John and liz Soar. (New Headway Beginner) 4th edition. Oxford: Oxford University Press.	Yes
Recommended Texts	English Grammar in Use by Raymond Murphy	No
Websites		

Module Information					
Module Title	**Thermodynamics principle**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**PM 103**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	PM		**College**	TEMO	
Module Leader	Mothana M. Mohamed Salih		**e-mail**	Muthanam.m1981@ntu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	M. Sc.	
Module Tutor	Mothana M. Mohamed Salih		**e-mail**	Muthanam.m1981@ntu.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	6/10/2024		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop problem solving skills and understanding of thermodynamics theory through the application of techniques. 2. To understand thermodynamics and energy law. 3. This course deals with the basic concept of heat, work and energy. 4. This is the basic subject for all cases of systems used in thermodynamics. 5. To understand the laws of energy conversion between thermodynamics systems. 6. Introducing students to thermodynamics by studying thermal systems in terms of energy interactions with its immediate surroundings.
Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize how temperature gauges work in laboratory equipment. 2. List the different thermodynamics terms. 3. Summarize what is meant by thermodynamics. 4. Discuss the reaction and participation of atoms in chemical reactions. 5. Describe thermal energy, work and energy. 6. Define Boyle's law. 7. Identify open and closed systems and their applications. 8. Discuss the heat transfer processes between thermal systems. 9. Discuss the different characteristics of the measuring devices used in the laboratory. 10. Explanation of Joule's law. 11. Identify the mathematical relationships in solving problems.

Learning and Teaching Strategies	
Strategies	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.

Student Workload (SWL)			
Structured SWL (h/sem)	81	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	119	**Unstructured SWL (h/w)**	8
Total SWL (h/sem)	**200**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introductions, references, units, General notations, about pressure, force, work etc.
Week 2	Temperature, unit of temperature and conversion, temperature measurements. Zeroth law of Thermodynamics. Energy, types of energy, positional, kinetic, internal and flow energy energies. Heat and work, power, enthalpy.
Week 3	First law of thermodynamics
Week 4	Steady flow energy equation for open system, non-flow energy equation for closed system, Ideal gas and equation of state
Week 5	Ideal gas, Boyle's law and Charles law and equation of state
Week 6	Specific heat at constant pressure and constant volume, closed system Processes using ideal gas. Isometric and isobaric processes.
Week7	Isothermal and adiabatic processes
Week 8	Polytropic processes
Week 9	open system processes
Week 10	Vapor, phase of substance, Phase change curve on P-V diagram.
Week 11	Dryness fraction, liquid and vapor lines, wet vapor
Week 12	Steam tables and Examples on steam tables
Week 13	Superheated vapor, tables of superheated tables.
Week 14	Processes using two phase system, processes on P-V diagram, Irreversible processes Closed system
Week 15	Second law of thermodynamics, heat engine, heat pump
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Thermal engineering (eighth edition) R. K. RAJPUT	Yes
Recommended Texts	Fundamentals of heat and mass transfer (M. Thirumaleshwar)	No
Websites		

Module Information					
Module Title	**Computer**		**Module Delivery**		
Module Type	**Basic**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**NTU 102**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	PM		**College**	TEMO	
Module Leader	Luluwah abdulwahaab Yaseen		**e-mail**	luluwah.alhubaity@ntu.edu.iq	
Module Leader's Acad. Title	Assist. Lecturer		**Module Leader's Qualification**	M. Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	6/10/2024		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	To learn about computers and their characteristics and features, compare different types of computers. 1. To learn about the computer's Hardware, Identify the factors that affect the computer's performance, Learn about the numerical systems and data representation. 2. Learn about the computer's Hardware (2), CPU, Memory 3. Learn about operating system software 4. Learn about the utility software programming languages, application software. 5. Learn the Microsoft office2020(Word, Excel, PowerPoint)
Module Learning Outcomes	1. Demonstrates knowledge of the Introduction to computer, computer component (hardware, software) 2. Demonstrates knowledge of the Operating system (windows), 3. Able to install windows (formatting) 4. 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 5. Able to use Microsoft word 2020, Microsoft excel 2020, Microsoft PowerPoint 2020 6. Able to use Internet , Internet explorer, starting, menus of internet explorer, E-Mail: Yahoo, Hotmail, google, yahoo, search information

Learning and Teaching Strategies	
Strategies	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.

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	12	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**75**		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Demonstrates knowledge of the Introduction to computer, computer component (hardware, software)
Week 2	● Demonstrates knowledge of the Operating system (windows), ● Able to install windows (formatting)
Week 3	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
Week 4	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
Week 5	Able to use Microsoft word 2020
Week 6	Able to use Microsoft word 2020
Week7	Able to use Microsoft word 2020
Week 8	Able to use Microsoft word 2020
Week 9	Able to use Microsoft word 2020
Week 10	Able to use Microsoft power point 2020
Week 11	Able to use Microsoft power point 2020
Week 12	Able to use Internet, Internet explorer, starting, menus of internet explorer
Week 13	Able to create and use E-Mail: Yahoo, Hotmail
Week 14	Able to utilize Search engines
Week 15	Able to use google, yahoo, search information
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	1. Introduction to Computer Skills For first year students, Bisha University 2. Computer Science Principles: The Foundational Concepts of Computer Science - For AP® Computer Science Principles 2020th Edition , Mr. Kevin P Hare (Author), Pindar Van Arman (Foreword)	Yes
Recommended Texts	Microsoft Access, Excel & Power Bi For Beginners & Power Users, Tech Demystified	No
Websites	https://www.just.edu.jo/~mqais/CIS99/PDF/Ch.01_Introduction_%20to_computers.pdf	

Module Information					
Module Title	**Arabic Language**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**NTU 103**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial**	
				☐ **Practical**	
				☒ **Seminar**	
Module Level		1	**Semester of Delivery**		2
Administering Department		PM	**College**	TEMO	
Module Leader	Dr. Eesha I. Mohammed		**e-mail**	aysha.ibrahim@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		Ph.d
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	ينشأ الطالب على حب اللّغة العربيّة لغة القرآن الكريم. التعرّف على مواطن الجمال في اللّغة العربيّة وآدابها، وأن يكتسب الطالب القدرة على دراسة فروع اللّغة العربيّة. تعريف الطالب بألفاظ اللّغة العربيّة الصحيحة وتراكيبها وأساليبها السليمة بطريقة مشوقة وجذابة. أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة . تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير، وتعويده حسن الاستماع لما يسمع مما ييسّر له أموره ويعينه على قضاء حوائجه. تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصوره. تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم. تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي. إيقاظ وعي الطالب لإدراك شرف الكلمة وتوجيهه؛ للمحافظة على طهارتها ونقائها حتى لا تستعمل إلا في الخير. مساعدة الطالب على فهم التراكيب المعقدة والأساليب الغامضة .
Module Learning Outcomes	١. معرفة القواعد النحوية والصرفية. ٢. التعريف بأبرز المصنفات اللغوية والأدبية. ٣. تحديد المشكلات اللغوية والأدبية لدى الدارسين. ٤. القراءة المعاصرة للنصوص اللغوية والأدبية. ٥. قراءة النصوص الأدبية وكتابتها وفق المعايير النحوية والصرفية ٦. تعزيز الثقة بالنفس والجرأة والفصاحة ٧. المنافسة والتميز في سوق العمل.

