

Refrigeration and Air Conditioning syllabus

Module Information				
معلومات المادة الدراسية				
Module Title	Mechanical Engineering /Static		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM 100			
ECTS Credits	8			
SWL (hr/sem)	200			
Module Level		1	Semester of Delivery	
Administering Department		PM	College	TEMO
Module Leader	Mothana M. Mohamed Salih		e-mail	muthanam.m1981@ntu.edu.iq
Module Leader's Acad. Title		Assist. Professor	Module Leader's Qualification	
Module Tutor	Mothana M. Mohamed Salih		e-mail	muthanam.m1981@ntu.edu.iq
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq
Scientific Committee Approval Date		01/06/2025	Version Number	3.0
Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	None			Semester
Co-requisites module	None			Semester
Module Aims, Learning Outcomes and Indicative Contents				
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				
Module Objectives أهداف المادة الدراسية	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. 10. Develop critical thinking and problem-solving skills in the context of engineering Statics. 11. Communicate effectively, both orally and in writing, to present and explain the analysis, results, and solutions of dynamic problems. By achieving these module objectives, students will gain a comprehensive understanding of the principles and applications of engineering Statics. They will be able to analyze and solve problems related to motion, forces, and vibrations in mechanical systems, and apply their knowledge to real-world engineering scenarios. They will also develop skills in critical thinking, problem-solving, and effective communication, which are valuable in the field of engineering.			
	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		

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مخرجات التعلم للمادة الدراسية	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. 9. Apply the principles of equilibrium to solve real-world engineering problems, such as determining the stability of structures, calculating the forces on supports and connections, and analyzing the behavior of mechanical systems. 10. Communicate effectively, both orally and in writing, to present and explain the analysis, results, and solutions of engineering mechanics/statics problems. By achieving these module learning outcomes, students will develop a strong foundation in engineering mechanics/statics and be equipped with the necessary knowledge and skills to analyze and solve a wide range of engineering problems involving static equilibrium and structural stability.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Statics • Definition and scope of statics • Fundamental concepts and principles • Importance of statics in engineering 2. Vectors and Vector Analysis • Vector representation and operations • Vector components and coordinate systems • Vector addition, subtraction, and scalar multiplication 3. Forces and Moments • Forces and their characteristics • Resultant and equilibrium of forces • Moment of a force and its properties • Couples and their effects 4. Equilibrium of Rigid Bodies • Free body diagrams and force analysis • Equations of equilibrium in two and three dimensions • Solving equilibrium problems using scalar and vector approaches • Applications to simple systems and structures 5. Truss Structures • Introduction to truss analysis • Method of joints and method of sections • Determination of member forces and support reactions 6. Friction • Laws of friction and frictional forces • Types of friction and their characteristics • Calculation of frictional forces and moments • Applications to inclined planes, wedges, and screws 7. Center of Gravity and Centroids • Definitions and properties of center of gravity and centroids • Determination of center of gravity and centroids of simple shapes • Composite bodies and distributed loads 8. Moments of Inertia • Moment of inertia and its physical significance • Calculating moments of inertia for simple shapes

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	- Parallel-axis and perpendicular-axis theorems - Application of moments of inertia in engineering analysis		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
Strategies	The module employs a blended approach combining structured lectures with interactive tutorials to reinforce core concepts. Problem-solving sessions are conducted weekly, where students apply vector analysis and equilibrium equations to real-world scenarios. Collaborative learning is encouraged through group assignments and case studies, fostering critical thinking and peer discussion. Additionally, formative assessments (quizzes and report writing) are integrated to provide regular feedback and support self-directed learning. Practical examples and free-body diagram exercises are used throughout to bridge theory with engineering applications.		
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	122	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
	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, Varignons 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 مصادر التعلم والتدريس			
	Text	Available in the Library?	
Required Texts	Engineering Mechanics/ Statics, Fourteen Edition, R.C. Hibbeler	yes	
Recommended Texts	1- Engineering Mechanics , Ferdinand L. Singer 2- Engineering Mechanics, Meriam 3- Engineering Mechanics/ Statics, Arthur P. Boresi & Richard J. Schmidt	No	
Websites			

Module Information

معلومات المادة الدراسية

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Module Title		Mathematics Principles		Module Delivery					
Module Type		Basic		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar					
Module Code		PM 101							
ECTS Credits		6							
SWL (hr/sem)		150							
Module Level		1							
Administering Department		PM		Semester of Delivery		1			
College		TEMO							
Module Leader		Raid Abdulhadi Abdulqader		e-mail		raid.alabdullah@ntu.edu.iq			
Module Leader's Acad. Title		Assistant Lecher		Module Leader's Qualification		M. Sc.			
Module Tutor				e-mail					
Peer Reviewer Name		Dr. Ammar Hassan		e-mail					
Scientific Committee Approval Date		01/06/2025		Version Number		3.0			
Relation with other Modules العلاقة مع المواد الدراسية الأخرى									
Prerequisite module		None				Semester		None	
Co-requisites module		None				Semester		None	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية									
Module Objectives أهداف المادة الدراسية		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 مخرجات التعلم للمادة الدراسية		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.							
Indicative Contents المحتويات الإرشادية		• Demonstrate an understanding of basic concepts in each of the module core topics (complex numbers, matrices, limits, differential equations, integration, hyperbolic functions, vectors, series, proof) • Demonstrate an understanding of basic skills and techniques in dealing with concrete examples in each of the core topics • Apply these skills and techniques to solve a wide range of familiar and unfamiliar problems in the core topics • Demonstrate an understanding of how to communicate mathematical ideas clearly and coherently							

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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	112	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	175		

Delivery Plan (Weekly Syllabus)

المناهج الأسبوعي النظري

	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	Two and more variable equations – partial derivative
Week 5	Chain rule for partial derivative – gradient and directional derivative – maximum and minimum values for two variable functions
Week 6	Double integral, areas and volumes – physical applications
Week 7	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 line 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

مصادر التعلم والتدريس

	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

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Module Title	Electrical Technology			Module Delivery	
Module Type	Basic			☒ Theory ☐ Lecture ☒ Tutorial ☒ Lab ☐ Seminar	
Module Code	PM 102				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		1	Semester of Deliver		1
Administering Department		PM	College		
Module Leader	Safwan Assaf Hamoodi		e-mail	Safwan79azb@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification		M.Sc.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		1/9/2023	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		Introduce students to the basic concepts of electrical engineering, including voltage, current, resistance, power, and energy. Teach students how to analyze simple electrical circuits using fundamental laws such as Ohm's Law and Kirchhoff's Laws, and apply circuit analysis tech. Provide a comprehensive understanding of both alternating current (AC) and direct current (DC) systems, including their characteristics, behaviors, and application. Familiarize students with common electrical components such as resistors, capacitors, inductors, diodes, and transistors, including their functions and applications in circuits. Enhance students' mathematical skills necessary for solving electrical engineering problems, including algebra, calculus, and complex number analysis.			
Module Learning Outcomes		1 . Fundamental Knowledge: Demonstrate an understanding of basic electrical engineering concepts, including voltage, current, resistance, power, and energy. 2 .Circuit Analysis: Apply Ohm's Law and Kirchhoff's Laws to analyze and solve simple electrical circuits, both in DC and AC contexts. 3 .Component Identification: Identify and describe the function of common electrical components such as resistors, capacitors, inductors, diodes, and transistors in circuit applications. 4 .Mathematical Proficiency: Utilize mathematical techniques, including algebra and complex numbers, to solve electrical engineering problems effectively. 5 .Practical Skills: Conduct laboratory experiments to build and analyze electrical circuits, demonstrating the ability to apply theoretical knowledge in a practical setting. 6 .Problem-Solving Ability:			

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	Develop systematic approaches to solve engineering problems, including the ability to model and simulate electrical systems. 7 .Safety Practices: Recognize and apply safety practices relevant to working with electrical systems and components in both laboratory and real-world environments.		
Indicative Contents	Part A: Symbols and Units: Define the meaning of units and its importance in engineering science, the Greek Alphabet, the symbols, suffix, acronyms and scientific numbers. The basic units, the derived units, and the available different systems of units. How to write units in official documents. The physical meaning of units. Revision problem classes. [20 hours]		
	Part B: The Basic Concepts of Electricity Parameters: The physical meaning of Energy, Work, Displacement, Distance, Force, Acceleration, Torque, and Power. The Potential, Voltage, and Current. The electric circuit 3 parameters, the conventional current and the electronic current, the electric power, the drift velocity, the atomic structure of insulators and conductors. Revision problem classes. [20 hours]		
	Revision Session and Quiz. [1.5 hours]		
	Part: Analogue DC Circuit Theories: Resistive networks, voltage and current sources, internal resistance concept, maximum power transfer theory, current and voltage division, Thevenin and Norton equivalent circuits, and other circuit theories. Revision problem classes. [20 hours]		
	Control Systems, Troubleshooting, and Maintenance. [10 hours]		
	Revision Session and Quiz [1.5 hours]		
Learning and Teaching Strategies			
Strategies	The main strategy that will be adopted in delivering this module is to declare the physical comprehension of the units like (Newton Unit) for example, the distinguishing between vector and scalar quantities, 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 practical examples before teaching each new subject to increase the student interest. The student must know the reason of learning each subject and its impact on his future as an engineer.		
Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		
Delivery Plan (Weekly Syllabus)			
Week	Material Covered		
Week 1	Introduction - Basic concepts and units: The international system of units, quantities derived from SI units. Units of force, energy, torque, and power. Abbreviation for multiples & sub-multiples.		
Week 2	Electricity & atomic structure of the substance.		
Week 3	Current and current density. Coulomb's Law.		
Week 4	potential, electromotive force (emf) and potential difference.		
Week 5	The relation between energy and heat. Efficiency and percentage efficiency.		
Week 6	Analysis of DC circuits: Ohm's law, resistivity & conductivity, temperature effect.		

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Week 7	Midterm exam +The internal resistance of a source. Equivalent resistance: Series, parallel, (Series-parallel).
Week 8	delta, and star connections. Equivalent voltage source: Series, parallel.
Week 9	Power calculation in DC circuit. Introduction to network theorems, types of sources: independent and dependent voltage sources and their transformation.
Week 10	Kirchhoff's laws, KVL, KCL, Maxwell's circulating current (mesh analysis). Nodal analysis, Superposition theorem.
Week 11	Thevenin's theorem, Norton's theorem, Maximum power transfer theorem. The Photovoltaic panel internal resistance, Millman's theorem, Substitution theorem, Reciprocity theorem.
Week 12	Magnetic field. Magnetic fields due to the electric current, magnetic field in a coil. Magnitude and direction of the force on a moving charge in the magnetic field (Motor and Generator principles).
Week 13	Ferromagnetic materials. The magnetization curve (B-H Curve). Permeability, Relative permeability. Magnetic constants: reluctance, magnetic leakage, and fringing. Magnetic circuit: Series, parallel, and (series-parallel). Kirchhoff's laws for the magnetic circuit.
Week 14	Condition for the minimum volume of a permanent magnet, load line of a permanent magnet.
Week 15	The force between two magnetic poles, the magnetic pull between two iron surfaces and (series parallel). Kirchhoff's laws for the magnetic circuit.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	Lab 1: Resistor color code
Week 2	Lab 2: Ohm's law
Week 3	Lab 3: Resistors in series parallel
Week 4	Lab 4: Divider Rules
Week 5	Lab 5: Kirchhoff's laws
Week 6	Lab 6: Delta & star.
Week 7	Lab 7: Mesh Method
Week 8	Lab 8: Nodal theorem
Week 9	Lab 9: Superposition theorem
Week 11	Lab 10: Thevenin's theorem
Week 12	Lab 11: Norton theorem
Week 13	Lab 12: Max. power theorem
Week 14	Lab 13: fundamental of Ac
Week 15	Lab 14: Oscilloscope

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education.	Yes
Recommended Texts	Digital Fundamentals, T. L. Floyd, Pearson Education Ltd.	Yes
Websites	https://logic.ly/demo/	

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معلومات المادة الدراسية					
عنوان المقرر		الديمقراطية وحقوق الانسان		طريقة تقديم المقرر	
نوع المقرر		مادة مساعدة		☒ نظري ☒ محاضرة ☐ مختبر ☒ تمارين ☐ عملي ☒ حلقة دراسية	
رمز المقرر		NTU100			
عدد الساعات المعتمدة		2			
ECTSبنظام		50			
SWL (hr/sem)					
1		فصل تقديم المقرر		1	
القسم الإداري المسؤول		PM		TEMO	
مسؤول المقرر		أ.م. د. محمد عبد الموجود حسن		dr.mohammed67@ntu.edu.iq	
اللقب الأكاديمي لمسؤول المقرر		أستاذ مساعد		الشهادات العلمية لمسؤول المقرر	
مدرس المقرر		أ.م. د. محمد عبد الموجود حسن		dr.mohammed67@ntu.edu.iq	
اسم المراجع النظير		د. عمار حسن سهيل		ايميل	
تاريخ اعتماد اللجنة العلمية		2025/06/01		رقم الاصدار	
3.0					
العلاقة مع المواد الدراسية الأخرى					
المقرر السابق المطلوب		لا يوجد		الفصل الدراسي	
المقررات المتزامنة		لا يوجد		الفصل الدراسي	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
أهداف المادة الدراسية		تهدف مادة حقوق الإنسان والديمقراطية إلى:			
		1. فهم المفاهيم الأساسية: تعريف الطالب بمفهوم حقوق الإنسان والديمقراطية، وأصولهما التاريخية ونشأتهما. 2. تحليل القوانين والمواثيق الدولية: التعرف على الإعلان العالمي لحقوق الإنسان، الاتفاقيات الدولية، والقوانين الوطنية المرتبطة بحقوق الإنسان. 3. تنمية الوعي الحقوقي والسياسي: تعزيز فهم الطالب للعلاقة بين الديمقراطية وحماية الحريات العامة، ووعي المسؤولية الفردية والاجتماعية. 4. تطوير المهارات التطبيقية: تمكين الطالب من تحليل الحالات العملية، كتابة تقارير، وحل مسائل تطبيقية تتعلق بحقوق الإنسان والديمقراطية. 5. تعزيز التفكير النقدي: قدرة الطالب على تقييم الانتهاكات الحقوقية، والممارسات الديمقراطية، ومناقشة التحديات المعاصرة في المجتمعات المختلفة.			
مخرجات التعلم للمادة الدراسية		بنهاية دراسة المادة، يُتوقع أن يكون الطالب قادرًا على:			
		1. تفسير المفاهيم الأساسية: تمييز مفاهيم حقوق الإنسان والديمقراطية وشرح خصائصها ومصادرها. 2. تتبع التطور التاريخي: تحليل تطور حقوق الإنسان عبر الحضارات (بلاد الرافدين، وادي النيل، الإغريق، الرومان، العصور الوسطى، والعصر الحديث). 3. فهم النظريات الحقوقية: تفسير نظريات حقوق الإنسان مثل القانون الطبيعي، والعقد الاجتماعي، والاقتصاد الحر. 4. تحليل النصوص القانونية: قراءة وتحليل الإعلان العالمي لحقوق الإنسان والاتفاقيات الدولية ذات الصلة. 5. تقييم الواقع الحقوقي: تشخيص واقع حقوق الإنسان في العراق وربطه بالمعايير الدولية. 6. تمييز أنواع الحقوق: تصنيف حقوق الإنسان إلى مدنية، سياسية، اقتصادية، اجتماعية، وثقافية، وفهم تكاملها. 7. تعزيز الثقافة الديمقراطية: الربط بين الديمقراطية واحترام حقوق الإنسان في بناء الدولة الحديثة. 8. استخدام التفكير النقدي: مناقشة القضايا الحقوقية بموضوعية واقتراح حلول واقعية. 9. فهم الآليات الوطنية: توضيح دور الدستور، القضاء، والفصل بين السلطات في حماية الحقوق. 10. تنمية مهارات التواصل: عرض وتحليل القضايا الحقوقية بأسلوب علمي واضح شفهيًا وكتابيًا.			
المحتويات الإرشادية		1. مدخل إلى حقوق الإنسان والديمقراطية: تعريف حقوق الإنسان وخصائصها، مفهوم الديمقراطية، العلاقة بينهما، وأهمية كل منهما في بناء المجتمع .			
		2. حقوق الإنسان عبر التاريخ: تطور حقوق الإنسان في الحضارات القديمة (بلاد الرافدين، وادي النيل، الإغريق، الرومان)، وواقعها في العصور الوسطى، ثم تطورها في العصر الحديث.			
		3. الأطر الفكرية والقانونية لحقوق الإنسان: تشمل حقوق الإنسان في الإسلام، والنظريات المفسرة لها، والإعلان العالمي لحقوق الإنسان من حيث نشأته وخصائصه وأنواع الحقوق التي تضمنها.			
		4. حماية حقوق الإنسان وآلياتها: تتضمن دراسة الحقوق الفئوية (المرأة، الطفل، ذوو الإعاقة، الأقليات)، والانتهاكات الجسيمة وخصائصها، وخطاب الكراهية وسبل معالجته، فضلاً عن الآليات الوطنية والمؤسسات الرقابية والتوعوية ودور الإعلام الحر والرأي العام في حماية الحقوق.			
		5. لتطبيقات المعاصرة لحقوق الإنسان: تشمل واقع حقوق الإنسان في العراق، والحقوق الرقمية، وآليات مكافحة التمييز، وحماية الأقليات، مع تحليل الحالات العملية وتعزيز دور المواطن في صون الحقوق والحريات.			