Learning and Teaching Strategies	
Strategies	١. تبسيط المعلومات وتنظيمها ٢. تسهيل عملية استرجاع المعلومات ٣. ربط المفاهيم الجديدة بالمكتسبات السابقة ٤. إيجاد العلاقة بين المفاهيم ٥. تسهيل تذكر المعارف والمعلومات

Student Workload (SWL)			
Structured SWL (h/sem)	48	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	2	**Unstructured SWL (h/w)**	0

Total SWL (h/sem)	50

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	مقدمة عن الأخطاء اللغوية
Week 2	التاء المربوطة والتاء المفتوحة
Week 3	همزة الوصل والقطع
Week 4	الهمزة المتوسطة والمتطرفة
Week 5	قواعد كتابة الالف الممدودة والمقصورة
Week 6	الحروف الشمسية والقمرية
Week7	الضاد والظاء
Week 8	العـدد
Week 9	المفاعيل
Week 10	أقسام الكلام
Week 11	معاني حروف الجر
Week 12	تطبيقات الأخطاء اللغوية الشائعة
Week 13	النون والتنوين
Week 14	مقدمة عن الأخطاء اللغوية
Week 15	الأخطاء اللغوية
Week 16	الامتحان النهائي

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	الكامل في اللغة والادب لابي عباس المبرد	Yes
Recommended Texts	أخطاء لغوية شائعة لخالد بن هلال بن ناصر العبري	No
Websites	https://www.eshamel.net https://www.ektebsa7.com	

Module Information					
Module Title	**Engineering Mechanics / Dynamics**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**		
Module Code	**PM 104**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	PM		**College**	TEMO	
Module Leader	Tariq Khalid		**e-mail**	tariqaikhalidi@ntu.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	M. Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Ayman Sabah		**e-mail**	aymansabah@ntu.edu.iq	
Scientific Committee Approval Date	6/10/2024		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Module Objectives for Engineering Mechanics/Dynamics: 1. Understand the fundamental concepts and principles of dynamics, including motion, forces, and acceleration. 2. Apply kinematic equations to analyze the motion of particles and rigid bodies in various scenarios. 3. Determine the relationship between forces, mass, and acceleration using Newton's laws of motion. 4. Apply the principles of work and energy to analyze and solve dynamic problems. 5. Analyze and calculate linear and angular momentum, and apply the principle of impulse and momentum to dynamic systems. 6. Understand and apply the principles of vibrations and oscillations in mechanical systems.
Module Learning Outcomes	Module Learning Outcomes for Engineering Mechanics/Dynamics: 1. Demonstrate a thorough understanding of the fundamental concepts and principles of dynamics, including motion, forces, and acceleration. 2. Apply kinematic equations to analyze the motion of particles and rigid bodies in different scenarios and determine their velocities and accelerations. 3. Analyze and calculate the forces and moments acting on particles and rigid bodies in dynamic situations, considering the principles of equilibrium. 4. Apply Newton's laws of motion to determine the relationship between forces, mass, and acceleration, and solve dynamic problems using these principles. 5. Utilize the principles of work and energy to analyze and solve dynamic problems, calculating mechanical work, kinetic energy, and potential energy. 6. Apply the principles of impulse and momentum to analyze the motion and collision of particles and rigid bodies, and solve related problems

Learning and Teaching Strategies	
Strategies	The main strategy for delivering this module is to actively engage students through problem-solving exercises, real-world applications, and interactive tutorials. Emphasis will be placed on developing critical thinking by analyzing

	motion, forces, energy, and vibrations through practical demonstrations, simple experiments, and collaborative learning. Visual aids and simulations will support deeper understanding of dynamic mechanical systems and principles.

Student Workload (SWL)			
Structured SWL (h/sem)	107	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	93	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**200**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to Engineering Mechanics/Dynamics • Overview of Engineering Mechanics/Dynamics • Fundamental concepts and principles • Unit conversions
Week 2	Kinematics of Particles / Position, velocity, and acceleration
Week 3	Rectilinear motion
Week 4	Curvilinear motion
Week 5	Tangential and normal components of acceleration
Week 6	Projectile motion
Week7	• Kinetics of Particles • Newton's laws of motion • Force, mass, and acceleration
Week 8	Application of Newton's laws to particles
Week 9	Frictional forces / Applications of particle kinetics
Week 10	Kinetics of Rigid Bodies/ Moment of inertia
Week 11	Work and Energy / Work done by a force
Week 12	Kinetic energy and potential energy/ Principle of work and energy
Week 13	• Impulse and Momentum/ Linear momentum and impulse/Conservation of linear momentum • Impulse-momentum principle /Impact and collision/Applications of momentum
Week 14	Vibrations • Free and forced vibrations/ Single degree of freedom systems
Week 15	Damping and damping ratios/Natural frequency and resonance/Vibration isolation and control
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Engineering Mechanics, Statics and Dynamics Twelfth Edition R. C. Hibbeler	Yes
Recommended Texts	Theory and Problems of Engineering Mechanics Statics and Dynamics/ Fifth Edition, Shaum's Outline	No
Websites		

Module Information					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**PM 105**			☐ **Lecture**	
ECTS Credits	**7**			☒ **Lab**	
SWL (hr/sem)	**175**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level		1	**Semester of Delivery**		2
Administering Department		PM	**College**	TEMO	
Module Leader	Shaima Salim Younus		**e-mail**	Shaima.salem@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M. Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Introduction students to the AutoCAD software. 1. Introduction to the students of engineering drawings. 2. Teaching students to draw geometrically according to accurate measurements. 3. To understand the basic principle for descriptive geometry. 4. to train students: to read the engineering drawings through the application of computers and techniques. 5. To understand standard specifications, draw simple and complex assembly drawings.
Module Learning Outcomes	Enables the students to use AutoCAD for 2-D representations. 1. Enables the students to Introduce the students to engineering drawings. 2. Enables the students to learn the techniques and standard practices of technical graphics. 3. To develop the student's abilities of engineering imagination. 4. To develop the student's engineering sense by dealing with dimensions and measurements. 5. To teach the student to identify the characteristics of geometric shapes and the various ways to draw them. 6. To teach the student diversity in the way of thinking and finding solutions for drawing each form.

Learning and Teaching Strategies	
Strategies	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. Group discussions, real-world problem applications, and the integration of visual demonstrations will further support concept retention and student motivation.

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	112	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	**175**		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Demonstrates knowledge about: • Introduction to engineering drawing. • Introduction about AutoCAD 2D software in engineering drawing. Limits, grid, object snap, view menu (zoom, pan).
Week 2	Correctly draw menu (line, poly line, polygon, rectangle, arc, circle, point, text).
Week 3	Correctly draw menu (line, poly line, polygon, rectangle, arc, circle, point, text).
Week 4	Correctly modify menu (erase, copy, mirror, offset, move, rotate, trim, extend, explode).
Week 5	Correctly modify menu (erase, copy, mirror, offset, move, rotate, trim, extend, explode).
Week 6	Complex geometrical shape.
Week7	Complex geometrical shape.
Week 8	Complex geometrical shape.
Week 9	Mid Semester exam
Week 10	Perspective
Week 11	Perspective
Week 12	Perspective
Week 13	Correctly implement and identify orthographic projection. Correctly implement and execute first and third angle projection method
Week 14	Correctly draw the projection with the first angle projection method Correctly draw the projection with the third angle projection method
Week 15	Demonstrates knowledge and implementation about drawing the three projections with the first and third angle projection method
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Fundamentals and principles of engineering drawing	Yes
Recommended Texts	Fundamentals of AutoCAD2020	No
Websites		

Module Information					
Module Title	**Occupational Safety**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**PM 106**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level		1	**Semester of Delivery**		2
Administering Department		PM	**College**	TEMO	
Module Leader	Banan Najim Al-deen Abdullah		**e-mail**	Banan.najim@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M. Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Understanding the Importance of Occupational Safety: This unit aims to provide students with a comprehensive understanding of the importance of occupational safety in the workplace. Students will identify potential hazards associated with various industries and their impact on employee safety. They will understand the importance of following safety guidelines to create a safe work environment. They will learn how to identify potential hazards, assess their severity and likelihood of occurrence, and develop appropriate control measures to mitigate or eliminate those hazards.
Module Learning Outcomes	1. Identify and assess workplace hazards: Engineering students will be able to identify and assess potential workplace hazards specific to their field of engineering. They will understand the importance of hazard identification and risk assessment in order to prevent accidents, injuries, and occupational illnesses. 2. Apply engineering principles to develop safety solutions: Students will be able to apply their engineering knowledge and skills to develop innovative and effective safety solutions. They will understand how engineering principles can be utilized to design and implement engineering controls, safety devices, and protective measures to minimize or eliminate workplace hazards. 3. Implement safety standards and regulations: Engineering students will be knowledgeable about relevant safety standards and regulations applicable to their specific engineering discipline. They will understand the importance of compliance with safety standards and be able to apply them in the design, construction, operation, and maintenance of engineering systems and processes. They will also be aware of the legal and ethical responsibilities associated with ensuring occupational safety in their professional practice.

Learning and Teaching Strategies	
Strategies	1. Familiarize yourself with the subject

	2. Collaborate and discuss: Engage in discussions and group activities with fellow engineering students. Share experiences, exchange ideas, and learn from each other's perspectives. This collaborative learning environment can broaden your understanding and provide different insights into safety practices. 3. Stay updated with industry standards: Keep yourself informed about the latest safety regulations, codes, and standards relevant to the engineering field. Regularly refer to authoritative sources such as government agencies, professional organizations, and reputable publications to stay up-to-date with best practices.

Student Workload (SWL)

Structured SWL (h/sem)	32	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	18	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	مقدمة في السلامة المهنية
Week 2	تحديد المخاطر وتقييم المخاطر
Week 3	وسائل السيطرة الهندسية وأنظمة السلامة
Week 4	معدات الحماية الشخصية ومعدات السلامة
Week 5	الصحة المهنية والصحة الصناعية
Week 6	سلامة الحرائق والاستعداد للطوارئ
Week7	سلامة الكهرباء في الهندسة
Week 8	سلامة الآلات والمعدات
Week 9	سلامة البناء في مشاريع الهندسة
Week 10	إدارة المواد الخطرة
Week 11	التدريب والتواصل في سلامة الهندسة
Week 12	تحقيق الحوادث وتقاريرها في الهندسة
Week 13	أنظمة إدارة السلامة في الهندسة
Week 14	تطبيق في السلامة المهنية ١
Week 15	تطبيق في السلامة المهنية٢
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	للمؤلف علي عبد العزيز المرزوقي. السلامة والصحة المهنية	Yes
Recommended Texts		
Websites	web.archive.org/web/20180626230747/https:/www.cdc.gov/niosh/topics/machine/	

Module Information					
Module Title	**Refrigeration & Air Conditioning Principles**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**PM 200**			☐ **Lecture**	
ECTS Credits	**8**			☒ **Lab**	
SWL (hr/sem)	**180**			☒**Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	2	**Semester of Delivery**	1		
Administering Department	PM	**College**	TEMO		
Module Leader	Husam Naufal Saleh Yassien	**e-mail**	husam.naufal@ntu.edu.iq		
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M. Sc.		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	6/10/2024	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Understand the basic principles of refrigeration and air conditioning systems. 2. To understand the fundamental properties of Air and Water vapor mixture. 3. This course deals with the basic concept of air-conditioning processes. 4. Identify and describe the components of a typical refrigeration and air conditioning system. 5. To explain the thermodynamic principles involved in refrigeration and air conditioning processes. 6. Demonstrate knowledge of refrigerants and their properties, including safety considerations and environmental impacts.
Module Learning Outcomes	1. Define Refrigeration and Air conditioning and identify their applications. 2. Define and calculate moist air properties using related equations. 3. Recognize how to use a Psychrometric chart in solving various Air conditioning processes. 4. Analyze the simple vapor compression cycle. 5. Describe the factors affecting vapor compression cycle performance. 6. Identify the multi pressure Refrigeration systems. 7. Recognize the refrigerant types and their effect on Ozone and How to Number it.

Learning and Teaching Strategies	
Strategies	The Refrigeration and Air Conditioning module employs a range of effective learning and teaching strategies. Students engage in theoretical lectures, practical demonstrations, and hands-on laboratory sessions to grasp the underlying principles and gain practical skills. Case studies and real-world scenarios enhance problem-solving abilities, while group projects foster teamwork and communication skills. Continuous assessment methods, including assignments and practical assessments, ensure students' progress and understanding of the subject matter. The module promotes equipping students with the knowledge and skills necessary for success in the field of refrigeration and air conditioning.