Refrigeration and Air Conditioning syllabus

استراتيجيات التعلم والتعليم

استراتيجيات	1. المحاضرات النظرية: تقديم المفاهيم الأساسية لحقوق الإنسان والديمقراطية، مدعومة بالمناقشات الصفية وتحليل الأمثلة الواقعية.
	2. المناقشات الصفية: تنفيذ تمارين تطبيقية، إعداد تقارير، تحليل وثائق وموثائق، والعمل ضمن مجموعات لمناقشة القضايا الحقوقية المعاصرة..
	3. التطبيق العملي والتمارين: حل مسائل تطبيقية، كتابة تقارير قصيرة، وممارسة تحليل الوثائق الدولية.
	4. التمارين والواجبات: إعداد تقارير عن موضوعات محددة، البحث في الموثائق الدولية، ومراجعة القوانين الوطنية المتعلقة بحقوق الإنسان.
	5. التعلم التعاوني: العمل ضمن مجموعات لمناقشة القضايا المعاصرة في الحقوق والديمقراطية، وتقديم حلول واقعية.
	6. العصف الذهني والتحليل النقدي: استخدام العصف الذهني لتحليل التحديات، مع اعتماد اختبارات قصيرة وعروض وتقارير لمتابعة تطور الطلبة.
	7. التقييم المستمر: اختبارات قصيرة، عروض تقديمية، تقارير عملية، لمتابعة تقدم الطلبة وفهمهم للمادة.

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

الحمل الدراسي المنتظم للطلاب خلال الفصل	33	الحمل الدراسي المنتظم للطلاب أسبوعيا	2
الحمل الدراسي غير المنتظم للطلاب خلال الفصل	17	الحمل الدراسي غير المنتظم للطلاب أسبوعيا	1
الحمل الدراسي الكلي للطلاب خلال الفصل	50		

المنهاج الاسبوعي النظري

الاسبوع	المحتوى الدراسي
الاسبوع 1	مدخل إلى حقوق الإنسان: التعريف، الأهداف، الخصائص.
الاسبوع 2	حقوق الإنسان في الحضارات القديمة (الرافدين، وادي النيل، الإغريق، الرومان).
الاسبوع 3	حقوق الإنسان في العصور الوسطى والعصر الحديث وتطورها.
الاسبوع 4	نظريات حقوق الإنسان (القانون الطبيعي، العقد الاجتماعي، الاقتصاد الحر)
الاسبوع 5	حقوق الإنسان في الإسلام ومبادئها الأساسية
الاسبوع 6	الاعلان العالمي لحقوق الإنسان :النشأة، الخصائص أنواع الحقوق ،
الاسبوع 7	الحقوق الفئوية: المرأة، الطفل، ذوو الإعاقة، الأقليات
الاسبوع 8	الانتهاكات الجسيمة لحقوق الإنسان وأنواعها
الاسبوع 9	خطاب الكراهية: المفهوم، الأسباب، وآليات المعالجة
الاسبوع 10	الآليات الوطنية لحماية حقوق الإنسان والمؤسسات الرقابية
الاسبوع 11	المؤسسات التوعوية، الإعلام الحر، والرأي العام
الاسبوع 12	حقوق الإنسان في العراق والحقوق الرقمية ومكافحة التمييز
الاسبوع 13	مدخل إلى الديمقراطية: المفهوم، النشأة، العلاقة بحقوق الإنسان
الاسبوع 14	التحديات المعاصرة للديمقراطية وحقوق الإنسان (خاصة في العالم العربي)
الاسبوع 15	مراجعة عامة / الامتحان النهائي

مصادر التعلم والتدريس

متوفر في المكتبة ؟	المراجع	الكتب المطلوبة
نعم	حقوق الانسان والديمقراطية - المفاهيم والمرتكزات للدكتور سماح مهدي العليوي والدكتور سلمان كاظم البهادلي	الكتب المقررة / الكتب الموصى بها
لا	الديمقراطية وحقوق الانسان في الاسلام للدكتور راشد الغنوشي	الكتب المقررة / الكتب الموصى بها
https://www.kutubypdf.com/book50469/ https://www.kutubypdf.com/book52099/		Websites

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Module Information				
معلومات المادة الدراسية				
Module Title	English Language		Module Delivery	
Module Type	Support		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	NTU101			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	1	Semester of Delivery		
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	MASTER
Module Tutor			e-mail	
Peer Reviewer Name	Dr. Ammar Hassan		e-mail	ammarsuhail@ntu.edu.iq
Scientific Committee Approval Date	01/06/2025		Version Number	3.0
Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	None			Semester
Co-requisites module	None			Semester
Module Aims, Learning Outcomes and Indicative Contents				
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				
Module Objectives أهداف المادة الدراسية	The module objectives of learning English are the goals or outcomes that a course/module wants students to achieve. These objectives usually focus on improving the main language skills and overall communication ability. Here are the most common objectives: 1. Improve Communication Skills • Help students speak clearly and confidently in English • Understand conversations in real-life situations (school, work, travel) 2. Develop the Four Main Skills • Listening: Understand spoken English (lectures, conversations, media) • Speaking: Express ideas, opinions, and feelings correctly • Reading: Understand texts like stories, articles, and instructions • Writing: Write sentences, paragraphs, and essays with correct structure 3. Build Vocabulary and Grammar • Learn new words and phrases • Use correct grammar in speaking and writing 4. Enhance Pronunciation • Improve how words are pronounced • Speak in a way that others can easily understand 5. Encourage Critical Thinking • Understand and analyze texts • Express opinions and support them with reasons 6. Use English in Real-Life Contexts • Practice English in daily situations (shopping, emails, presentations) • Prepare for academic or professional environments 7. Increase Confidence • Reduce fear of making mistakes			

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Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module, students will be able to: 1. Identify main ideas in short reading passages 2. Use basic grammar correctly in sentences 3. Communicate simple ideas in spoken English 4. Write a short paragraph with correct structure 5. Understand everyday conversations.		
Indicative Contents المحتويات الإرشادية	The module will cover the following topics: • Basic grammar (tenses, sentence structure) • Vocabulary development (common words and expressions) • Reading comprehension (short texts and passages) • Writing skills (sentences and paragraphs) • Listening practice (conversations and audio materials) • Speaking practice (dialogues, discussions, pronunciation)		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
Strategies	The module adopts a communicative and student-centered approach, emphasizing active participation in real-life language use. Interactive seminars and pair/group activities are used to develop speaking, listening, reading, and writing skills in an integrated manner. Role-plays, discussions, and listening exercises simulate authentic contexts such as travel, work, and daily conversations. Formative assessments (quizzes, assignments, and a seminar presentation) provide regular feedback to reinforce grammar, vocabulary, and pronunciation. The strategy encourages students to practice English confidently inside and outside the classroom, fostering continuous improvement.		
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
	Material Covered		
Week 1	Unit 2: Grammar: Present, past, present perfect • Topic: Different lifestyles and cultures • Skills: Reading about families, speaking comparisons		
Week 2	Unit 2: Relationships • Grammar: Present perfect vs past simple • Vocabulary: Family and relationships • Skills: Listening and discussing personal experiences		
Week 3	Unit 3: Work and Jobs • Grammar: Present tenses and questions • Vocabulary: Jobs and workplaces • Skills: Talking about work and daily routines		
Week 4	Unit 4: Time and Money • Grammar: Countable/uncountable nouns, quantities • Vocabulary: Money and shopping • Skills: Real-life conversations		
Week 5	Unit 5: Travel and Adventure • Grammar: Past simple and continuous • Vocabulary: Travel and holidays • Skills: Reading travel stories, speaking		
Week 6	Unit 6: Education and Learning • Grammar: Modal verbs (can, must, should)		

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	Skills: Talking about school and learning	
Week 7	Unit 7: Technology and Communication - Grammar: Future forms (will, going to) - Vocabulary: Technology - Skills: Discussions and listening	
Week 8	Unit 8: (More Units) - Topics like: - Culture - Health - Environment - Society	
Week 9	Unit 9: Culture and Media - Grammar: Passive voice - Vocabulary: TV, films, media - Skills: Expressing opinions, discussions	
Week 10	Unit 10: Society and Environment - Grammar: Conditionals (if clauses) - Vocabulary: Environment, social issues - Skills: Problem-solving discussions	
Week 11	Unit 11: Experiences - Grammar: Past perfect - Vocabulary: Life experiences - Skills: Storytelling, speaking	
Week 12	Unit 12: Student-Centered Learning - The syllabus focuses on student participation - Encourages learners to speak, interact, and practice actively	
Week 13	Unit 13: Communicative Approach - Emphasis on using English in real communication - Not only learning rules, but using language in real situations	
Week 14	Unit 14: Integration of Skills - Listening, speaking, reading, and writing are taught together, not separately - Activities combine more than one skill	
Week 15	Unit 15: Review & Consolidation - Revision of all grammar and vocabulary - Integrated skills practice - Final assessment	
Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Head way students’ books	No
Recommended Texts		No
Websites		

Refrigeration and Air Conditioning syllabus

Module Information				
معلومات المادة الدراسية				
Module Title	Thermodynamics principle		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 Deliver	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. Professor	Module Leader's Qualification	master
Module Tutor	Mothana M. Mohamed Salih		e-mail	muthanam.m1981@ntu.edu.iq
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq
Scientific Committee Approval Date		01/6/2025	Version Number	3.0
Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	None			Semester
Co-requisites module	None			Semester
Module Aims, Learning Outcomes and Indicative Contents				
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				
Module Objectives أهداف المادة الدراسية	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 مخرجات التعلم للمادة الدراسية	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.			

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	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.		
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A</u> ● Introduction - Textbooks - Units. Important definitions - force - pressure - system. Pressure and its types [15 hrs] ● Vapor - Forms of matter when changing its phase - Drawing the phase change of matter on the pressure-volume chart. [15 hrs] ● Specific heat at constant pressure - specific heat at constant volume. Closed system procedures - constant volume - constant pressure. [10 hrs] ● Energy Equation for Systems: Open and Closed - Applications [15 hrs] ● Revision problem classes [6 hrs] <u>Part B</u> ● Fundamentals ● Temperature: Units - Conversions - Measuring Methods - Zero Law. Definition of energy - forms of energy: potential, kinetic, thermal - work - capacity - flow work - pressure diagram. internal energy - enthalpy [15 hrs] ● Steam procedures and their projection on the pressure-volume chart [7 hrs] ● Identify the types of pressure gauges used in refrigeration - types of air velocity gauges and their uses. [15 hrs]		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
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) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	107	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
	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		

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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.
Week 7	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

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Identify the types of pressure gauges used in refrigeration and their uses.
Week 2	Lab 2: Identify the types of air velocity gauges and their uses.
Week 3	Lab 3: Identify the types of temperature measurements used in refrigeration and their uses.
Week 4	Lab 4: Types of heat pumps with a study of the efficiency of the heat pump.
Week 5	Lab 5: compression cycle performance
Week 6	Lab 6: The real refrigeration cycle
Week 7	Lab 7: Filters

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thermal engineering (eighth edition) R. K. RAJPUT	No
Recommended Texts	Fundamentals of heat and mass transfer (M. Thirumaleshwar)	No
Recommended Texts	Heat and mass transfer (SI UNITS) (Er. R. K. RAJPUT) (S. CHAND)	No
Websites		

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Module Information معلومات المادة الدراسية				
Module Title	Computer		Module Delivery	
Module Type	Support		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	NTU 102			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	1	Semester of Deliver		
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	Dr. Ammar Hassan		e-mail	ammarsuhail@ntu.edu.iq
Scientific Committee Approval Date	01/6/2025		Version Number	1.0
Relation with other Modules العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	None			Semester
Co-requisites module	None			Semester
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				
Module Objectives أهداف المادة الدراسية	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 مخرجات التعلم للمادة الدراسية	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			
Indicative Contents المحتويات الإرشادية	After studying this chapter, the student is expected to master the following knowledge and skills: 1. To know what is the computer, distinguish different computer properties, list the computers features and capabilities, compare between the different types of computers [11 hrs] 2. Classifies the computer's hardware components to internal and external [11 hrs]			

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	- To know the CPU, types of memory modules, learn about input and output units, Learn about storage media, learn the components of the motherboard [11 hrs] - Distinguish between different types of software, differentiate between types of system software, distinguish between types of operating systems, count the basic functions of the operating system. [12 hrs] - Learn about different types of utility software, learn about the most important utility software and its functions, distinguish between different types of programming languages, differentiate between the types of different programming languages Compilers, classifies different programming languages, classifies application software, learn about the most important application software [12 hrs] - Learn to use the Microsoft office 2020 [15hrs] - Word [5 hrs] - Excel [5 hrs] - Powerpoint [5 hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Introduction to Computer: Concepts of Hardware and Software with their components; Concept of Computing, Data and Information; Applications of Information Electronics and Communication Technology (IECT); Connecting input/output devices, and peripherals to CPU
Week 2	Computer Components: Computer Portions, Hardware Parts, I/O Units, Memory Types, Basic CPU Components, Computer Ports, Personal Computer, Personal Computer (Features and Types)
Week 3 & 4	Operating System and Graphical User Interface GUI: Operating System; Basics of Common Operating Systems; The User Interface, Using Mouse Techniques; Use of Common Icons, Status Bar, Using Menu and Menu-selection, Concept of Folders and Directories, Opening and closing of different Windows: Creating Short cuts
Week 5&6	Word Processing: Word Processing Basics: Opening and Closing of documents, Text creation and Manipulation; Formatting of text; Table handling: Spell check, language setting and thesaurus; Printing of word document.
Week 7& 8& 9	Spread Sheet: Basics of Spreadsheet, Manipulation of cells; Formulas and Functions, Editing of Spread, printing of spread sheet.
Week 10&11	Presentation Software: Basics of presentation software; Creating Presentation; Preparation and Presentation of Slides; Slide Show; Taking printouts of presentation / handouts
Week 12	Introduction to Internet and Web Browsers:

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	Computer networks Basic; LAN, WAN; Concept of Internet and its Applications; connecting to internet; World Wide Web; Web Browsing software's, Search Engines: Understanding URL: Domain name; IP Address	
Week 13	Communications and Emails: Basics of electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration	
Week 14	Computer Troubleshooting: Identifying and solving common hardware and software problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues.	
Week 15	Preparatory week before the final Exam	
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر		
	Material Covered	
Week 5&6	Able to use Microsoft word 2020	
Week 7& 8& 9	Able to use Microsoft excel 2020	
Week 10&11	Able to use Microsoft powerpoint 2020	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Introduction to Computer Skills For first year students, Bisha University Computer Science Principles: The Foundational Concepts of Computer Science - For AP® Computer Science Principles 2020th Edition , <u>Mr. Kevin P Hare</u> (Author), <u>Pindar Van Arman</u> (Foreword) 1. Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition	Yes
Recommended Texts	<u>MICROSOFT ACCESS, EXCEL & POWER BI FOR BEGINNERS & POWER USERS, Tech Demystified</u>	No
Websites	https://www.just.edu.jo/~mqais/CIS99/PDF/Ch.01_Introduction_%20to_computers.pdf	

Refrigeration and Air Conditioning syllabus

معلومات المادة الدراسية					
عنوان المقرر		اللغة العربية		طريقة تقديم المقرر	
نوع المقرر		مادة مساعدة Support or related learning activity		☒ نظري ☒ محاضرة ☐ مختبر ☒ تمارين ☐ عملي ☒ حلقة دراسية	
رمز المقرر		NTU 103			
عدد الساعات المعتمدة ECTS بنظام		2			
SWL (hr/sem)		50			
مستوى المقرر		1		فصل تقديم المقرر	2
القسم الإداري المسؤول		PM		الكلية	TEMO
مسؤول المقرر		أ.م. د. محمد عبد الموجود حسن		إيميل	dr.mohammed67@ntu.edu.iq
اللقب الأكاديمي لمسؤول المقرر		أستاذ مساعد		الشهادات العلمية لمسؤول المقرر	دكتوراه
مدرس المقرر		أ.م. د. محمد عبد الموجود حسن		إيميل	dr.mohammed67@ntu.edu.iq
اسم المراجع النظير		د. عمار حسن سهيل		إيميل	ammarsuhail@ntu.edu.iq
تاريخ اعتماد اللجنة العلمية		2025/06/01		رقم الاصدار	3.0
العلاقة مع المواد الدراسية الأخرى					
المقرر السابق المطلوب		لا يوجد		الفصل الدراسي	
المقررات المترتبة		لا يوجد		الفصل الدراسي	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
أهداف المادة الدراسية		تهدف المادة إلى: - تمكين الطلبة من الكتابة الصحيحة الخالية من الأخطاء الإملائية والنحوية - تعريف الطلبة بالقواعد الأساسية في اللغة العربية - تنمية القدرة على التمييز بين التراكيب اللغوية المختلفة - معالجة الأخطاء اللغوية الشائعة في الاستعمال اليومي - تطوير مهارات الكتابة الرسمية والإدارية.			
مخرجات التعلم للمادة الدراسية		بنهاية المادة يكون الطالب قادراً على: - كتابة نصوص سليمة لغوياً - تطبيق قواعد الإملاء والنحو الأساسية - تصحيح الأخطاء اللغوية - استخدام اللغة العربية في الكتابات الرسمية والإدارية - التعبير عن الأفكار بشكل واضح ومنظم			
المحتويات الإرشادية		- تتناول المادة أساسيات اللغة العربية من حيث قواعد الإملاء الصحيحة، ومعالجة الأخطاء اللغوية الشائعة، بما يسهم في تحسين سلامة الكتابة لدى الطلبة. - كما تشمل دراسة مبادئ النحو الأساسية مثل أقسام الكلام وبعض التراكيب اللغوية، إلى جانب استعمال علامات الترقيم ودلالات العدد وحروف الجر في السياق اللغوي. - وتركز المادة على التطبيقات العملية من خلال تحليل النصوص وتصحيح الأخطاء، بما يعزز مهارات الفهم والاستخدام الصحيح للغة. - وتتضمن كذلك التعريف بأسس الكتابة الوظيفية والخطاب الإداري، من حيث الشكل والمضمون، وصولاً إلى تمكين الطلبة من كتابة نصوص رسمية سليمة.			
استراتيجيات التعلم والتعليم					
استراتيجيات		1. المحاضرات النظرية: تقديم المفاهيم والقواعد الأساسية للغة العربية مع أمثلة تطبيقية 2. المناقشات الصفية: تشجيع الطلاب على المشاركة وتحليل النصوص اللغوية ومناقشة الأخطاء الشائعة. 3. التطبيق العملي: تدريبات كتابة وتحرير نصوص، وتصحيح الأخطاء اللغوية والنحوية. 4. التمارين والواجبات: حل تدريبات على الإملاء، علامات الترقيم، المفاعيل، والكتابة الرسمية. 5. التعلم التعاوني: العمل ضمن مجموعات لمراجعة النصوص وتحليلها وتقديم حلول تصحيحية. 6. العصف الذهني: مناقشة الأساليب الصحيحة في الخطاب الإداري وتحليل نماذج كتابية. 7. التقييم المستمر: اختبارات قصيرة، تقارير، وعروض تطبيقية لمتابعة تقدم الطلاب.			

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الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
2	الحمل الدراسي المنتظم للطلاب أسبوعيا	33	الحمل الدراسي المنتظم للطلاب خلال الفصل
1	الحمل الدراسي غير المنتظم للطلاب أسبوعيا	17	الحمل الدراسي غير المنتظم للطلاب خلال الفصل
50		الحمل الدراسي الكلي للطلاب خلال الفصل	
المنهاج الاسبوعي النظري			
الاسبوع	المحتوى الدراسي		
الأسبوع 1	القرآن الكريم: من سورة الحج (1-5) + الحديث الشريف وشرحه		
الأسبوع 2	الأدب: بائية ابن الرومي (شرح الأبيات وتحليلها)		
الأسبوع 3	الأدب: القيم الإنسانية في الشعر الجاهلي + الإسلام والشعر		
الأسبوع 4	النحو: أقسام الكلام وعلامات الإعراب		
الأسبوع 5	النحو: المعرب والمبني + المعرفة والنكرة		
الأسبوع 6	النحو: المبتدأ والخبر		
الأسبوع 7	النحو: النواسخ		
الأسبوع 8	النحو: الفاعل ونائب الفاعل		
الأسبوع 9	البلاغة: مقدمة عامة + تعريف البلاغة وعلومها		
الأسبوع 10	البلاغة: علم البيان + التشبيه		
الأسبوع 11	البلاغة: الحقيقة والمجاز + المجاز اللغوي		
الأسبوع 12	البلاغة: الاستعارة + المجاز العقلي + الكناية		
الأسبوع 13	المعاجم: المدارس المعجمية + مفردات القرآن + منهج (العين والأساس)		
الأسبوع 14	مراجعة عامة + الأخطاء اللغوية الشائعة + التهيئة للامتحان		
الأسبوع 15	الامتحان النهائي		
مصادر التعلم والتدريس			
الكتب المطلوبة	المراجع		متوفر في المكتبة ؟
الكتب المقررة / الكتب الموصى بها	قواعد اللغة العربية للعلامة حفني ناصف وآخرون		نعم
Websites	قواعد النحو وتعلم العربية (أ.د. محمد حماسة عبد اللطيف - رحمه الله)		لا
المكتبة الشاملة https://shamela.ws/			

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	Engineering Mechanics/ Dynamics		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar		
Module Code	PM 105				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level		1	Semester of Delivery		2
Administering Department		PM	College	TEMO	
Module Leader	Mohammed Taha Mohammed		e-mail	mohammed.taha@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	Module Leader's Qualification		MASTER
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number		3.0
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives	Module Objectives for Engineering Mechanics/Dynamics:				
	أهداف المادة الدراسية 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. 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. 10. Develop critical thinking and problem-solving skills in the context of engineering dynamics. 11. Communicate effectively, both orally and in writing, to present and explain the analysis, results, and solutions of dynamic problems. By achieving these module objectives, students will gain a comprehensive understanding of the principles and applications of engineering dynamics. They will be able to analyze and solve problems related to motion, forces, and vibrations in mechanical systems, and apply their knowledge to real-world engineering scenarios. They will also develop skills in critical thinking, problem-solving, and effective communication, which are valuable in the field of engineering.				

Refrigeration and Air Conditioning syllabus

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	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. 7. Understand the principles of vibrations and oscillations in mechanical systems, and analyze their behavior, natural frequencies, and damping effects. 8. Analyze three-dimensional motion of rigid bodies, applying Euler's equations of motion to determine their rotational and translational behavior. 9. Understand gyroscopic motion and its applications in stability and control systems, including precession and gyroscope stabilization. 10. Apply the principles of balancing rotating masses to minimize vibrations and ensure smooth operation of rotating machinery. 11. Analyze multi-degree of freedom systems, determine their natural frequencies and mode shapes, and understand their response to dynamic loading. 12. Apply the principles and techniques learned in dynamics to solve real-world engineering problems, such as analyzing the motion and forces in mechanical systems. 13. Demonstrate critical thinking and problem-solving skills by effectively applying dynamic principles to analyze and solve complex engineering problems. 14. Communicate effectively, both orally and in writing, to present and explain the analysis, results, and solutions of dynamics problems. By achieving these module learning outcomes, students will have a solid foundation in engineering dynamics, enabling them to analyze and solve problems related to motion, forces, vibrations, and stability in mechanical systems. They will develop critical thinking skills, problem-solving abilities, and effective communication skills, which are essential for success in the field of engineering dynamics.
Indicative Contents المحتويات الإرشادية	Indicative Contents for Engineering Mechanics/Dynamics: 1. Kinematics of Particles • Position, velocity, and acceleration • Rectilinear and curvilinear motion • Projectile motion • Tangential and normal components of acceleration 2. Kinetics of Particles • Newton's laws of motion • Force, mass, and acceleration • Application of Newton's laws to particles • Frictional forces • Applications of particle kinetics 3. Kinematics of Rigid Bodies • Rotation and angular displacement • Angular velocity and acceleration • Fixed axis rotation • General plane motion 4. Kinetics of Rigid Bodies • Moment of inertia • Parallel-axis theorem • Angular momentum and torque • Equations of motion for rigid bodies • Applications of rigid body kinetics 5. Work and Energy • Work done by a force

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	• Kinetic energy and potential energy • Principle of work and energy • Power and efficiency • Conservative and non-conservative forces 6. Impulse and Momentum • Linear momentum and impulse • Conservation of linear momentum • Impulse-momentum principle • Impact and collision • Applications of momentum 7. Vibrations and Oscillations • Free and forced vibrations • Single degree of freedom systems • Damping and damping ratios • Natural frequency and resonance • Vibration isolation and control		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
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) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	122	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	8
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	200		
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
	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		
Week 7	• 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		

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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

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Engineering Mechanics: Dynamics, By R. C. Hibbeler 14th edition.	No
Recommended Texts	• Engineering Mechanics: Dynamics, by J. L. Meriam and L. D. Kraige 9th edition • Theory and Problems of Engineering Mechanics: Statics and Dynamics, Fifth Edition, Shaum's Outline Series. • Engineering Mechanics: Dynamics, by Andrew Pytel and Jaan Kiusalaas, 3rd edition.	No
Websites		

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	Engineering drawing		Module Delivery		
Module Type	Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	PM 106				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		1	Semester of Deliver		2
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	Name (if available)		e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		01/6/2025	Version Number		3.0
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives أهداف المادة الدراسية	1. Introduction students to the Autocad software.				
	2. Introduction to the students of engineering drawings.				
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	3. Teaching students to draw geometrically according to accurate measurements.				
	4. To understand the basic principle for descriptive geometry.				
Module Indicative Contents المحتويات الإرشادية	5. to train students: to read the engineering drawings through the application of computers and techniques.				
	6. To understand standard specifications, draw simple and complex assembly drawings.				
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enables the students to use AutoCAD for 2-D representations.				
	2. Enables the students to Introduce the students to engineering drawings.				
Module Indicative Contents المحتويات الإرشادية	3. Enables the students to learn the techniques and standard practices of technical graphics.				
	4. To develop the student's abilities of engineering imagination.				
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	5. To develop the student's engineering sense by dealing with dimensions and measurements.				
	6. To teach the student to identify the characteristics of geometric shapes and the various ways to draw them.				
Module Indicative Contents المحتويات الإرشادية	7. To teach the student diversity in the way of thinking and finding solutions for drawing each form.				
	Indicative content includes the following.				
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Part A -				
	Introduction to (CAD), components of computer aided drawing (CAD), Exercises. [8 hrs.]				

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	Introducing the most important geometric shapes and their components, and how to draw each shape using the program [4hrs.] Introducing the most important commands that contribute to making modifications to the geometric shapes drawn using the program [8 hrs.] Demonstrate the method of drawing advanced geometric shapes using the program. [4 hrs.] Training students to draw advanced geometric shapes using the program [8 hrs.] Revision and quiz [8hrs] <u>Part B -</u> Training students at this stage to draw triangular projections of geometric shapes for any geometric shape in general. [8 hrs.] Complex geometrical shape. [12 hrs.] Training the students at this stage to draw the triangular projections of the geometric shapes of the mechanical engineering shapes in particular. [15 hrs.] Training the students at this stage to draw the Perspective. [15 hrs.] Revision and quiz [8hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	112	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	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&3	Correctly draw menu (line, poly line, polygon, rectangle, arc, circle, point, text).
Week 4&5	Correctly modify menu (erase, copy, mirror, offset, move, rotate, trim, extend, explode).
Week 6&7&8	Complex geometrical shape.
Week 9	Mid Semester exam
Week 10&11&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 Demonstrates knowledge and implementation about drawing the three projections with the first and third angle projection method

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Week 15	Semester exam	
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر		
	Material Covered	
Week 1	No	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Fundamentals and principles of engineering drawing Fundamentals of AutoCAD 2010	Yes
Recommended Texts	Fundamentals of AutoCAD2020	Yes
Websites	https://tr.pinterest.com/pin/343540277818420973/	

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Module Information					
Module Title	Occupational Safety			Module Delivery	
Module Type	Support			☒ Theory ☒ Lecture ☐ Laboratory ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM 107				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	Semester of Deliver		2
Administering Department		PM and AM	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		Msc
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number		3.0
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.				
1. Indicative Contents	Indicative content includes the following. Introduction to Occupational Safety, Identifying and Assessing Risks, Engineering Controls and Safety Systems, Personal Protective Equipment and Safety, Equipment Occupational Health and Industrial Health [10 hrs]				

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	Fire Safety and Emergency Preparedness, Electrical Safety in Engineering Machine and Equipment, Safety Construction, Safety in Engineering Projects, Hazardous Materials Management [10 hrs] Revision classes [2 hrs] Incident Investigation and Reporting in Engineering Safety Management Systems in Engineering Application in Occupational Safety 1 Application in Occupational Safety 2. [10 hrs]
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2. Learning and Teaching Strategies

3. 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.
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Student Workload (SWL)

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Introduction to Occupational Safety
Week 2	Hazard Identification and Risk Assessment
Week 3	Engineering Controls and Safety Systems
Week 4	Personal Protective Equipment (PPE) and Safety Equipment
Week 5	Occupational Health and Industrial Hygiene
Week 6	Fire Safety and Emergency Preparedness
Week 7	Electrical Safety in Engineering
Week 8	Machine and Equipment Safety
Week 9	Construction Safety in Engineering Projects
Week 10	Hazardous Materials Management
Week 11	Training and Communication in Engineering Safety
Week 12	Accident Investigation and Reporting in Engineering
Week 13	Safety Management Systems in Engineering
Week 14	Application in Occupational Safety 1
Week 15	Application in Occupational Safety 2
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1. "السلامة والصحة المهنية" بواسطة علي عبد العزيز المرزوقي.	Yes
Recommended Texts		
Websites	<i>"Machine Safety"</i> . NIOSH Workplace Safety and Health Topics. National Institute of Occupational Safety and Health.	