Student Workload (SWL)			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	107	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	**200**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Air-conditioning, Air-conditioning systems, SI units, Fundamental properties of Air and Water vapour mixture; definition of (moist air properties) , Dry bulb, wet bulb and Dew point temperatures, partial pressure, Relative humidity, moisture content, Specific volume and Enthalpy.
Week 2	The General Gas Law, Dalton's law of partial pressure, Calculation of moist air properties using related equations.
Week 3	Psychrometric chart, Construction of psychrometric chart, Sensible Heat and Latent Heat.
Week 4	Air-conditioning processes, Adiabatic saturation process, sensible cooling, and sensible heating.
Week 5	Dehumidification; by pass factor, contact factor, Humidification – Humidification by water injection, steam injection.
Week 6	Mixing of air streams, Cooling and dehumidification with reheat.
Week 7	Preheating with humidification and reheat. Summer and winter cycle.
Week 8	Refrigeration application, refrigeration theory, heat pump, reversed Carnot cycle.
Week 9	Simple vapour compression cycle, vapour compression cycle components, Simple vapour compression cycle analysis.
Week 10	Ideal and actual vapour compression cycle, factors affecting vapour compression cycle performance (effect of suction temperature, effect of condensing temperature, effect of subcooling, effect of superheating, effect of pressure loss).
Week 11	Multi Pressure systems: Removing of flash gas, inter-cooler.
Week 12	Single evaporator and single compressor, single compressor and two evaporators.
Week 13	Two compressors and two evaporators, multi-stage compression cycle using, water intercooler, flash intercooler, liquid refrigerants intercooler.
Week 14	Refrigerants, types of old and new refrigerant. Effect of refrigerant on Ozone, secondary refrigerants.
Week 15	Numbering of Refrigerants.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Refrigeration & Air Conditioning, W.F. Stoecker & J.W Jones, Second Edition, McGraw-Hill, Inc.	Yes
Recommended Texts	Air Conditioning Engineering , W.P. Jones, Fifth Edition Elsevier Butterworth-Heinemann	No
Websites	https://www.ashrae.org/technical-resources/ashrae-handbook	

Module Information					
Module Title	**Fluid Mechanics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PM 201**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level		2	**Semester of Delivery**		1
Administering Department		PM	**College**	TEMO	
Module Leader	Noor Moneer Basher		**e-mail**	noorabasher@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M. Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To understand the properties of fluids, dimensions and units. 2. To derive the equation of conservation of mass, momentum, energy and its application. 3. To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems. 4. To understand the various flow measuring devices. 5. To understand the classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent.
Module Learning Outcomes	1. Understand how to convert the unit system from British to SI. unit or vice versa. 2. Training the students how to solve the problems associated with fluid mechanics. 3. Measure the fluid flow of liquids by different types of flow meters. 4. Analyze the magnitude of the horizontal and vertical components of the force of the water on the gate. 5. Determine the reading on the pressure gauge by the different types of manometers. 6. Draw simple hydraulic and energy gradient lines. 7. Solve the formulas of open channel flow.

Learning and Teaching Strategies	
Strategies	The teaching of fluid mechanics will utilize a combination of interactive lectures, problem-solving sessions, and hands-on laboratory experiments. Conceptual understanding will be strengthened through the use of real-life engineering examples and fluid simulation tools. Students will engage in collaborative group work and guided tutorials to develop critical thinking and analytical skills. Visual aids, animations, and demonstration videos will support diverse learning styles. Regular quizzes and feedback sessions will help monitor progress and reinforce key concepts effectively.

Student Workload (SWL)			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	107	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	**200**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction - Units system
Week 2	Physical properties of fluids.
Week 3	Physical properties of fluids.
Week 4	Fluid pressure at static.
Week 5	Fluid pressure instruments.
Week 6	Hydrostatic force on a plane surface.
Week7	Hydrostatic force on an inclined surface
Week 8	Hydrostatic force on a curved surface.
Week 9	Fluid dynamics / classifications of fluids.
Week 10	Conservation of mass.
Week 11	Conservation of momentum and its application.
Week 12	Conservation of energy- Bernoulli equation.
Week 13	Bernoulli equation applications.
Week 14	Viscous flow in pipes.
Week 15	Pumps or turbines.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	A Textbook Of Fluid Mechanics And Hydraulic Machines By Rajput.	Yes
Recommended Texts	Fluid Mechanics by Yunus A. Cengel, John M. Cimbala.	No
Websites		

Module Information					
Module Title	**Mathematics**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**TECM 200**			☐ **Lecture**	
ECTS Credits	**8**			☐ **Lab**	
SWL (hr/sem)	**200**			☒ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	2	**Semester of Delivery**	1		
Administering Department	PM	**College**	TEMO		
Module Leader	Ahmed Mustaffa Saleem	**e-mail**	ahmedmustafa@ntu.edu.iq		
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	M. Sc.		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	6/10/2024	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Mathematics provides a powerful and universal language. Students are expected to use appropriate mathematical language and different forms of representation when communicating mathematical ideas, reasoning and findings, both orally and in writing. In order to reach the aims of mathematics, students should be able to: 1. use appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations. 2. use appropriate forms of mathematical representation to present information. 3. move between different forms of mathematical representation. 4. communicate complete, coherent and concise mathematical lines of reasoning. 5. organizes information using a logical structure.
Module Learning Outcomes	1. Students are able to appreciate the importance of understanding the structure of algebra to a higher-level concept. 2. Students can create awareness, especially symbolic thinking within the framework of the theory of modules. 3. Students have the capability to use its understanding and analyzing models of mathematics, science and technology and other disciplines related fields. 4. Students are able to develop an understanding framework that supports science and technology, and mathematics as well as communicate the results of the development of oral and written comprehension.

Learning and Teaching Strategies	
Strategies	Teaching and learning strategies can include a range of whole class, group and individual activities to accommodate different abilities, skills, learning rates and styles that allow every student to participate and to achieve some degree of success.