Refrigeration and Air Conditioning syllabus

Module Information					
Module Title	Refrigeration & Air Conditioning Principles		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☒ Laboratory ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	PM 200				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level		2	Semester of Deliver		3
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		Msc
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025			3.0
Relation with other Modules					
Prerequisite module	None			Semester	
Co-requisites module	None			Semester	
Module Aims, Learning Outcomes and Indicative Contents					
Module Objectives	The main objective of studying Refrigeration and Air Conditioning principles is to understand the fundamental concepts and working mechanisms used to control temperature, humidity, and air quality in different environments. This field teaches students how heat is transferred and how refrigeration cycles operate in systems such as air conditioners, refrigerators, and industrial cooling units. It also aims to develop the ability to analyze, design, operate, and maintain refrigeration and air-conditioning systems efficiently. By studying these principles, students gain the knowledge needed to improve energy efficiency, ensure thermal comfort in buildings, and support various applications in homes, hospitals, industries, and transportation systems				
Module Learning Outcomes	4. Understand the basic principles of refrigeration and air-conditioning systems. 5. Identify and explain the main components of refrigeration systems such as compressors, condensers, evaporators, and expansion devices. 6. Analyze refrigeration cycles and thermodynamic processes used in cooling systems. 7. Calculate cooling load requirements for buildings and different applications. 8. Evaluate the performance and efficiency of refrigeration and air-conditioning systems. 9. Apply engineering knowledge to design simple refrigeration and HVAC systems.				

Refrigeration and Air Conditioning syllabus

	10. Diagnose common operational problems and maintenance issues in cooling systems. 11. Understand the environmental and energy impacts of refrigeration and air-conditioning technologies. 12. Develop practical skills for installation, operation, and maintenance of refrigeration equipment.		
4. Indicative Contents	Introduction to refrigeration and air-conditioning systems Properties of refrigerants and their environmental impact The vapor compression refrigeration cycle and its components Types and working principles of compressors, condensers, evaporators, and expansion devices Performance analysis of refrigeration systems and coefficient of performance (COP) Psychrometric properties of air and air-conditioning processes Cooling load estimation for buildings and indoor spaces Types of air-conditioning systems used in residential and commercial buildings Energy efficiency and methods for improving system performance Basic installation, operation, and maintenance of refrigeration and air-conditioning equipment Safety considerations and environmental regulations in refrigeration systems		
5. Learning and Teaching Strategies			
6. Strategies	4. Lectures: Presenting theoretical concepts and fundamental principles of refrigeration and air-conditioning systems. 5. Class Discussions: Encouraging students to discuss concepts, ask questions, and analyze practical problems. 6. Problem-Solving Sessions: Solving numerical and engineering problems related to refrigeration cycles and system performance. 7. Laboratory Experiments: Conducting practical experiments to understand the operation of refrigeration and air-conditioning equipment. 8. Case Studies: Studying real-life applications of HVAC systems in buildings and industry. 9. Group Work: Assigning collaborative tasks to improve teamwork and technical understanding. 10. Practical Demonstrations: Demonstrating the working principles of system components such as compressors, condensers, and evaporators. 11. Assignments and Projects: Giving students tasks to apply theoretical knowledge to practical design or analysis problems. 12. Use of Multimedia and Simulation Tools: Using software, videos, and visual aids to illustrate system operation and performance.		
Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
Material Covered			

Refrigeration and Air Conditioning syllabus

Week 1	introduction
Week 2	SI Units
Week 3	Fundamental properties of air and water vapour mixture
Week 4	Psychrometric Chart
Week 5	The Psychrometry of Air and Conditioning Process
Week 6	Winter Cycle)
Week 7	Summer Cycle
Week 8	REFRIGERATION
Week 9	Refrigerators And Heat Pumps
Week 10	Reversed Carnot Cycle
Week 11	VAPOUR COMPRESSION CYCLE
Week 12	Multipressure systems Performance of the standard vapour compression cycle
Week 13	Multipressure systems Performance of the standard vapour compression cycle
Week 14	Multipressure systems Performance of the standard vapour compression cycle
Week 15	Refrigerants
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	2. Refrigeration & Air Conditioning Technology 3. Introduction to Refrigeration and Air Conditioning Systems	No
Recommended Texts	Introduction to Refrigeration and Air Conditioning Systems (2023).	
Websites		

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	Mathematics			Module Delivery	
Module Type	Basic			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM 200				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		2	Semester of Deliver		3
Administering Department		PM	College	TEMO	
Module Leader	Ahmed Mustaffa Saleem		e-mail	ahmedmustafa@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Professor	Module Leader's Qualification		M.Sc.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number	3.0	
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module	None			Semester	
Co-requisites module	None			Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives	أهداف المادة الدراسية				
	1.To enable the student to solve the mathematical problems. 2. To provide a suitable type of discipline in the mind of the learners. 3. To prepare the student for various technical profession. 4. To prepare the student for economic purposeful, productive, creative, and constructive living. 5. To prepare the student for undergraduate as well as postgraduate education. 6. To develop in the power of thinking and reasoning. 7. To develop in the student the habit of concentration, self-reliance and discovery.				
Module Learning Outcomes	مخرجات التعلم للمادة الدراسية				
	1. Solve problems at various levels and in various contexts. 2. Learn how to read, understand, and formulate the definitions of mathematical concepts. 3. Cultivate how to read and analyze mathematical statements. 4. Apply logical deduction and acquire mathematical reasoning through writing formal mathematical proofs. 5. Work with ideas and approaches representing the breadth of mathematical sciences, ranging from continuous to discrete and theoretical to applied.				
Indicative Contents	المحتويات الإرشادية				
	1. Evidence an understanding of general fundamental mathematical topics. 2. Evidence an understanding of mathematics topics related to engineering and technology. 3. Demonstrate ability to analyses and present information and data through the use of graphs and tables, or other similar data presentation methods.				

Refrigeration and Air Conditioning syllabus

Learning and Teaching Strategies			
استراتيجيات التعلم والتعليم			
Strategies	Effective mathematics instruction involves a combination of pedagogical strategies that address conceptual understanding, procedural fluency, and problem-solving abilities. Key strategies include explicit instruction, cooperative learning, hands-on activities, visual aids, and strategic questioning. These strategies can be integrated to create engaging and effective math lessons, ultimately leading to a deeper understanding of mathematical concepts.		
Student Workload (SWL)			
الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		
Delivery Plan (Weekly Syllabus)			
المنهاج الاسبوعي النظري والعملي			
	Material Covered		
Week 1	Introduction of Derivatives and Integration		
Week 2	Vector, vector components, vector in space		
Week 3	Complex number, Argand diagram, De Moivre's Theorem		
Week 4	Partial derivatives, Chain rule, gradient derivatives, directional derivatives		
Week 5	Double integral, volume by double integral		
Week 6	physical application of double integral		
Week 7	Triple integral		
Week 8	Polar coordinates		
Week 9	Matrices, matrix by matrix product		
Week 10	Solve equation by inverse matrix method		
Week 11	Green’s theorem		
Week 12	Line integration		
Week 13	MacLaurin series		
Week 14	Taylor series		
Week 15	Solution of differential equations		
Week 16	Preparatory week before the final Exam		
Learning and Teaching Resources			
مصادر التعلم والتدريس			
	Text	Available in the Library?	
Required Texts	George B. Thomas, Jr et al., 2014. Thomas Calculus. Thirteen Edition	Yes	
Recommended Texts	H.S. Gangwar and Prabhakar Gupta, 2009. A Textbook of Engineering Mathematics. Second Edition	Yes	
Websites	https://rodrigopacios.github.io/mrpacios/download/Thomas_Calculus.pdf		

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
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 Deliver		3
Administering Department		PM	College	TEMO	
Module Leader	Firas Aziz Ali		e-mail	firasaziz@ntu.edu.iq	
Module Leader's Acad. Title		Assist prof.	Module Leader's Qualification		M.Sc.
Module Tutor	Firas Aziz Ali		e-mail	firasaziz@ntu.edu.iq	
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number	3.0	
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
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.			
Indicative Contents		Indicative content includes the following. Part A- Introduction: Basic concepts of fluid mechanics. Fundamental terms. Physical values. Fluids and their properties. Forces inside fluid. Measurement of pressure. Relative statistics of fluid – constant acceleration, rotation. Forces of hydrostatic			
المحتويات الإرشادية					

Refrigeration and Air Conditioning syllabus

	pressure. Buoyancy. Streamlines. Stream surface. Stream tube. Mass/volume flow. Control volume. Fluid Dynamics: Continuity equation. Basic laws of fluid dynamics – conservation of mass, conservation of linear momentum, conservation of energy. Ideal fluid flow. Application of Bernoulli's equation. Real fluid flow. Viscosity. Determination of losses. Reynolds experiment. Laminar and turbulent flow. Boundary layer. Velocity profile. Losses in pipes. Frictional losses. Moody's diagram. Local losses. Pumps, types. Turbines and the working principle of the turbine. Part B- Analyze characteristics of a particular flow. Formulate the governing equations and boundary conditions. Solve these equations analytically in simple cases. Revision problem classes and quiz [6 hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	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.
Week 7	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

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Density and Specific Gravity.
Week 2	Lab 2: DETERMINATION OF LIQUID VISCOSITY USING STOCK'S METHOD.
Week 3	Lab 3: Determination of Centre of Pressure and Hydro-static Force on Plane surface (Part One).

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Week 4	Lab 4: Determination of Centre of Pressure and Hydro-static Force on Plane surface (Part Two).
Week 5	Lab 5: Reynolds Number Investigation.
Week 6	Lab 6: Estimation of the Volume Flow Rate Using Orifice Meter Apparatus.
Week 7	Lab 7: IMPACT OF WATER JET ON VANES.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	FLUID MECHANICS	Yes
Recommended Texts	1- A TEXTBOOK OF FLUID MECHANICS AND HYDRAULIC MACHINES BY RAJPUT. 2- Fluid Mechanics by Yunus A. Cengel, John M. Cimbala. 3- fluid_mechanics_frank_m._white_4th_ed.	No
Websites		

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	Mechanical Drawing			Module Delivery	
Module Type	Core			☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM202				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	2	Semester of Delivery			
Administering Department		PM	College	TEMO	
Module Leader	Wijdan Ahmed Jalal		e-mail	Mti.lec227.wajdan@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification		M.Sc
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number	3.0	
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives		1. Understand the fundamental principles of technical drawing. 2. Interpret and create 2D mechanical drawings using standard projection methods (e.g., orthographic and isometric projections). 3. Apply proper dimensioning, tolerancing, and annotation techniques in mechanical drawings. 4. Identify and use common drawing symbols, conventions, and standards (e.g., ISO, ANSI). 5. Develop basic skills in using Computer-Aided Design (CAD) software for mechanical drafting. 6. Analyze and visualize mechanical components and assemblies through detailed technical drawings.			
Module Learning Outcomes		Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize the fundamentals and principles of mechanical engineering drawing. 2. List the technical terms associated with mechanical drawing. 3. Summarize different projection methods such as orthographic and isometric projections. 4. Discuss the importance and role of dimensions and tolerances in mechanical drawings. 5. Describe the use of symbols and standard conventions in technical drawing. 6. Define accurate measurement and annotation techniques in drawings.			

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	7. Discuss the basic operations of using Computer-Aided Design (CAD) software. 8. Analyze and assemble detailed drawings of mechanical components. 9. Explain how to read and interpret complex engineering drawings. 10. Recognize the applications of mechanical drawing in various engineering industries.		
Indicative Contents المحتويات الإرشادية	1. Introduction to Engineering Drawing: Importance and applications of mechanical drawing in engineering industries. Fundamentals and principles of technical drawing. Technical terminology used in mechanical drawings. 2. Projection Methods: Orthographic projections: front, top, and side views. Isometric and pictorial projections. Converting 3D objects into 2D representations. 3. Dimensioning and Tolerancing: Types of dimensions and dimensioning techniques. Tolerances and their importance in mechanical design. Standard annotation practices in drawings. 4. Drawing Conventions and Symbols: Line types, title blocks, and borders. Common mechanical drawing symbols (e.g., threads, holes, surface finishes). Standards in mechanical drawing (ISO, ANSI, BS). 5. Computer-Aided Design (CAD) Basics: Introduction to CAD software for mechanical drafting. Basic operations: creating, editing, and saving 2D drawings. Generating views and applying dimensions in CAD. 6. Assembly and Visualization of Mechanical Components: Understanding exploded views and assembly drawings. Reading and interpreting complex drawings of components and assemblies. Visualization of mechanical systems from detailed drawings. 7. Practical Applications and Exercises: Hands-on practice in creating mechanical drawings. Exercises in orthographic and isometric projection. CAD-based drawing assignments and mini-projects.		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
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) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Refrigeration and Air Conditioning syllabus

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, Simplifications, Conventions and Symbols
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	Exercises.
Week 5	Keys, types of keys, spline shaft and hub.
Week 6	Rivets and riveted joints, types of riveted joints, Conventional rivet symbo
Week 7	Welding, type of weld joints, welding symbols standard, location and dimension of weld.
Week 8	Pulleys, types of pulleys.
Week 9	Gears classification of gears, spur gear, definitions, formulas and calculations.
Week 10	Gear tooth profile, working drawing
Week 11	Bevel gear, calculations, working drawing.
Week 12	Helical gear, worms and worm gear, rack and pinion.
Week 13	Gear boxes.
Week 14	Assembly and details of common mechanical unit, (Vice).

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		Yes
Recommended Texts		No
Websites		

Refrigeration and Air Conditioning syllabus

معلومات المادة الدراسية				
اسم المادة الدراسية		جرائم نظام حزب البعث في العراق		كيفية تدريس المقرر
نوع المقرر		اساسي		☒ نظري ☒ محاضرات ☐ مختبر ☐ تمارين ☐ عملي ☒ حلقات دراسية
رمز المقرر		NTU 200		
عدد الوحدات الاوربية		2		
ECTS				
الحمل الدراسي للفصل (بالساعات)		50		
مستوى المقرر		الثاني	الفصل الدراسي	
القسم المسؤول		PM	TEMO	
اسم مدرس المقرر		سجى مؤيد احمد		saja.moaeed@ntu.edu.iq
اللقب العلمي لمدرس المقرر		مدرس مساعد	المؤهل العلمي لمدرس المقرر	
اسم المدرس المساعد				الايميل
اسم المقيم العلمي		د. عمار حسن	الايميل	
تاريخ موافقة اللجنة العلمية		2025/06/01	رقم الاصدار	
3.0				
العلاقة مع المواد الدراسية الأخرى				
مقررات متطلبة سابقة		لا توجد		الفصل الدراسي
مقررات مرافقة		لا توجد		الفصل الدراسي
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				
أهداف المادة الدراسية		1. التعرف على طبيعة الأنظمة السياسية في العراق عبر المراحل التاريخية المختلفة. 2. فهم مفهوم حقوق الإنسان والحريات العامة في الأنظمة الديمقراطية والاستبدادية. 3. تحليل انتهاكات حقوق الإنسان في ظل نظام حزب البعث. 4. دراسة الأبعاد السياسية والاجتماعية والنفسية لتلك الانتهاكات. 5. تقييم أثر القمع السياسي على المجتمع العراقي. 6. التعرف على دور الإعلام والثقافة في تكريس الفكر الشمولي. 7. تحليل تأثير الحروب والسياسات البيئية على السكان. 8. فهم مفهوم العدالة الانتقالية وأهميتها. 9. تنمية القدرة على التفكير النقدي تجاه الأنظمة الاستبدادية. 10. تعزيز الوعي بحقوق الإنسان وأهميتها في بناء الدولة الحديثة.		
مخرجات التعلم للمادة الدراسية		عند الانتهاء من المقرر، سيكون الطالب قادرًا على: 1. يعرف الطالب مفاهيم حقوق الإنسان والحريات العامة. 2. يميز بين الأنظمة الديمقراطية والاستبدادية. 3. يشرح مراحل تطور النظام السياسي في العراق. 4. يحلل أشكال انتهاكات حقوق الإنسان في عهد البعث. 5. يقيم أثر السياسات القمعية على المجتمع. 6. يفسر دور الإعلام في تشكيل الرأي العام. 7. يناقش آثار الحروب على البيئة والسكان. 8. يوضح مفهوم العدالة الانتقالية وتطبيقاتها. 9. يربط بين الأحداث التاريخية والواقع الحالي. 10. يطور مهارات البحث والتحليل الأكاديمي.		
المحتويات الإرشادية		1. مدخل إلى حقوق الإنسان والحريات العامة . 2. الأنظمة السياسية في العراق (1921–2003)		