Student Workload (SWL)			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6

Unstructured SWL (h/sem)	107	**Unstructured SWL (h/w)**	7
Total SWL (h/sem)	**200**		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Review in differential and integration
Week 2	Vectors: general introduction to vectors in space – equation of straight line and an equation for a plane in space – plane, tangent and perpendicular line – vector function
Week 3	Complex numbers – polar form – Euler equation – exponential and roots of complex numbers – composite functions – Cauchy-Riemann equation
Week 4	Tow and more variable equations – partial derivative
Week 5	Chain rule for partial derivative – gradient and directional derivative – maximum and minimum values for tow variable functions
Week 6	Double integral, areas and volumes – physical applications
Week7	Triple integral
Week 8	Polar coordinates – cylindrical and spherical coordinates – curve drawing in polar coordinates
Week 9	Green's theorem - divergence theorem
Week 10	The linear integration
Week 11	The Series: sequences of numbers – limits – infinite series – limit by definition - alternating series test - power series - converges interval
Week 12	Taylor/Maclaurin series for a function – general applications
Week 13	Matrices: introduction and Basic Operations
Week 14	Inverse of a Matrix (system of linear equations) – solution of equations by matrices
Week 15	Solution of Differential Equations
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	" Calculus " , Ford , S.R. and Ford , J.R. , (1963) McGraw-Hill	Yes
Recommended Texts	“Advanced Engineering Mathematics”, Erwin Kreyszig et al., (2006)	No
Websites	https://library.oapen.org/bitstream/handle/20.500.12657/31235/633792.pdf?sequence=1&isAllowed=y	

Module Information					
Module Title	**Mechanical Drawing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PM 202**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		2	**Semester of Delivery**		1
Administering Department		PM	**College**	TEMO	
Module Leader	Asmaa taha Hussein		**e-mail**	Asmaa.taha@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M. Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. to train students: to read the technical drawings through the application of techniques. 2. Learn students to read symbols, technical terms, standard specifications. 3. To understand basic principle for the descriptive geometry. 4. This course deals with the basic concept of the computer in mechanical drawing. 5. To be able to communicate with manufacturers of mechanical systems. 6. To understand standard specifications, draw the simple and complex assembly drawings. 7. To be able to communicate with other mechanical engineering professionals regardless their spoken language.
Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Capability to use AutoCAD for 2-D representations. 2. To make the students understanding all about the screw threads and their definitions also to teach the students all common types for screw threads and the common types for bolts and nuts with over view in details. 3. To make the students understanding all about the Keys, types of keys, spline shaft and hub concept, and the basic definitions for Keys also the correct manner for Keys drawing. 4. Enables the students to learn the techniques and standard practices of technical graphics. 5. To make the students understanding all about the riveting and types of rivets. 6. Read a working or assembly drawing (blueprint) 7. Represent mechanical components in multi view orthographic representation 8. understanding all about welding, types of weld joints and the basic definitions for welding also the correct manner for all types of welding symbol.

	9. To help students understanding all about the Gears classification, draw spur gear, definitions, formulas and calculations.

Learning and Teaching Strategies	
Strategies	The teaching of mechanical drawing will be conducted through a combination of theoretical instruction and practical application. Lectures will introduce drawing principles, standards, and conventions, while hands-on sessions will develop students' skills in manual and computer-aided drafting (CAD). Students will practice creating 2D and simple 3D mechanical drawings with emphasis on accuracy and clarity. Interactive tutorials, peer evaluations, and regular feedback will reinforce learning. The use of real engineering examples and drawing assignments will enhance spatial visualization and technical communication skills.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	37	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**100**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to (CAD), components of computer aided drawing (CAD), Exercises
Week 2	Screw threads, forms of screw thread, international metric threads (ISO screw), Common types of fasteners.
Week 3	Method of drawing (Hexagonal & Square headed bolts and nuts)
Week 4	Keys, types of keys.
Week 5	Pins and Cotters.
Week 6	Rivets and riveted joints.
Week7	Types of riveted joints, Conventional rivet symbol, working drawing.
Week 8	Welding, type of weld joints, welding symbols standard, location and dimension of weld.
Week 9	Pulleys, types of pulleys.
Week 10	Gears classification of gears, spur gear, definitions, formulas and calculations.
Week 11	Gear tooth profile, working drawing.
Week 12	Assembly and details of common mechanical unit. Screw Jack (Assembly and details).
Week 13	Power screw (Assemble and details)
Week 14	Coupling, Types of coupling, Bearings, types of bearings.
Week 15	Pipes and pipe joints, piping fittings, pipe symbols standard.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	k. l. Narayana p. kannaiah k. venketa reddy mechanical engineering.	Yes
Recommended Texts	Up.and.Running.with.AutoCAD.2012.2D.and.3D.Drawing.and.Modeling	No
Websites	https://learnengineering.in/mechanical-drawing-books/	

Module Information					
Module Title	**Baath's Crimes in Iraq**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**NTU 200**			☐ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial**	
				☐ **Practical**	
				☒ **Seminar**	
Module Level	1	**Semester of Delivery**	1		
Administering Department	PM	**College**	TEMO		
Module Leader	Abdulkareem Ataya	**e-mail**	ABDZuhair93@ntu.edu.iq		
Module Leader's Acad. Title	Assist. Lecturer	**Module Leader's Qualification**	M. Sc.		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	6/10/2024	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. The course aims for the student to be knowledgeable about the crimes committed by the Ba'ath regime in Iraq. 2. To provide students with a comprehensive understanding of the political and historical background of the Ba'ath regime in Iraq. 3. To examine the nature, scope, and impact of the crimes committed by the regime against individuals and communities. 4. To develop students' ability to critically assess sources and narratives related to the regime's human rights violations. 5. To foster awareness of justice, accountability, and transitional justice mechanisms.
Module Learning Outcomes	By the end of this module, students will be able to: 1. **Identify** key historical events and crimes committed by the Ba'ath regime in Iraq, including their political, social, and humanitarian impacts. 2. **Analyze** the legal and ethical dimensions of the Ba'ath regime's actions within the framework of international human rights laws. 3. **Evaluate** primary and secondary sources related to the regime's practices, including testimonies, official documents, and scholarly research. 4. **Discuss** the long-term consequences of authoritarian rule on Iraqi society, institutions, and individual freedoms. 5. **Apply** critical thinking to compare the Ba'ath regime's practices with those of other authoritarian regimes in modern history.

Learning and Teaching Strategies	
Strategies	This module will use a combination of lectures, guided discussions, and case studies to explore the crimes of the Ba'ath regime. Students will engage with historical documents, survivor testimonies, and multimedia resources to deepen understanding. Critical thinking exercises, group presentations, and reflective writing will be used to encourage analysis and personal engagement. Field visits, guest speakers, and debates may be integrated to connect theory with lived experiences and historical context.

Student Workload (SWL)			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to the Ba'ath Party and Its Rise to Power in Iraq
Week 2	Political Context of Iraq Before and During the Ba'ath Regime
Week 3	Overview of Human Rights Violations Under Ba'ath Rule
Week 4	Genocide
Week 5	Political Context of Iraq Before and During the Ba'ath Regime
Week 6	Education and Cultural Policies Under the Ba'ath Regime
Week7	The Role of Intelligence and Security Services in Repression
Week 8	Impact of Ba'ath Policies on Iraqi Society and Minorities
Week 9	Forced Displacement and Population Control Strategies
Week 10	Media Censorship and Propaganda Under the Ba'ath Regime
Week 11	Economic Exploitation and Corruption in Ba'ath Iraq
Week 12	International Response and Sanctions Against the Ba'ath Regime
Week 13	The Fall of the Ba'ath Regime: Causes and Consequences
Week 14	Role of NGOs and Human Rights Organizations in Iraq
Week 15	The Impact of Ba'ath Rule on Iraq's Legal and Judicial Systems
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Baath's Crimes in Iraq	Yes
Recommended Texts		No
Websites	https://iraqicenter-fdec.org/archives/5146	

Module Information					
Module Title	**Strength of Materials**		**Module Delivery**		
Module Type	**Core**		☒ **Theory**		
Module Code	**PM 203**		☐ **Lecture**		
ECTS Credits	**6**		☒ **Lab**		
SWL (hr/sem)	**150**		☒ **Tutorial**		
			☐ **Practical**		
			☐ **Seminar**		
Module Level	2	**Semester of Delivery**		2	
Administering Department	PM	**College**	TEMO		
Module Leader	Hussein Mohammed Ali	**e-mail**	alabadi.hussein@ntu.edu.iq		
Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**		Ph.d	
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	6/10/2024	**Version Number**		1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module 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
Module Learning Outcomes	Students who successfully complete this course will have demonstrated an ability to: 1. Understand the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials. 2. Calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings. 3. Calculate the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels. 4. Determine the stresses and strains in members subjected to combined loading and apply the theories of failure for static loading. 5. Determine and illustrate principal stresses, maximum shearing stress, and the stresses acting on a structural member. 6. Determine the deflections and rotations produced by the three fundamental types of loads: axial, torsional, and flexural. 7. Analyze slender, long columns subjected to axial loads. 8. Design simple bars, beams, and circular shafts for allowable stresses and loads.

Learning and Teaching Strategies	
Strategies	This module uses lectures, problem-solving sessions, and lab experiments to teach material behavior under loads. Students apply theory through computer simulations and real-world examples. Group discussions and case studies develop critical thinking, while quizzes and assignments track progress. This approach ensures a strong grasp of both concepts and practical skills essential for mechanical engineering.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**150**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Simple stress
Week 2	Shearing stress, Bearing stress
Week 3	Thin wall cylinders
Week 4	Simple strain, stress-strain diagram, Hook's law
Week 5	Thermal stress
Week 6	Welded connection
Week7	Riveted joints
Week 8	Torsion
Week 9	Spring
Week 10	Shear and moment in Beam
Week 11	Beam deflection
Week 12	Deflection cantilever Beam
Week 13	Deflection of simply supported Beam
Week 14	Combined stresses
Week 15	Stress at a point /Mohr circle
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Strength of Materials, Ferdinand L. Singer and Andrew Pytel.	Yes
Recommended Texts	Schaum's Outline of Strength of Materials	No
Websites	https://www.coursera.org/learn/mechanics-1	

Module Information					
Module Title	**Engineering Materials**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**PM 204**			☒ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	2	**Semester of Delivery**	2		
Administering Department	PM	**College**	TEMO		
Module Leader	Dr. Jamal. N. Sultan	**e-mail**	Jamal.nayyef@ntu.edu.iq		
Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**	Ph.d		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	6/10/2024	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Understand the Structure of Materials: Learn about the atomic and molecular structure of materials, including the arrangement of atoms, crystal structures, and the relationship between structure and material properties. 2. Study Material Properties: Explore the various physical and mechanical properties of materials such as strength, hardness, elasticity, conductivity, thermal expansion, and corrosion resistance. 3. Learn about Material Processing: Gain knowledge about different manufacturing and processing techniques used to modify the structure and properties of materials. This may include topics such as casting, forging, welding, heat treatment, and surface treatment.
Module Learning Outcomes	1. Knowledge of Material Properties: Students should gain a comprehensive understanding of the fundamental properties of different engineering materials such as metals, polymers, ceramics, and composites. This includes knowledge of mechanical properties (strength, stiffness, toughness), thermal properties (conductivity, expansion), electrical properties, corrosion resistance, and other relevant characteristics. 2. Material Selection and Application: Students should learn how to select appropriate materials for specific engineering applications based on their properties, performance requirements, and cost considerations. 3. Material Processing and Manufacturing: Students should acquire knowledge of different material processing and manufacturing techniques, including casting, forming, machining, welding, heat treatment, and surface treatment.

Learning and Teaching Strategies	
Strategies	1. Active Learning: Engage students in hands-on activities, experiments, and projects that involve working with engineering materials. This could include laboratory sessions, case studies, or design projects that require students to apply their knowledge to real-world problems. 2. Visualization Tools: Utilize visualization tools such as diagrams, models, and simulations to help students understand the structure, properties, and behavior of different engineering materials. This can enhance their conceptual

	understanding and make complex concepts more accessible. 3. Practical Examples: Provide practical examples of engineering materials used in real-world applications. Showcase the materials' properties and performance in various industries.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**150**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to Engineering Materials: Importance of materials in engineering./ Classification and properties of materials. Structure of materials: atomic, crystalline, and non-crystalline materials. FCC, BCC, CPH structures.
Week 2	Atom binding: Ionic bond, covalent bond, metallic bond, Van der Waals forces.
Week 3	Crystalline defects: dislocations, types of dislocations
Week 4	Phase Diagrams and Phase Transformations: -Phase equilibrium and phase diagrams./ Solidification, different crystals form in an ingot, castings defects./ Heat treatment processes (e.g., annealing, quenching, tempering).
Week 5	Mechanical Properties of Materials: Stress and strain.-/ Elasticity and plasticity./ Tensile, compressive, and shear behavior. -Hardness, toughness, and impact resistance.
Week 6	Metals and Alloys: Strengthening mechanisms: solid solution, precipitation, and dispersion strengthening. Ferrous and non-ferrous metals and alloys./Corrosion and oxidation of metals.
Week7	Creep test.
Week 8	Fatigue test.
Week 9	Iron-making and steel making.
Week 10	Thermal equilibrium diagram for Iron-iron carbide.
Week 11	Types of steels: carbon steel, alloy steel.
Week 12	Nanomaterials and nanotechnology./ Biomaterials and medical applications.
Week 13	Ceramics: Structure and properties of ceramics./Types of ceramics: oxides, non-oxides, composites. Ceramic processing techniques./Applications and limitations of ceramics.
Week 14	Polymers and Composite Materials
Week 15	Material Selection and Design:
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	"Materials Science and Engineering: An Introduction" by William D. Callister Jr. and David G. Rethwisch.	Yes
Recommended Texts	"Introduction to Materials Science for Engineers" by James F. Shackelford.	No
Websites	American Ceramic Society (ACerS) - The ACerS website (www.ceramics.org)	

Module Information					
Module Title	**Thermodynamics**		**Module Delivery**		
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**		
Module Code	**PM 205**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	PM		**College**	TEMO	
Module Leader	Anwar Ahmed Yousif		**e-mail**	nawarayousif@ntu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	6/10/2024		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. The aim is to enhance problem-solving abilities and gain a comprehensive comprehension of thermodynamics theory by utilizing various methodologies. 2. The objective is to grasp the principles of thermodynamics and the laws governing energy. 3. The course primarily focuses on the fundamental notions of heat, work, and energy. 4. This subject serves as a foundational component for understanding different systems employed in thermodynamics. 5. The goal is to comprehend the principles that govern the conversion of energy between different thermodynamic systems.
Module Learning Outcomes	1. Classify and define various terms related to thermodynamics. 2. Provide a concise explanation of the concept of thermodynamics. 3. Analyze the involvement and behavior of atoms in chemical reactions. 4. Explain the concepts of thermal energy, work, and energy in the context of thermodynamics. 5. Define Boyle's law and understand its significance in thermodynamics. 6. Differentiate between open and closed systems and comprehend their respective applications. 7. Explore the processes of heat transfer between thermal systems.