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3. نشأة نظام حزب البعث وتطوره . 4. انتهاكات الحقوق الفكرية والسياسية . 5. انتهاكات الحريات العامة (الإعلام، التعبير، التنظيم) . 6. القمع السياسي وأثره على المجتمع . 7. الميدان النفسي والاجتماعي في ظل النظام . 8. الدين والدولة في الفكر البعثي . 9. الثقافة والإعلام وعسكرة المجتمع . 10. أثر الحروب والسياسات البيئية (التلوث، التهجير، المقابر الجماعية) .			
استراتيجيات التعلم والتعليم			
تعتمد استراتيجيات التدريس في هذا المقرر على مزيج من المحاضرات النظرية، والمناقشات الصفية، والعروض التقديمية، وتحليل النصوص التاريخية، بهدف تعزيز الفهم العميق لدى الطلبة. كما يتم توظيف التعلم النشط من خلال طرح الأسئلة التحليلية ودراسة الحالات الواقعية، إضافة إلى تكليف الطلبة بإعداد بحوث قصيرة وعروض جماعية لتنمية مهارات التفكير النقدي والعمل الجماعي. ويتم استخدام الوسائل السمعية والبصرية لدعم العملية التعليمية وربط المفاهيم النظرية بالواقع العملي، مع تشجيع الطلبة على المشاركة الفاعلة وتحليل الأحداث من منظور أكاديمي موضوعي.		الاستراتيجيات	
الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
2	الحمل الدراسي المنتظم للطلاب أسبوعيا	33	الحمل الدراسي المنتظم للطلاب خلال الفصل
1	الحمل الدراسي غير المنتظم للطلاب أسبوعيا	17	الحمل الدراسي غير المنتظم للطلاب خلال الفصل
50		الحمل الدراسي الكلي للطلاب خلال الفصل	
خطة تدريس المقرر المنهاج الاسبوعي النظري			
الاسبوع		المواد	
الاسبوع الاول		مقدمة عن المقرر وأهمية حقوق الإنسان	
الاسبوع الثاني		مفهوم الحقوق والحريات العامة	
الاسبوع الثالث		الأنظمة السياسية في العراق (1921-1958)	
الاسبوع الرابع		الأنظمة السياسية (1958-1968)	
الاسبوع الخامس		نظام حزب البعث (1968-2003)	
الاسبوع السادس		انتهاكات الحقوق السياسية	
الاسبوع السابع		انتهاكات الحريات الفكرية والإعلام	
الاسبوع الثامن		القمع السياسي وأدواته	
الاسبوع التاسع		امتحان نصف الفصل	
الاسبوع العاشر		الميدان النفسي والاجتماعي	
الاسبوع الحادي عشر		الدين والدولة في النظام البعثي	
الاسبوع الثاني عشر		الثقافة والإعلام وعسكرة المجتمع	
الاسبوع الثالث عشر		الحروب وتأثيرها على البيئة والسكان	
الاسبوع الرابع عشر		العدالة الانتقالية ومعالجة الانتهاكات	
الاسبوع الخامس عشر		مراجعة عامة + عرض مشاريع الطلبة	
مصادر التعلم والتدريس			
هل المصدر متوفر في المكتبة		المصدر	
كلا		جرائم نظام حزب البعث في العراق	
كلا		الكتب الموصى بها:	
		المواقع الالكترونية	

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Module Information					
معلومات المادة الدراسية					
Module Title	English Language		Module Delivery		
Module Type	Basic		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	NTU201				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		2	Semester of Delivery		3
Administering Department		PM	College	TEMO	
Module Leader	Wijdan Ahmed Jalal		e-mail	Mti.lec227.wajdan@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification		M.Sc
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number		3.0
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives أهداف المادة الدراسية		1. Develop Core Language Skills			
		- Improve listening skills to understand real-life conversations and everyday dialogues. - Enhance speaking skills through practice and interaction in various communicative situations. - Strengthen reading skills to comprehend and analyze intermediate-level texts. - Build writing skills to produce clear and accurate short paragraphs, letters, and essays.			
		2. Expand Vocabulary:			
		Learn and use new words and expressions related to topics such as work, travel, relationships, technology, and health.			
		3. Master Grammar:			
		Review and apply key grammar structures including verb tenses (past, present, future), auxiliary verbs, conditionals, and modal verbs.			
		4. Improve Pronunciation:			
		Practice accurate pronunciation, stress, and intonation to enhance spoken communication.			
		5. Develop Communication Skills and Confidence:			
		Encourage students to use English confidently in real-life contexts through interactive tasks and group discussions.			
		6. Enhance Cultural Awareness:			
		Explore aspects of English-speaking cultures and global perspectives through reading and listening materials.			
Module Learning Outcomes مخرجات التعلم للمادة الدراسية		By the end of this course, students will be able to:			
		1. Listening:			
		Understand the main ideas and specific details in conversations, interviews, and short talks on familiar topics.			
		2. Speaking:			

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	a. Communicate effectively in everyday situations using appropriate vocabulary, grammar, and pronunciation. b. Participate confidently in discussions, role-plays, and short presentations. 3. Reading: a. Read and comprehend intermediate-level texts on a variety of topics. b. Identify the main ideas, supporting details, and the writer's purpose or opinion. 4. Writing: a. Write coherent and grammatically correct short texts such as emails, letters, and descriptive or narrative paragraphs. b. Use appropriate vocabulary and linking words to organize ideas clearly. 5. Grammar and Vocabulary: a. Use key grammar structures accurately, including verb tenses, modals, conditionals, and reported speech. b. Apply a wide range of vocabulary related to everyday and academic topics. 6. Pronunciation and Fluency: a. Demonstrate improved pronunciation, stress, and intonation patterns for clearer communication. b. Speak with greater fluency and confidence in spontaneous conversations. 7. Cultural Awareness: a. Show awareness of cultural differences and similarities in English-speaking countries through course materials and discussions. 8. Recognize the applications of mechanical drawing in various engineering industries.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Grammar: - o Review of present, past, and future tenses - o Present perfect simple and continuous - o Passive voice - o Modals and semi-modals - o Reported speech - o Conditionals (zero, first, second, and third) - o Relative clauses and question forms 2. Vocabulary: - o Words and expressions related to everyday life, work, travel, technology, relationships, and health - o Collocations, phrasal verbs, and idiomatic expressions - o Word formation and parts of speech 3. Listening: - o Listening to real-life dialogues, interviews, and short talks - o Understanding gist, detail, and implied meaning - o Developing note-taking and comprehension strategies 4. Speaking: - o Pair and group discussions - o Role-plays and simulations of real-life situations - o Short oral presentations and debates - o Pronunciation and intonation practice 5. Reading: - o Reading texts from different genres (articles, stories, letters, etc.) - o Skimming and scanning techniques - o Identifying main ideas and supporting details - o Interpreting opinions and attitudes 6. Writing: - o Paragraph writing (descriptive, narrative, and opinion) - o Writing emails, letters, and short essays - o Organizing ideas using linking words and cohesive devices - o Editing and revising written work 7. Cultural and Communicative Awareness: - o Exposure to English-speaking cultures through readings and listening activities - o Understanding cultural norms and communication styles - o Comparing cultural aspects with the students' own context

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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Task-based & cyclical: Each week, complete one real-world project (e.g., plan a trip, write a work email, give a health talk). For that project, cycle through all skills: read a related text (skim/scan), listen to a dialogue (note implied meaning), practice grammar (tenses, passives, conditionals) and vocabulary (phrasal verbs, word formation) as needed, speak via role-play, then write and revise. End with a cultural comparison. Repeat weekly with a new theme.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Present Simple, Present Continuous, Past Simple, Past Continuous.
Week 2	Present Perfect Word formation, Phrasal verbs Social expressions.
Week 3	Past Simple, Present Perfect Sport and leisure, play football, work in a bank .
Week 4	Numbers and dates, Money, fractions
Week 5	Past Simple and Past Perfect, Past Perfect Continuous Art and literature Giving opinions
Week 6	Modal verbs (obligation, permission, prohibition, necessity)
Week 7	Nationality words Requests and queries
Week 8	Future forms (going to, will), Future Continuous The weather Travelling around using public transport
Week 9	Questions with like Describing food, towns, places Signs and sounds, Saying sorry, thanks
Week 10	Present Perfect versus Past Simple, Present Perfect Continuous Literal information, Phrasal verbs Taking a telephone message, Talking about a loan
Week 11	First Conditional, Second Conditional Adverbs and adjectives, Words good and well Making suggestions, Shopping
Week 12	Modal verbs (probability), Modal verbs in the past Character adjectives Agreeing and disagreeing
Week 13	Present Perfect Simple versus Continuous (focus on duration using for/since) Gerunds and Infinitives Emphasizing what you say
Week 14	Indirect questions Verbs and nouns that go with sounds Informal/Formal English.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	New Headway Intermediate	Yes
Recommended Texts		
Websites		

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Module Information					
معلومات المادة الدراسية					
Module Title	Strength of Materials			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM 203				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		2	Semester of Delivery		4
Administering Department		PM	College	TEMO	
Module Leader	Mohammed Taha Mohammed		e-mail	mohammed.taha@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	Module Leader's Qualification		MASTER
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number		3.0
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module	None			Semester	
Co-requisites module	None			Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives أهداف المادة الدراسية	By the end of this module, students should be able to: 1. To understand the behavior of solid bodies subjected to different types of loads. 2. To know different types of stresses acting on mechanical elements and their effects (strain). 3. To study shear force and bending moment diagrams with associated stresses. 4. To analyze strength, stiffness, and failure of engineering materials and structures.				
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing this module, students will be able to: 1. Identify and calculate different types of stress and strain. 2. Interpret stress–strain relationships and material properties (E, yield strength, etc.). 3. Analyze elastic behavior using Hooke’s law and modulus of elasticity. 4. Evaluate shear stress, bearing stress, and temperature stress. 5. Analyze thin-walled cylinders and pressure vessels. 6. Determine stresses in compound sections. 7. Construct and interpret shear force and bending moment diagrams. 8. Analyze torsion and combined stresses in mechanical components.				
Indicative Contents المحتويات الإرشادية	Indicative Contents for Strength of Materials • Introduction to Strength of Materials • Simple stress and strain • Stress–strain diagram • Shearing stress • Bearing stress				

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	- Thermal (temperature) stress - Thin-walled cylinders - Stress in compound sections - Shear force and bending moment in beams - Bending stress - Slope and deflection of beams - Torsion - Combined stresses
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Learning and Teaching Strategies - Lectures explaining theoretical concepts - Worked examples and problem-solving sessions - Homework assignments and class exercises - Quizzes and mid-term assessments - Technical reports - Use of diagrams and graphical analysis (S.F. & B.M.) - Final examination for comprehensive evaluation
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Strength of Materials
Week 2	Simple stress and strain
Week 3	Stress-strain diagram
Week 4	Bearing stress
Week 5	Thermal stress
Week 6	Thin wall cylinders
Week 7	Shear force and bending moment in beam
Week 8	Shear force and bending moment in beam
Week 9	Bending stress
Week 10	Slope and Deflection of Beams
Week 11	Slope and Deflection of Beams
Week 12	Bending stress
Week 13	Torsion
Week 14	Combined stresses
Week 15	Combined stresses
Week 16	Final Examination

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to Mechanical Tests
Week 2	Lab 2: Tensile Test
Week 3	Lab 3: Compression Test

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Week 4	Lab 4: Brinell Hardness Test	
Week 5	Lab 5: Vickers Hardness Test	
Week 6	Lab 6: Rockwell Hardness Test	
Week 7	Lab 7: Impact Test	
Week 8	Lab 8: Torsion Test	
Week 9	Lab 9: Bending Test	
Week 10	Lab 10: Fatigue Test	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Strength of Materials, By Andrew Pytel and Ferdinand L. Singer 4th edition.	No
Recommended Texts	- A Textbook of Strength of Materials, by R. K. Rajput, 7th edition - Mechanics of Materials, by Ferdinand P. Beer, 8th edition. - Mechanics of Materials I, by E. J. Hearn, 3rd edition.	No
Websites	https://seia.org/	

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Module Information				
معلومات المادة الدراسية				
Module Title	Engineering Materials		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	PM 204			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	2	Semester of Delivery		
Administering Department		PM	College	TEMO
Module Leader	Zina Saad Abdul Jabbar		e-mail	Zena.saad@ntu.edu.iq
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification	M.Sc.
Module Tutor			e-mail	
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq
Scientific Committee Approval Date		01/06/2025	Version Number	3.0
Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module		None	Semester	
Co-requisites module		None	Semester	
Module Aims, Learning Outcomes and Indicative Contents				
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				
Module Objectives أهداف المادة الدراسية	Understand the Internal Structure of Materials: Learn about the atomic and molecular composition of materials, including atomic arrangements, crystal structures, and how these affect material properties and behavior.			
	Study Physical and Mechanical Properties: Explore key properties such as strength, hardness, elasticity, conductivity, thermal expansion, and corrosion resistance, and understand their impact on material performance in various applications.			
	Gain Knowledge of Material Processing Techniques: Familiarize yourself with manufacturing and processing methods used to alter the structure and properties of materials, including casting, forging, welding, heat treatment, and surface modification.			
	Comprehend Material Selection Principles: Understand the criteria for selecting appropriate materials for engineering applications, considering mechanical needs, environmental conditions, cost, and sustainability.			
	Analyze Causes of Material Failure: Investigate failure mechanisms like fracture, fatigue, creep, and wear, and learn strategies to prevent such failures through material science principles.			
	Learn Material Testing and Characterization Methods: Study experimental techniques used to evaluate material properties and performance, such as tensile testing, hardness tests, microscopy, spectroscopy, and non-destructive testing.			
	Understand Material Behavior under Various Conditions: Examine how materials respond to external factors such as temperature, pressure, and loading, including concepts like elasticity, plasticity, viscoelasticity, and behavior at extreme temperatures.			
Explore Sustainability in Materials: Understand the importance of sustainable materials, recycling, and environmental impact assessment, considering the material lifecycle and ecological footprint.				