Learning and Teaching Strategies	
Strategies	Thermodynamics is taught through a combination of lectures, problem-solving sessions, and interactive discussions to build a strong theoretical foundation. Students engage in tutorials and practical experiments to apply laws of thermodynamics to real systems. Visual aids, simulation tools, and real-life engineering examples enhance understanding. Regular assessments, group work, and feedback help reinforce concepts and encourage active learning.

Student Workload (SWL)			
Structured SWL (h/sem)	93	**Structured SWL (h/w)**	6

Unstructured SWL (h/sem)	82	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	**175**		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to Thermodynamics; Overview, system, surroundings, boundary, properties
Week 2	First Law of Thermodynamics; Energy transfer and work, Heat transfer and thermal energy, Conservation of energy principle
Week 3	Second Law of Thermodynamics; Heat engines and refrigerators, Carnot cycle and efficiency, Entropy and its significance
Week 4	Entropy and its Applications; Calculation of entropy changes, Entropy generation and irreversibility, Entropy balance in thermodynamic processes
Week 5	Properties of Pure Substances; Equations of state, Phase diagrams and phase equilibrium, Ideal gas behavior
Week 6	Vapor and Gas Power Cycles; Rankine cycle, Brayton cycle, Combined cycles
Week7	Refrigeration and Heat Pump Systems; Vapor compression refrigeration, Absorption refrigeration, Coefficient of Performance (COP)
Week 8	Thermodynamic Property Relations; Maxwell's equations, Departure functions, Compressibility factor
Week 9	Mixtures and Psychometrics; Properties of mixtures, Psychrometric properties and processes, Air conditioning and humidity control
Week 10	Chemical Reactions and Thermodynamics; Enthalpy of reactions, Gibbs free energy and chemical equilibrium, Chemical equilibrium constant
Week 11	Exergy and Second Law Analysis; Exergy analysis and applications, Availability and irreversibility, Second law efficiency
Week 12	Power and Refrigeration Cycles; Gas power cycles (Otto, Diesel, and more), Refrigeration cycles (Cascade, Multi-stage, etc.)
Week 13	Introduction to Heat Transfer; Modes of heat transfer (conduction, convection, radiation), Fourier's law, Newton's law of cooling, Stefan-Boltzmann law
Week 14	Heat Exchangers; Types of heat exchangers, Effectiveness-NTU method, Heat exchanger design and analysis
Week 15	Review and Applications; Review of key concepts and principles, Applications of thermodynamics in various industries, Final exam preparation
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Thermodynamics: An Engineering Approach" by Yunus A. Çengel and Michael A. Boles	Yes
Recommended Texts	Fundamentals of Engineering Thermodynamics" by Michael J. Moran, Howard N. Shapiro	No
Websites	(https://www.khanacademy.org/science/physics/thermodynamics) (https://ocw.mit.edu/courses/chemistry/5-60-thermodynamics-kinetics-spring-2008/)	

Module Information					
Module Title	**Electrical Machines**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**PM 206**			☐ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☒ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	2	**Semester of Delivery**	2		
Administering Department	PM	**College**	TEMO		
Module Leader	Safwan Assaf Hamoodi	**e-mail**	Safwan79azb@ntu.edu.iq		
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	M. Sc.		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	6/10/2024	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Building a foundation for studying electrical calculations in both AC and DC circuits, and familiarizing students with the various theories used in these calculations. 2. Gaining a comprehensive understanding of electrical principles and concepts, such as voltage, current, resistance, and power. This knowledge will be applied to the analysis of electrical circuits and systems. 3. Applying the acquired knowledge to the operation and maintenance of electrical machines, including motors and generators. Students will also explore the fundamentals of power systems, including power generation, transmission, and distribution.
Module Learning Outcomes	1. Mastery of electrical circuit theory: Students will acquire a comprehensive understanding of the fundamental principles of electrical circuit theory, encompassing key concepts such as voltage, current, resistance, and power. They will be proficient in applying this knowledge to analyze and solve basic electrical circuits. 2. Application of electrical machines and power systems: Students will explore the principles and workings of electrical machines, including motors and generators, gaining insight into their applications and performance characteristics. Additionally, they will develop a foundational understanding of power systems, encompassing power generation, transmission, and distribution aspects, enabling them to comprehend the broader context of electrical engineering.

Learning and Teaching Strategies	
Strategies	1. Active Participation: Actively participate in class discussions to engage with the subject matter and deepen your understanding. 2. Problem-Solving Skills: Develop and enhance your problem-solving skills, as they are essential in Electrical and Electronic Engineering. 3. Practical Application: Gain hands-on experience through laboratory sessions and projects, allowing you to apply theoretical concepts to real-world scenarios.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	75	**Unstructured SWL (h/w)**	5
Total SWL (h/sem)	**150**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	D.C motors, construction, commutator, types of D.C motors
Week 2	Back e.m.f, speed equation, speed control
Week 3	Load Toque Requirement, types Load Torque
Week 4	Starting of D.C motor, starter connection, torque of D.C motors
Week 5	Speed-torque characteristics of each type of D.C motor
Week 6	Examples to evaluate the starting current of D.C motor with and without starter, speed control
Week7	Single phase induction motor, split-phase, capacitor-start, shaded-pole type
Week 8	3-phase induction motor, construction, synch. Speed, slip.
Week 9	Control of three-phase induction motor using voltage frequency control.
Week 10	Starting of 3-phase induction motor, star-delta method, step down transformer
Week 11	Torque characteristic, max torque
Week 12	3-phase system, star and delta connection, line current, line voltage, phase current and voltage
Week 13	Instruments and measurements, ammeters, voltmeter, ohmmeter, kw - h meters.
Week 14	Contactors, relays, timers
Week 15	Thermal overload, starter (contactor +timer)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1. Electric Machinery and Power System Fundamentals" by Stephen J. Chapman 2. Principles of Electric Machines and Power Electronics" by P.C. Sen	Yes
Recommended Texts	1. Electrical Wiring Residential by Ray C. Mullin and Phil Simmons 2. Electrical Safety Handbook by John Cadick, Mary Capelli - Schellpfeffer, and Dennis Neitzel	No
Websites	(www.allaboutcircuits.com) (www.electrical4u.com)	