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	Develop Material Design Skills: Apply knowledge of material properties and processing to design components and systems that meet specific engineering requirements, optimizing the relationship between design, materials, and manufacturing. Enhance Problem-Solving and Analytical Abilities: Build critical thinking skills related to material selection, performance evaluation, and failure analysis, applying theoretical knowledge to practical engineering challenges.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	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. They should be able to analyze and evaluate material properties and make informed decisions regarding material selection for various engineering designs and applications. 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. They should understand how these processes affect material properties and performance, and be able to choose appropriate manufacturing methods for specific materials and applications. 4. Material Testing and Characterization: Students should learn various techniques for testing and characterizing engineering materials, such as tensile testing, hardness testing, impact testing, microscopy, spectroscopy, and non-destructive testing methods. They should gain practical experience in conducting material tests, interpreting test results, and relating them to material properties. 5. Material Failure Analysis: Students should develop an understanding of the causes and mechanisms of material failure, including factors such as fatigue, fracture, creep, and environmental degradation. They should be able to analyze and diagnose material failures and propose appropriate solutions to prevent or mitigate such failures. 6. Material Sustainability and Environmental Impact: Students should gain an awareness of the environmental and sustainability aspects related to engineering materials. This includes understanding the life cycle of materials, recycling and waste management, energy consumption, and the environmental impact of different material choices. They should be able to consider sustainability principles when selecting and designing with materials. 7. Professional and Ethical Considerations: Students should develop an understanding of the professional and ethical responsibilities associated with working with engineering materials. This includes considerations such as safety protocols, regulatory compliance, intellectual property, and ethical practices in material selection, testing, and manufacturing. 1. These learning outcomes aim to provide students with a solid foundation in the properties, selection, processing, testing, and application of engineering materials, enabling them to make informed decisions and contribute effectively in various engineering disciplines.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Metals: • Ferrous Metals: Iron, Carbon, Manganese, Chromium, Nickel, Molybdenum, etc. • Non-Ferrous Metals: Aluminum, Copper, Zinc, Lead, Tin, Titanium, etc. 2. Polymers (Plastics): • Polyethylene: Ethylene monomer units • Polypropylene: Propylene monomer units • Polyvinyl Chloride (PVC): Vinyl Chloride monomer units • Polystyrene: Styrene monomer units • Polyethylene Terephthalate (PET): Ethylene Glycol, Terephthalic Acid

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	3. Ceramics: • Traditional Ceramics: Clay, Feldspar, Silica, Alumina • Advanced Ceramics: Zirconia, Silicon Carbide, Aluminum Nitride, Boron Nitride 4. Composites: • Fiber Reinforced Composites: Glass fibers, Carbon fibers, Aramid fibers • Matrix Materials: Epoxy resins, Polyester resins, Thermoplastics 5. Semiconductors: • Silicon: Pure silicon with small amounts of impurities (dopants) like Boron or Phosphorus 6. Concrete: • Cement: Portland cement (mainly composed of Calcium, Silicon, Aluminum, Iron) • Aggregates: Crushed stone, Sand, Gravel 7. Wood: • Cellulose: Main constituent of wood • Lignin: Provides rigidity and strength to wood 8. Glass: • Silica: Main component of glass • Various additives: Sodium carbonate, Calcium oxide, Aluminum oxide, etc.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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, such as aerospace, automotive, or construction. This can help students connect theoretical knowledge with practical relevance. 4. Collaborative Learning: Encourage collaboration among students through group discussions, team projects, and peer learning. This fosters active engagement and allows students to learn from each other's perspectives and experiences. Assigning group projects that involve materials selection, analysis, or testing can enhance teamwork and problem-solving skills. 5. Problem-Based Learning: Present students with real or hypothetical engineering problems that require material selection or analysis. This approach promotes critical thinking, problem-solving skills, and the application of theoretical knowledge to practical scenarios. Encourage students to research, analyze, and propose solutions using appropriate materials. 6. Multimedia Resources: Utilize multimedia resources such as videos, interactive websites, and online simulations to supplement classroom lectures and textbooks. These resources can provide visual representations, demonstrations, and interactive experiences that enhance understanding and engagement. 7. Guest Speakers and Industrial Visits: Invite industry professionals, researchers, or experts in materials engineering to give guest lectures or organize industrial visits. This exposes students to real-world applications, current research trends, and industry practices, providing valuable insights and networking opportunities. 8. Formative Assessment: Incorporate formative assessment methods such as quizzes, concept maps, or short assignments to gauge students' understanding of engineering materials throughout the learning process. This helps identify areas of improvement and allows for timely feedback and clarification.

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	9. Scaffolded Learning: Break down complex concepts into smaller, more manageable units and provide scaffolding to support students' learning progression. Start with foundational knowledge and gradually build up to more advanced topics, ensuring students grasp fundamental principles before moving forward. 10. Reflective Practices: Encourage students to reflect on their learning experiences, make connections between theory and practice, and identify areas of improvement. Incorporate reflective exercises, journals, or group discussions to promote metacognitive skills and enhance self-directed learning.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	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.
Week 7	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	Advanced Topics: - 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: - Polymer structure and properties. - Polymerization techniques. - Thermoplastics and thermosetting polymers.

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	Composite materials: types, properties, and applications.
Week 15	Material Selection and Design: - Material selection criteria. - Design considerations and constraints. - Failure analysis and prevention. - Sustainability and environmental aspects of materials.
Week 16	Preparatory week before the final Exam
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Mechanical Tests.
Week 2	Lab 2: Impact Test.
Week 3	Lab 3: Fatigue Test.
Week 4	Lab 4: Specimen Preparation For Microscopic Examination.
Week 5	Lab 5: Microscopic Examination of Different Types of Steel.
Week 6	Lab 6: Heat Treatments of Steel.
Week 7	Lab 7 Surface Hardening of Steel.
Week 8	Lab 8: Thermal Equilibrium Diagrams of Two Metals Completely Soluble in Each Other in Liquid States.
Week 9	Lab 9: Microstructure Examination of Stainless Steel .
Week 10	Lab 10: Microstructure Examination of Cast Iron.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. "Materials Science and Engineering: An Introduction" by William D. Callister Jr. and David G. Rethwisch.	Yes
Recommended Texts	1. "Introduction to Materials Science for Engineers" by James F. Shackelford. 2. "Mechanical Metallurgy" by George E. Dieter. 3. "Fundamentals of Materials Science and Engineering" by William D. Callister Jr. and David G. Rethwisch. 4. "Engineering Materials 1: An Introduction to Properties, Applications, and Design" by Michael F. Ashby and David R. H. Jones.	No
Websites	1. Materials Research Society (MRS) - The MRS website (www.mrs.org) offers a wide range of materials science resources, including journals, publications, news, events, and educational materials. It is a leading organization dedicated to advancing the field of materials research. 2. American Ceramic Society (ACerS) - The ACerS website (www.ceramics.org) focuses specifically on ceramic materials. It provides access to journals, conferences, educational resources, and news related to ceramics and other related materials.	

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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 Deliver	4	
Administering Department		PM	College	TEMO	
Module Leader	Anwar Ahmed Yousif		e-mail	anawarayousif@ntu.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		MSc.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2023	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. 6. Students will be introduced to the field of thermodynamics through the examination of thermal systems and their interactions with the surrounding environment in terms of energy.				
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.				

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	8. Evaluate the characteristics and functions of measuring devices used in laboratory settings. 9. Elaborate on Joule's law and its implications in thermodynamics. 10. Identify and apply relevant mathematical relationships for problem-solving purposes.		
Indicative Contents	Part A Course Introduction: This initial module provides an introduction to the course, including an overview of the content and objectives. It also introduces the recommended textbooks and outlines the different units that will be covered. [15 hrs] Key Definitions: In this module, we will focus on important definitions related to force, pressure, and system. By understanding these fundamental concepts, students will be better equipped to grasp the subsequent topics. [15 hrs] Pressure and its Types: This module explores the concept of pressure in detail, examining its various types and their respective characteristics and applications. Students will spend significant time understanding and analyzing pressure in different contexts.. [10 hrs] Specific Heat at Constant Pressure and Volume: This module covers specific heat and its variations under constant pressure and constant volume conditions. Students will gain an understanding of the significance of specific heat and its practical implications. The module will also address closed system procedures, including those related to constant volume and constant pressure conditions. [15 hrs] Revision problem classes [6 hrs] Part B Fundamentals: Temperature: This section covers the measurement of temperature, including units of measurement, conversion between different scales, various measuring methods, and the principles of the Zeroth Law of Thermodynamics. Energy: The concept of energy is defined, and different forms of energy such as potential, kinetic, and thermal energy are explained. Work, capacity, flow work, and pressure diagrams are also discussed. Internal energy and enthalpy are introduced as important thermodynamic properties. [9 hrs] Steam Procedures and Pressure-Volume Chart: This topic focuses on the procedures related to steam and their representation on a pressure-volume chart. Students will learn about the behavior of steam during various processes and how to interpret and analyze such processes graphically. [10 hrs] Types of Pressure Gauges in Refrigeration: This section covers the different types of pressure gauges commonly used in refrigeration systems. Students will become familiar with these gauges, their working principles, and their specific applications in refrigeration processes. [6 hrs] Types of Air Velocity Gauges and Their Uses: This topic explores the various types of air velocity gauges and their respective uses. Students will learn about the different instruments used to measure air velocity and how these measurements are relevant in various contexts, such as HVAC systems or airflow analysis. [6 hrs]		
Learning and Teaching Strategies			
Strategies	The primary methodology employed in delivering this module aims to actively involve students in exercises that will enhance their critical thinking skills and promote engagement. This will be achieved through a combination of lectures, interactive tutorials, and the inclusion of various types of simple experiments. These experiments will be designed to captivate students' interest and provide hands-on experience in the subject matter. The overall objective is to encourage active learning, foster critical thinking, and create an engaging learning environment for the students.		
Student Workload (SWL)			
Structured SWL (h/sem)	123	Structured SWL (h/w)	8
Unstructured SWL (h/sem)	52	Unstructured SWL (h/w)	3

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Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		175
Delivery Plan (Weekly Syllabus)		
	Material Covered	
Week 1	Introduction and Basic Concepts	
Week 2	Properties of Pure Substances	
Week 3	Steam Power Plant	
Week 4	Rankin reheat cycle	
Week 5	Isentropic efficiencies of steady flow devices	
Week 6	Regenerative cycle	
Week 7	Gas mixtures	
Week 8	Real Gases	
Week 9	Thermodynamics of combustion	
Week 10-11	Positive Displacement Machine	
Week 12-13	Gas Turbine	
Week 14-15	Steam Turbine	
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر		
	Material Covered	
Week 1	Lab 1: Introduction to Laboratory Safety and Equipment	
Week 2	Lab 2: Measurement of Temperature and Heat Transfer; Calibration, Determination of heat transfer coefficients, Analysis of heat conduction experiments	
Week 3	Lab 3: Measurement of Pressure and Flow; Calibration, Measurement of pressure drops in flow systems, Flow rate measurements using different devices (venturi meter, orifice plate, et	
Week 4	Lab 4: Measurement of Thermodynamic Properties; Determination of specific heat capacity of substances, Measurement of enthalpy changes in chemical reactions, Calculation of thermodynamic properties using steam tables or software	
Week 5	Lab 5: Performance Analysis of Heat Engines and Refrigeration Systems	
Week 6	Lab 6: Experimental Analysis of Energy Conversion Systems	
Week 7	Lab 7: Data Analysis and Report Writing	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. "Thermodynamics: An Engineering Approach" by Yunus A. Çengel and Michael A. Boles	No
Recommended Texts	1. "Fundamentals of Engineering Thermodynamics" by Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, and Margaret B. Bailey 2. "Introduction to Chemical Engineering Thermodynamics" by J.M. Smith, Hendrick C. Van Ness, Michael M. Abbott, and Mark T. Swihart	No
Websites	(https://www.khanacademy.org/science/physics/thermodynamics) (https://ocw.mit.edu/courses/chemistry/5-60-thermodynamics-kinetics-spring-2008/) (https://www.engineeringtoolbox.com/thermodynamics-d_28.html)	

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Module Information					
Module Title	Electrical Machines		Module Delivery		
Module Type	Basic		☒ Theory ☐ Lecture ☒ Tutorial ☒ Lab ☐ Seminar		
Module Code	PM 206				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		2	Semester of Deliver		4
Administering Department		PM	College		
Module Leader	Safwan Assaf Hamoodi		e-mail	Safwan79azb@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Professor	Module Leader's Qualification		M.Sc.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		1/6/2025	Version Number	3.0	
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			

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	distribution aspects, enabling them to comprehend the broader context of electrical engineering.
Indicative Contents	Part A: Fundamentals of Electrical Principles, Measurements, and Instruments [20 hours] Introduction to Electrical Machines, Power Systems, Safety, and Direct Current Circuits [20 hours] Revision Session and Quiz [1.5 hours] Part B: 4. Alternating Current Circuits, Circuit Theory, and Analogue Electronics [20 hours] Control Systems, Troubleshooting, and Maintenance [10 hours] Revision Session and Quiz [1.5 hours] Revised Description: Part A of the course focuses on building a strong foundation in electrical engineering. Students will start by understanding the basic principles of electricity, along with electrical measurements and the use of instruments. They will then explore electrical machines, power systems, and safety considerations in the context of direct current circuits. A revision session and quiz will help reinforce the learned concepts.

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. 4. Collaborative Learning: Foster collaborative learning by actively engaging in group discussions and study sessions with your peers. 5. Utilize Learning Resources: Make effective use of various resources such as textbooks, online tutorials, video lectures, and educational websites to supplement your learning and broaden your knowledge. 6. Time Management: Manage your time effectively by creating a study schedule and dedicating specific time slots for studying Electrical and Electronic Engineering. 7. Regular Review and Recap: Continuously review previously covered topics to reinforce your understanding and ensure long-term retention of the learned material.
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Student Workload (SWL)

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعياً	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعياً	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Delivery Plan (Weekly Syllabus)

Week	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 Torque Requirement, types Load Torque
Week 4	Starting of D.C motor, starter connection, torque of D.C motors

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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
Week 7	DC generator construction and types.
Week 8	Single phase induction motor, split-phase, capacitor-start, shaded-pole type
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	3-phase induction motor, construction, synch. Speed, slip. line current, line voltage, phase current
Week 12	Contactors, relays, timers
Week 13	Thermal overload, starter (contactor +timer)
Week 14	Transformer
Week 15	Types of transformers and application
Week 16	Final Examination

Delivery Plan (Weekly Lab. Syllabus)

Week	Material Covered
Week 1	Lab 1: Basic wiring diagram for electrical measurements
Week 2	Lab 2: Measurement of inductive reactance of comp. windings
Week 3	Lab 3: Test of current, voltage and solid-state relay
Week 4	Lab 4: Test and calibrate pressure switch and thermostat
Week 5	Lab 5: Test of overload and defrost.
Week 6	Lab 6: Start-up compressor with solid state relay.
Week 7	Lab 7: Start-up compressor with current relay
Week 8	Lab 8: Rotor Voltage Control of Induction Motor
Week 9	Lab 9: Frequency Control of Induction Motor
Week 11	Lab 10: slip power control by dc converter of Induction Motor
Week 12	Lab 11: Single phase Dismantling of induction motor
Week 13	Lab 12: Make fault on voltage and current relay, effect of faults
Week 14	Lab 13: damage, notice the effects
Week 15	Lab 14: Dismantling of induction motor

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	
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	
Websites	(www.allaboutcircuits.com) (www.electrical4u.com)	

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Module Information					
معلومات المادة الدراسية					
Module Title	Computer		Module Delivery		
Module Type	Support		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	NTU 202				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		2	Semester of Deliver		4
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		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/6/2025	Version Number		3.0
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
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. 3. Communicate Effectively in Various Contexts: Adapt communication styles to suit academic, professional, and intercultural settings. Collaborate and communicate efficiently within teams and group environments			

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	4. 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. 5. Develop Critical Thinking and Message Analysis Skills: Evaluate the credibility and effectiveness of messages in media and interpersonal contexts. Construct coherent, persuasive, and ethically sound messages 6. Resolve Communication Barriers and Conflicts: Identify common communication barriers and propose solutions. Practice conflict resolution strategies through communication techniques.		
Indicative Contents المحتويات الإرشادية	Learning Internet Communications requires understanding various technical concepts that form the foundation of how the Internet works. Here are practical guidelines to help you study this subject effectively: ✔ 1. Understand Networking Basics Start with studying the fundamentals of Computer Networks: What is a protocol? Types of networks (LAN, WAN, MAN) Network components (modem, router, switch) Learn about the OSI Model and TCP/IP Model and their layers. ✔ 2. Focus on Key Internet Protocols Make sure you understand the following protocols: IP (Internet Protocol) – for addressing TCP / UDP – reliable vs. unreliable transmissi... Learning Internet Communications requires understanding various technical concepts that form the foundation of how the Internet works. Here are practical guidelines to help you study this subject effectively:		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
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) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	12	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	75		
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
	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		

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Week 3 &4	Computer Troubleshooting: Identifying and solving common hardware and software problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 5&6	Introduction to AI: Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations
Week 7& 8& 9	AI in Our Daily Lives: AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 10&11	Applications of AI: Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 12	AI and Society: (How AI affects social, AI and international relations, AI and the future of humanity.
Week 13	surveillance, the impact of AI on the job market
Week 14	The Future of AI (Future trends in AI, recent research and emerging technologies.)
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introduction to Computer Skills For first year students, Bisha University Computer Science Principles: The Foundational Concepts of Computer Science - For AP® Computer Science Principles 2020th Edition , <u>Mr. Kevin P Hare</u> (Author), <u>Pindar Van Arman</u> (Foreword) 1. Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020) 2. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology In Action Complete", 16th Edition (2020). 3. Ahmed Banafa, "Introduction to Artificial Intelligence (AI)", 1st Edition (2024).	Yes
Recommended Texts	<u>MICROSOFT ACCESS, EXCEL & POWER BI FOR BEGINNERS & POWER USERS, Tech Demystified</u>	No
Websites	https://www.just.edu.jo/~mqais/CIS99/PDF/Ch.01_Introduction_%20to_computers.pdf	