Module Information					
Module Title	**Arabic Language**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**NTU 203**			☒ **Lecture**	
ECTS Credits	**2**			☐ **Lab**	
SWL (hr/sem)	**50**			☐ **Tutorial**	
				☐ **Practical**	
				☒ **Seminar**	
Module Level		2	**Semester of Delivery**		2
Administering Department		PM	**College**	TEMO	
Module Leader	Dr. Eesha I. Mohammed		**e-mail**	aysha.ibrahim@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		Ph.d
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	١. ينشأ الطالب على حب اللّغة العربيّة لغة القرآن الكريم. ٢. التعرّف على مواطن الجمال في اللّغة العربيّة وآدابها، ٣. وأن يكتسب الطالب القدرة على دراسة فروع اللّغة العربيّة. ٤. تعريف الطالب بألفاظ اللّغة العربيّة الصحيحة وتراكيبها وأساليبها السليمة بطريقة مشوقة وجذابة. ٥. أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة . ٦. تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير، وتعويده حسن الاستماع لما يسمع مما ييسّر له أموره ويعينه على قضاء حوائجه. ٧. تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصوره. تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم. ٨. تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي. إيقاظ وعي الطالب لإدراك شرف الكلمة وتوجيهه؛ للمحافظة على طهارتها ونقائها حتى لا تستعمل إلا في الخير. ٩. مساعدة الطالب على فهم التراكيب المعقدة والأساليب الغامضة
Module Learning Outcomes	١. معرفة القواعد النحوية والصرفية. ٢. التعريف بأبرز المصنفات اللغوية والأدبية. ٣. تحديد المشكلات اللغوية والأدبية لدى الدارسين. ٤. القراءة المعاصرة للنصوص اللغوية والأدبية. ٥. قراءة النصوص الأدبية وكتابتها وفق المعايير النحوية والصرفية ٦. تعزيز الثقة بالنفس والجرأة والفصاحة ٧. المنافسة والتميز في سوق العمل.

Learning and Teaching Strategies	
Strategies	١. تبسيط المعلومات وتنظيمها. ٢. تسهيل عملية استرجاع المعلومات. ٣. ربط المفاهيم الجديدة بالمكتسبات السابقة

	٤. إيجاد العلاقة بين المفاهيم. ٥. تسهيل تذكر المعارف والمعلومات

Student Workload (SWL)			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	17	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**50**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	ان وأخواتها
Week 2	كان واخواتها
Week 3	الاستثناء
Week 4	أدوات النصب
Week 5	أدوات الجزم
Week 6	أنواع الافعال وطرق اعرابها
Week7	النعت وانواعه
Week 8	نائب فاعل
Week 9	كيفية التخلص من الاخطاء
Week 10	الاستفهام
Week 11	لغة الضاد
Week 12	المبتدأ والخبر
Week 13	التقديم والتأخير
Week 14	الأسماء الموصولة
Week 15	كيفية كتابة الطلب وإجابة الكتب الواردة
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	الكامل في اللغة والادب لابي عباس المبرد	Yes
Recommended Texts	كتاب النحو الواضح في قواعد اللغة العربية، لعلي الجارم ومصطفى أمين	No
Websites	https://www.eshamel.ne https://shamela.ws/book/10018	

Module Information					
Module Title	**Computer**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NTU 202**				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level		2	**Semester of Delivery**		2
Administering Department		PM	**College**	TEMO	
Module Leader	Safa Akram Younis		**e-mail**	safa.altutunji@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	**Module Leader's Qualification**		M. Sc.
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		6/10/2024	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	The goal of teaching the subject of communications is to provide students with a fundamental understanding of how information is transmitted and received over various media. It aims to: 1. Introduce basic concepts such as signals, modulation, bandwidth, and noise. 2. Explain communication systems, including analog and digital transmission. 3. Develop problem-solving skills in analyzing and designing communication circuits and systems. 4. Prepare students for advanced topics like wireless communication, data networks, and information theory. 5. Enhance practical skills through lab work and simulations involving real world communication technologies. Overall, the course equips students with the theoretical and practical knowledge needed for careers in telecommunications, electronics, and networking.
Module Learning Outcomes	1. Understand the Fundamentals of Communication: Describe the basic principles, types, and models of communication. Explain the components and processes of effective communication. 2. Apply Verbal and Non-verbal Communication Skills: Demonstrate effective speaking, listening, and presentation techniques. Interpret and use body language, tone, and other non-verbal cues appropriately. Communicate Effectively in Various Contexts: Adapt communication styles to suit academic, professional, and intercultural settings. 3. Utilize Modern Communication Technologies: Use digital tools (e.g., email, social media, video conferencing) for clear and professional communication. Analyze the impact of technology on modern communication practices. 4. Develop Critical Thinking and Message Analysis Skills: Evaluate the credibility and effectiveness of messages in media and interpersonal contexts.

	5. Resolve Communication Barriers and Conflicts: Identify common communication barriers and propose solutions.

Learning and Teaching Strategies	
Strategies	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.

Student Workload (SWL)			
Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	12	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**75**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Security and Networking: What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting
Week 2	E-Commerce: Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking. SMS banking, electronic alert, Mobile banking
Week 3	Computer Troubleshooting: Identifying and solving common hardware and software problems that computer users encounter
Week 4	Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 5	Introduction to Al
Week 6	Definition of Al, History of Al, Al Techniques and Approaches, Challenges and Ethical Considerations
Week7	AI in Our Daily Lives: Al in smartphones and virtual assistants like Siri or Google Assistant.
Week 8	AI in Our Daily Lives: Al in smartphones and virtual assistants like Siri or Google Assistant.
Week 9	AI in Our Daily Lives: Al in smartphones and virtual assistants like Siri or Google Assistant.
Week 10	Applications of Al: Education, Healthcare, Transportation, Marketing and Advertising.
Week 11	Applications of Al: Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 12	Al and Society: (How Al affects social, Al and international relations, Al and the future of humanity.
Week 13	surveillance, the impact of Al on the job market
Week 14	surveillance, the impact of Al on the job market
Week 15	The Future of Al (Future trends in Al, recent research and emerging technologies.)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Introduction to Computer Skills For first year students, Bisha University	Yes
Recommended Texts	Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition	
Websites	https://www.just.edu.jo/~mqais/CIS99/PDF/Ch.01_Introduction_%20to_compers.pdf	