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معلومات المادة الدراسية			
عنوان المقرر	اللغة العربية	طريقة تقديم المقرر	
نوع المقرر	مادة مساعدة	☒ نظري ☒ محاضرة ☐ مختبر ☒ تمارين ☐ عملي ☒ حلقة دراسية	
رمز المقرر	NTU203		
عدد الساعات المعتمدة ECTS	2		
SWL (hr/sem)	50		
مستوى المقرر	2	فصل تقديم المقرر	4
القسم الإداري المسؤول	PM	الكلية	TEMO
مسؤول المقرر	أ.م. د. محمد عبد الموجود حسن	إيميل	dr.mohammed67@ntu.edu.iq
اللقب الأكاديمي لمسؤول المقرر	أستاذ مساعد	الشهادات العلمية لمسؤول المقرر	دكتوراه
مدرس المقرر	أ.م. د. محمد عبد الموجود حسن	إيميل	dr.mohammed67@ntu.edu.iq
اسم المراجع النظير	د. عمار حسن سهيل	إيميل	ammarsuhail@ntu.edu.iq
تاريخ اعتماد اللجنة العلمية	2025/06/01	رقم الاصدار	3.0
العلاقة مع المواد الدراسية الأخرى			
المقرر السابق المطلوب	لا يوجد	الفصل الدراسي	
المقررات المتزامنة	لا يوجد	الفصل الدراسي	
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
تهدف مادة اللغة العربية للمرحلة الثانية إلى: 1. تعميق فهم القواعد اللغوية: تطوير مهارات الطالب في النحو والصرف والإملاء على مستوى متقدم. 2. تطوير مهارات الكتابة الأكاديمية: تمكين الطالب من صياغة المقالات، التقارير، والأبحاث بأسلوب لغوي سليم ودقيق. 3. تحليل النصوص الأدبية والإدارية: تعزيز قدرة الطالب على فهم النصوص المعقدة، واستنتاج القواعد والأساليب البلاغية. 4. معالجة الأخطاء اللغوية المتقدمة: تدريب الطالب على التعرف على الأخطاء الشائعة وتصحيحها في مختلف السياقات. 5. تنمية التفكير النقدي والتحليلي: القدرة على تحليل النصوص، والمقارنة بين الأساليب اللغوية، وتقديم حلول تحريرية دقيقة. 6. إتقان أساليب الخطاب الرسمي والإداري: تعزيز مهارات الطالب في كتابة الوثائق الرسمية والخطابات الأكاديمية والإدارية بطريقة صحيحة ومنظمة.			أهداف المادة الدراسية
بنهاية دراسة المادة، يُتوقع أن يكون الطالب قادرًا على: • تطبيق القواعد اللغوية المتقدمة: استخدام النحو والصرف والإملاء بشكل صحيح في الجمل المعقدة والمركبة. • تحليل النصوص: تفسير النصوص الأدبية والإدارية، وتحديد الأساليب البلاغية واللغوية فيها. • كتابة نصوص أكاديمية وإدارية سليمة: صياغة المقالات، التقارير، والأبحاث، والوثائق الرسمية بدقة ووضوح. • معالجة وتصحيح الأخطاء اللغوية: التعرف على الأخطاء الشائعة وتصحيحها في مختلف السياقات الكتابية. • التفكير النقدي والتحليلي: تقييم النصوص والمقارنة بين الأساليب اللغوية المختلفة، واقتراح الحلول التحريرية المناسبة.			مخرجات التعلم للمادة الدراسية

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• التواصل الفعال كتابيًا وشفهياً: التعبير عن الأفكار بطريقة منظمة ودقيقة باستخدام اللغة العربية المتقدمة.	
- مراجعة قواعد الإملاء وعلامات الترقيم، مع التركيز على القواعد المتقدمة. - النحو المتقدم: أقسام الكلام، الجملة المركبة، الأساليب النحوية المعقدة. - المفاعيل والعدد وحروف الجر المركبة، وتطبيقاتها العملية. - البلاغة العربية: التشبيه، الاستعارة، المجاز، وأساليب الإقناع. - الكتابة الأكاديمية والإدارية: صياغة المقالات، الأبحاث، والوثائق الرسمية. - تحليل النصوص الأدبية والإدارية، وتصحيح الأخطاء اللغوية المتقدمة. - مشروع عملي نهائي: كتابة نص أكاديمي أو تحليلي متكامل مع مراجعة عامة للمادة.	المحتويات الإرشادية
استراتيجيات التعلم والتعليم	
1. المحاضرات النظرية: تقديم القواعد المتقدمة في النحو والصرف والإملاء، وشرح أساليب البلاغة والتحليل الأدبي. 2. المناقشات الصفية: تحليل النصوص الأدبية والإدارية، ومناقشة الأساليب البلاغية والأسلوبية المختلفة. 3. التطبيق العملي والتمارين: كتابة المقالات، التقارير، والوثائق الرسمية مع التركيز على تصحيح الأخطاء اللغوية. 4. التمارين والواجبات: حل تدريبات نحوية وإملائية متقدمة، وتحليل نصوص أدبية وإدارية مختارة. 5. التعلم التعاوني: العمل ضمن مجموعات لمناقشة النصوص، تبادل الملاحظات، وتحليل التطبيقات العملية. 6. العصف الذهني: مناقشة الأساليب اللغوية المختلفة، تقييم النصوص، واقتراح الحلول التحريرية الصحيحة. 7. التقييم المستمر: اختبارات قصيرة، عروض تقديمية، تقارير تطبيقية، لمتابعة تقدم الطلاب في جميع جوانب المادة.	استراتيجيات

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

2	الحمل الدراسي المنتظم للطلاب أسبوعيا	33	الحمل الدراسي المنتظم للطلاب خلال الفصل
1	الحمل الدراسي غير المنتظم للطلاب أسبوعيا	17	الحمل الدراسي غير المنتظم للطلاب خلال الفصل
50			الحمل الدراسي الكلي للطلاب خلال الفصل

المنهاج الاسبوعي النظري

المحتوى الدراسي	الاسبوع
مراجعة شاملة لقواعد الإملاء: التاء، الألف، الهزرة، وعلامات الترقيم	الأسبوع 1
النحو المتقدم: أقسام الكلام، الجملة الاسمية والفعلية، التراكيب المعقدة	الأسبوع 2
المفاعيل: المفعول به، المطلق، لأجله، فيه – تطبيقات عملية	الأسبوع 3
العدد وأنواعه المتقدمة، التوافق مع المعدود، تدريبات تطبيقية	الأسبوع 4
حروف الجر المركبة وحروف الاستثناء وأثرها على الجملة	الأسبوع 5
الأساليب النحوية المتقدمة: العطف، البدل، النعت، التوكيد	الأسبوع 6
الإعراب التطبيقي: تحليل الجمل الطويلة والمركبة	الأسبوع 7
الأخطاء اللغوية الشائعة في المستويات المتقدمة وطرق تصحيحها	الأسبوع 8
البلاغة العربية: التشبيه، الاستعارة، المجاز، أساليب الإقناع	الأسبوع 9
الخطاب الأكاديمي: كتابة المقالة والبحث العلمي بأسلوب سليم	الأسبوع 10
التحرير الإداري المتقدم: الصياغة الرسمية للوثائق والخطابات	الأسبوع 11
الأسلوب الأدبي: تحليل نصوص مختارة من الشعر والنثر	الأسبوع 12
تطبيقات عملية على النصوص الإدارية والأدبية: التدقيق والتصحيح	الأسبوع 13
مشروع نهائي: كتابة نص أكاديمي رسمي أو تحليلي متكامل + مراجعة عامة	الأسبوع 14
الامتحان النهائي	الأسبوع 15

مصادر التعلم والتدريس

متوفر في المكتبة ؟	المراجع	
نعم	قواعد اللغة العربية للعلامة حنفي ناصف وآخرون	الكتب المطلوبة
لا	قواعد اللغة العربية والاملاء للدكتور محمد عبد الله الشال	الكتب المقررة / الكتب الموصى بها
	https://shamela.ws/ المكتبة الشاملة	Websites

Refrigeration and Air Conditioning syllabus

Module Information					
Module Title	Machine Design			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM 300				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	Semester of Delivery		5
Administering Department		PM	College	TEMO	
Module Leader	Noori Raad Noori		e-mail	Noori.raad@ntu.edu.iq	
Module Leader's Acad. Title		Assistant lecture	Module Leader's Qualification		M.Sc.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/6/2025	Version Number	3.0	
Relation with other Modules					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
Module Objectives		The Machine Design course aims to develop students' ability to analyze, design, and evaluate mechanical components used in energy and refrigeration systems by applying principles of stress analysis, material selection, and safety factors. Students will learn to design essential machine elements such as shafts, bearings, fasteners, springs, belts, and gears, and assess their performance under various loading conditions. The course also enhances students' skills in using engineering software for modeling and verification, promotes understanding of failure theories and reliability, and strengthens their ability to communicate technical solutions and work collaboratively in solving practical design problems relevant to energy and cooling applications.			
Module Learning Outcomes		1) Explain the fundamental concepts of mechanical design, stress analysis, and material behavior under load. 2) Analyze machine components subjected to tension, compression, torsion, bending, and combined loading conditions. 3) Design common machine elements such as shafts, fasteners, bearings, springs, belts, and gears according to engineering principles and safety criteria. 4) Select appropriate materials and mechanical components for energy and refrigeration applications based on operating and environmental conditions. 5) Construct and interpret engineering drawings and 3D models using modern design software tools. 6) Evaluate the reliability, safety, and performance of mechanical components using failure theories and design standards.			

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	7) Communicate design solutions effectively through technical documentation and presentations.		
Indicative Contents	1) Introduction to machine design: design process, design standards, and factors of safety. 2) Mechanical properties of materials: stress–strain behavior, elasticity, plasticity, hardness, fatigue, and material selection for mechanical components. 3) Analysis of stresses and strains: axial loading, torsion, bending, combined loading, stress concentrations, and Mohr’s circle. 4) Design of mechanical joints: threaded fasteners, bolts, welded joints, riveted joints, and shaft–hub connections (keys, pins, and couplings). 5) Design of shafts and axles: torsional and bending analysis, critical speeds, deflection limits, and applications in compressors, fans, and pumps. 6) Design of springs: helical compression and tension springs, torsion springs, and their applications in vibration control. 7) Bearings and lubrication: rolling-contact bearings, plain bearings, load ratings, bearing life, and selection criteria. 8) Power transmission elements: belt drives, chain drives, gear drives, speed ratios, tension analysis, and system efficiency. 9) Failure theories and fatigue analysis: static failure theories, fatigue loading, S–N curves, and design for durability. 10) Mechanical design in energy and refrigeration systems: component selection for compressors, evaporator fans, pumps, and rotating machinery. 11) Use of engineering software (SolidWorks, AutoCAD, ANSYS) for modeling, simulation, and design verification.		
Learning and Teaching Strategies			
Strategies	1) Lectures: Delivery of core theoretical concepts using illustrated examples, problem-solving demonstrations, and real engineering applications relevant to energy and refrigeration systems. 2) Interactive Discussions: Guided class discussions to promote critical thinking, clarify concepts, and connect theory with practical engineering challenges. 3) Problem-Solving Sessions: Structured in-class exercises where students analyze and design machine elements, reinforcing analytical and mathematical skills. 4) Laboratory and Workshop Practice: Hands-on activities involving mechanical testing, part measurements, CAD modeling, and simulation using tools such as SolidWorks or ANSYS. 5) Project-Based Learning: Small design projects that require students to apply design methodologies to real or simulated mechanical components used in energy and cooling systems. 6) Collaborative Group Work: Team-based tasks to encourage communication, teamwork, and shared problem-solving. 7) Case Studies: Examination of real mechanical failures or industrial designs to enhance understanding of safety, reliability, and engineering decision-making. 8) E-Learning Resources: Use of digital platforms, instructional videos, and simulation tools to support independent learning and reinforce lecture material. 9) Formative Feedback: Continuous feedback through quizzes, assignments, lab reports, and consultations to support improvement and deeper understanding.		
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		

Refrigeration and Air Conditioning syllabus

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to Machine Design, design process, role in engineering
Week 2	Material properties: stress, strain, strength, hardness, fatigue
Week 3	Failure theories and safety factors
Week 4	Shaft design: torsion, bending, combined loads
Week 5	Keys and couplings: types and design
Week 6	Bearings: journal and rolling-element bearings
Week 7	Gears: spur, helical, bevel, gear design basics
Week 8	Midterm
Week 9	Belt and chain drives
Week 10	Springs: types, design under static/dynamic load
Week 11	Fasteners and joints (bolts, screws, welded joints)
Week 12	Brakes and clutches
Week 13	Design optimization: efficiency, cost, reliability
Week 14	Standards and codes in machine design
Week 15	Course review & project presentations
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Introduction to SolidWorks interface, basic sketching
Week 2	2D sketches, constraints, and simple part modeling
Week 3	Extrude, revolve, and basic 3D part modeling
Week 4	Modeling shafts and applying material properties
Week 5	Modeling keys and couplings in SolidWorks
Week 6	Bearing modeling and simple assembly
Week 7	Gear modeling (using toolbox/design library)
Week 8	Modeling disc brakes / clutches assemblies
Week 9	SolidWorks simulation: stress & displacement
Week 10	Final project submission and presentation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1) Machine Design: An Integrated Approach – Robert L. Norton (balanced between theory, examples, and CAD use) 2) Mechanical Design of Machine Elements and Machines – Jack A. Collins, Henry R. Busby, George H. Staab (good for applied examples)	No
Recommended Texts	1) Machine Design by R.S. KHURMI J.K. GUPTA 2) Shigley's Mechanical Engineering Design – R. Budynas & J. Nisbett 3) Design of Machine Elements – V.B. Bhandari 4) Machine Design Fundamentals – J.E. Shigley	No
Websites	https://www.machinedesign.com	

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Module Information					
معلومات المادة الدراسية					
Module Title	Engineering Analysis			Module Delivery	
Module Type	Basic			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM 301				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	Semester of Delivery		5
Administering Department		PM	College	TEMO	
Module Leader	Dr. Qais A. Yousif		e-mail	kaisyusuf@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Professor	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number		3.0
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives	أهداف المادة الدراسية				
	1. Understand the basic principles of engineering analysis and technologies. 2. Learn about the applications of Engineering Analysis. 3. Understand the current challenges in engineering Analysis.				
Module Learning Outcomes	مخرجات التعلم للمادة الدراسية				
	1. Develop the student's ability to work on the performance of the duties and delivered on schedule. 2. How to solve the problem in Sport's statistical analysis and find the solution with various methods. 3. Acquiring knowledge about using many methods to evaluate difficult algebraic equations.				
Indicative Contents	المحتويات الإرشادية				
	1. Specific goals, such as verifying a design, improving performance, or investigating a failure. 2. Translating a physical system into a mathematical model. 3. Equations governing the system's behavior, such as Newton's laws of motion, Fourier's heat transfer laws, or Maxwell's equations.				

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	- Evaluation of how changes in parameters affect the overall system performance. - Comparison of model predictions with theoretical, empirical, or experimental results to ensure validity. - An evaluation of the results in relation to the design objectives and requirements. - Cost-benefit analysis to select the most efficient design. - Suggested actions, such as design modifications, material changes, or further testing to mitigate risks. - Clear statements of limitations, such as steady-state vs. transient, linear vs. non-linear, or assumed boundary conditions. - Definition of what is included and, crucially, what is excluded from the analysis.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	- Detailed explanation of the scientific material. - Students' participation in solving mathematical problems during the class lecture time. - Discussion and dialogue about vocabulary related to the topic.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Linear and Non-Linear Equations, System of Linear Equations, Classification of linear systems
Week 2	Methods for solution linear systems (Gaussian, Gauss-Jordan Elimination)
Week 3	Quiz
	Methods for solution non-linear systems.
Week 4	Applications of Linear and Non-linear systems (Fitting polynomials, Network Analysis, Kirchhoff's Laws, Heat Flow).
Week 5	Quiz
	Fourier Series (Periodic Functions, Sketching a Periodic Function)
Week 6	Even and Odd Functions.
Week 7	Quiz
	Determination of Fourier Coefficients (Euler's Formulae).
Week 8	Determination of Fourier Coefficients.
Week 9	Quiz
	Laplace Transform, Properties of Laplace Transform.
Week 10	The Inverse Laplace Transform.
Week 11	Midterm exam

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Week 12	Applications of Laplace Transform (Solving 1 st Differential Equations using Laplace transforms).	
Week 13	Quiz	
	Applications of Laplace Transform (Solving 2 nd Differential Equations using Laplace transforms)	
Week 14	Applications of Laplace Transform (Solving 2 nd Differential Equations using Laplace transforms)	
Week 15	Review	
Week 16	Preparatory week before the final Exam	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Advanced Engineering Mathematics by C. R. Wylie 2. Advanced Engineering Mathematics by Peter V. O'Neil 3. Advanced Engineering Mathematics by Erwin Kreysizg 4. Introduction to communication systems by Ferrell G. Stemler	No
Websites	https://www.coursera.org / browse / physical-science-and-engineering / electrical engineering	

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Module Information					
معلومات المادة الدراسية					
Module Title	Heat transfer		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	PM302				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level		3	Semester of Delivery		5
Administering Department		PM	College	TEMO	
Module Leader	Ahmed Hani Ghanim		e-mail	Ahmed.hanigh@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	Module Leader's Qualification		M.Sc.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/6/2025	Version Number	3.0	
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives أهداف المادة الدراسية		- Understand the fundamental principles and mechanisms of heat transfer, including conduction, convection, and radiation, and their role in thermal systems. - Develop the ability to analyze and solve steady and transient heat conduction problems in one and two dimensions, including systems with fins, multilayer walls, cylinders, and thermal contact resistance. - Apply appropriate analytical, empirical, and approximate methods to evaluate convective heat transfer in forced and natural convection and to use dimensionless numbers in engineering analysis. - Analyze, design, and evaluate the performance of heat exchangers using concepts such as overall heat transfer coefficient, fouling factor, log-mean temperature difference, and effectiveness. - Describe and calculate basic radiation heat transfer between surfaces, including concepts of emissivity, view factor, and radiation exchange between black and gray surfaces.			
Module Learning Outcomes		upon successful completion of this course, the student will be able to: Explain the fundamental laws and physical mechanisms of heat transfer by conduction, convection, and radiation, and their relevance to thermal systems.			

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مخرجات التعلم للمادة الدراسية	- Formulate and solve steady and transient heat conduction problems in one and two dimensions, including fins, multilayer plane walls, and cylindrical systems, using appropriate analytical methods. - Evaluate convective heat transfer coefficients for forced and natural convection using dimensionless groups and empirical correlations, and apply them to internal and external flows. - Analyze and assess the performance of heat exchangers using overall heat transfer coefficients, log-mean temperature difference, and effectiveness–NTU methods for different configurations. - Apply radiation heat transfer concepts, including emissivity and view factors, to calculate radiative heat exchange between surfaces and integrate radiation with other modes of heat transfer in engineering applications
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	A study of the types of heat transfer and their practical applications. The types are conduction, convection, and radiation. Practical applications of heat transfer include fins, heat exchangers, and insulators, along with their uses in factories and electrical appliances. The study also includes a study and calculation of the convection heat transfer coefficient using tables. Radiation heat, the effect of barriers between two radiant plates, and boiling were also studied.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	123	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	200		

Delivery Plan (Weekly Syllabus)

المناهج الأسبوعي النظري

	Material Covered
Week 1	Introduction, Basic Concepts of Heat Transfer, Heat Transfer Mechanisms. Steady State One Dimensional Heat Conduction in a Large Plane Wall, and in a Cylinder.
Week 2	Conduction through Multilayer Plane Wall, and Cylinder. Over all Heat Transfer Coefficient.
Week 3	Conduction through Multilayer Plane Wall, and Cylinder. Over all Heat Transfer Coefficient.
Week 4	Critical Radius of Insulation. Thermal Contact Resistance.
Week 5	The Fins
Week 6	Transient Heat Conduction, (Lumped System Analysis Two Dimensional Steady Heat Conduction
Week 7	Transient Heat Conduction, (Lumped System Analysis Two Dimensional Steady Heat Conduction
Week 8	Introduction to Heat Transfer by Convection, Review to the Fluid Flow Non-Dimensional Group Numbers Analysis The Log Mean Temperature Difference Method, The Effectiveness of the heat Exchangers
Week 9	Introduction to Heat Transfer by Convection, Review to the Fluid Flow Non-Dimensional Group Numbers Analysis The Log Mean Temperature Difference Method, The Effectiveness of the heat Exchangers
Week 10	Analytical Solution for Heat Convection Heat Transfer for Laminar And Turbulent Flow
Week 11	One Dimensional Steady State Force Convection Heat Transfer on Flat Plate Empirical Equations for Forced Convection Heat Transfer (Laminar and Turbulent Flow
Week 12	Natural Convection Heat Transfer Empirical Equations for Natural Convection Heat Transfer

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Week 13	Introduction to Heat Exchangers, Kinds of Heat Exchangers The Overall Heat Transfer Coefficient, Fouling Factor	
Week 14	The Performances for Difference Kinds of the Heat Exchangers Heat Radiation, Introduction, Basic Concepts	
Week 15	Characteristics of Radiation, The View Factor Radiation Heat Transfer Between Two Black Surfaces	
Week 15	Final Exam	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	J.P. Holman;"Heat Transfer"; Tenth Edition Mc. Graw hill, 2010 Yunus A. cengel "Heat Transfer a Practical Approach" Second Edition Mc. Graw hill, 2010.	No
Recommended Texts		No
Websites	http://www.tandfonline.com	

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	Thermal Systems Design			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	RAC 301				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	Semester of Delivery		5
Administering Department		PM	College	TEMO	
Module Leader	Dr. Nabeel Mukhlif Abdulrazaq		e-mail	Nabil84m@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name	Dr. Ammar Hassan Suhail		e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number	3.0	
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module	None			Semester	
Co-requisites module	None			Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives أهداف المادة الدراسية	By the end of this module, students should be able to:				
	1. To introduce the fundamental principles of thermal systems and their classification across various engineering applications.				
	2. To provide a structured methodology for the engineering design process, from problem formulation and conceptual design to modeling, simulation, and evaluation.				
	3. To develop proficiency in modeling and simulation of key thermal system components, particularly heat exchangers (parallel-flow, counter-flow, cross-flow, multipass) and flat-plate solar collectors.				
	4. To teach systematic approaches for system-level simulation using tools like Information Flow Diagrams (IFDs) to manage the complexity of interconnected components.				
	5. To introduce mathematical optimization techniques for thermal systems, including calculus methods (Lagrange multipliers), search methods, and				

Refrigeration and Air Conditioning syllabus

	geometric programming, with the goal of minimizing cost or maximizing performance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing this module, students will be able to: 1. Classify and describe various types of thermal systems and their key operating principles. 2. Apply the LMTD (Logarithmic Mean Temperature Difference) and effectiveness-NTU methods to calculate heat transfer rates and design/simulate single-pass and multipass heat exchangers. 3. Analyze the performance of flat-plate solar collectors, including calculating useful energy gain, collector efficiency, and overall heat loss coefficients (top, bottom, and edge losses). 4. Construct and interpret Information Flow Diagrams (IFDs) to represent the input/output relationships of components and to develop efficient strategies for simulating complex thermal systems (e.g., a refrigeration cycle or a pump-heat exchanger system). 5. Formulate an optimization problem by defining an objective function (e.g., minimize cost), independent variables, and constraints (equality and inequality). 6. Apply calculus-based methods (e.g., Lagrange multipliers) and geometric programming to solve unconstrained and constrained optimization problems relevant to thermal system design. 7. Use sensitivity analysis to understand the impact of parameter changes on the optimal design.
Indicative Contents المحتويات الإرشادية	Indicative Contents for Thermal Systems Design 1. Introduction to Thermal Systems – Defines thermal systems, their complexity (fluid mechanics, heat transfer), and classifications across manufacturing, energy, aerospace, and HVAC applications. 2. Engineering Design Process – Covers stages from need/opportunity identification, market analysis, and feasibility to conceptual design, modeling, and moving from acceptable to optimal design. 3. Heat Exchanger Configurations – Explains parallel-flow, counter-flow, cross-flow, and multipass arrangements, including temperature profiles and application contexts. 4. LMTD and Effectiveness-NTU Methods – Derives Logarithmic Mean Temperature Difference and effectiveness-NTU relations for calculating heat transfer rates and sizing heat exchangers. 5. Overall Heat Transfer Coefficient – Addresses convection, conduction through tube walls, fouling factors, and combined thermal resistance in double-pipe and shell-and-tube heat exchangers. 6. Cross-Flow and Multipass Heat Exchangers – Presents effectiveness formulas for mixed/unmixed cross-flow and analytical methods for multipass (e.g., 1-2 pass) configurations. 7. Flat-Plate Solar Collectors – Models energy balance, useful gain (Hottel-Whillier-Bliss equation), collector efficiency, and heat removal factor. 8. Solar Collector Heat Losses – Calculates top, bottom, and edge loss coefficients using thermal network analysis and empirical relations for multiple glazing covers. 9. System Simulation with Information Flow Diagrams (IFDs) – Uses IFDs to represent component input-output relationships and develop efficient strategies for simulating interconnected systems. 10. Optimization Fundamentals – Defines objective functions, independent variables, equality/inequality constraints, and levels of optimization (concept comparison vs. within-concept). 11. Lagrange Multipliers for Constrained Optimization – Applies calculus-based method to find minima/maxima subject to constraints, with examples like minimum material boxes and heat exchanger sizing.

Refrigeration and Air Conditioning syllabus

12. **Geometric Programming** – Solves posynomial objective functions with zero or positive degree of difficulty, providing optimal variable values and cost distribution among terms.
13. **Unconstrained Optimization and Sensitivity Analysis** – Uses derivatives to find optimal points, second-derivative tests for max/min, and sensitivity coefficients to assess constraint change effects.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

The learning and teaching strategies for the "Thermal Systems Design" module center on a blended approach that combines **expository lectures** with extensive **guided and independent problem-solving**. The instructor presents core concepts and step-by-step mathematical derivations (e.g., LMTD, effectiveness-NTU, Hottel-Whillier-Bliss equation), immediately followed by **worked examples** that model the application of theory to numerical problems. Students then reinforce their skills through **problem-based tutorials**, often drawing from a core textbook (Stoecker), to develop fluency. A strong emphasis is placed on **modeling and simulation** as core activities, where students learn to simplify real systems, make appropriate assumptions, and use **Information Flow Diagrams (IFDs)** to represent component interactions and manage computational flow for whole-system simulation. Finally, **optimization is taught as an integral design philosophy**, introducing students to multiple methods (calculus, Lagrange multipliers, geometric programming) and instilling the mindset of seeking the "best" solution within constraints, not merely an acceptable one. A **core textbook** supports independent learning and provides additional reference material.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	Introduction to Thermal Systems & Engineering Design
Week 2	Design Problem Formulation & Conceptual Design
Week 3	Heat Exchanger Basics: Parallel & Counter-Flow
Week 4	Effectiveness-NTU Method for Heat Exchangers
Week 5	Overall Heat Transfer Coefficient & Fouling
Week 6	Cross-Flow & Multipass Heat Exchangers
Week 7	Heat Exchanger Design Problems
Week 8	Flat-Plate Solar Collectors: Energy Balance
Week 9	Solar Collector Efficiency & Heat Removal Factor
Week 10	Overall Loss Coefficient for Solar Collectors
Week 11	System Simulation using Information Flow Diagrams (IFDs)
Week 12	Case Study: Simulation of a Pump-Heat Exchanger System
Week 13	Optimization Fundamentals & Lagrange Multipliers
Week 14	Geometric Programming
Week 15	Unconstrained Optimization & Sensitivity Analysis
Week 16	Review & Final Assessment

Learning and Teaching Resources

مصادر التعلم والتدريس

Refrigeration and Air Conditioning syllabus

	Text	Available in the Library?
Required Texts	Stoecker, W. F. Design of Thermal Systems. McGraw-Hill	No
Recommended Texts	- Dhar, P. L. and Thyageswaran, S. Thermal System Design and Simulation. Elsevier (2nd Edition). - Das, M. K. and Panigrahi, P. K. Design and Analysis of Thermal Systems. CRC Press.	No
Websites		

Module Information

معلومات المادة الدراسية

Module Title	Drawing of Refrigeration & Air Conditioning Systems			Module Delivery	
Module Type	Core			☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	RAC 301				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	3	Semester of Delivery			
Administering Department		PM	College	TEMO	
Module Leader	Sohaib Hassan Mohammed		e-mail	Sohaib.hassan.1983@ntu.edu.iq	
Module Leader's Acad. Title		Assist Lecturer	Module Leader's Qualification		M.Sc.
Module Tutor	Sohaib Hassan Mohammed		e-mail	Sohaib.hassan.1983@ntu.edu.iq	
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2026	Version Number		3.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	- The student understands the concept of the AutoCAD program. - The student learns about the components of the AutoCAD program and how to interact with its contents. - Implement the instructions that comprise the AutoCAD program. - Implement a drawing of the components and parts of the main cooling system. - Implement a drawing of the air distribution systems. - Drawing the piping design systems. - Drawing the airflow systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Use AutoCAD commands initially. - Explain the AutoCAD interface. - Determine the constants used in drawing in AutoCAD. - Determine the measurements used in drawing in AutoCAD. - Implement the main cooling system components in detail. - Draw the main cooling systems. - Design the air distribution systems. - Design the piping systems. - Design the airflow systems.

Refrigeration and Air Conditioning syllabus

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The Indicative Contents of two paragraphs. <u>The first paragraph (A)</u> is the theoretical content, which includes an explanation of the concept of the unit for each week and providing the methods and explanation of the content for each unit so that the implementation of the practical drawing is clearer [SSWL=1 hrs]. <u>The second paragraph (B)</u> includes practical laboratory application for each weekly unit, covering all the sections covered in the first section. This includes three hours per week for each unit per week [SSWL=3 hrs].		
	Learning and Teaching Strategies استراتيجيات التعلم والتعليم		
Strategies	The main strategy used in teaching this unit is to encourage and engage students in engaging in important exercises and drawings, while simultaneously honing and expanding their critical thinking skills. This will be achieved through classroom instruction, interactive lessons, and the study of both important and simple drawings, including some of the key activities that interest students throughout this unit.		
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
	Material Covered		
Week 1	Basic concepts of Drawing Air- Conditioning System		
Week 2	Introductory concepts for Drawing Air- Conditioning System		
Week 3	Identify the parts of the cooling system		
Week 4	Explain the concept Drawing of refrigeration and air conditioning systems.		
Week 5	Explain the concept Drawing of auxiliary devices for air conditioning systems such as cooling towers.		
Week 6	Explain the concept Drawing of piping system components.		
Week 7	Piping system drawing.		
Week 8	Explain the concept Drawing modern air conditioning systems such as: VRV		
Week 9	Explain the concept Drawing modern air conditioning systems such as: VRF		
Week 10	Explain the concept Drawing modern air handling unit.		
Week 11	Explain the concept Drawing modern air ducting design.		
Week 12	Explain the concept Drawing of the evaporator for a refrigeration system.		
Week 13	Explain the concept Drawing of the condenser for a refrigeration system.		
Week 14	Explain the concept Drawing of the expansion valve for a refrigeration system.		
Week 15	Explain the concept Drawing of the assembly for a refrigeration system.		
Week 16	Preparatory week before the final Exam.		
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر			
	Material Covered		
Week 1	Drawing Identify the parts of the cooling system		
Week 2	Drawing of refrigeration and air conditioning systems.		
Week 3	Drawing of auxiliary devices for air conditioning systems such as cooling towers.		

Refrigeration and Air Conditioning syllabus

Week 4	Drawing of piping system components.
Week 5	Drawing Piping system.
Week 6	Drawing modern air conditioning systems such as: VRV
Week 7	Drawing modern air conditioning systems such as: VRF
Week 8	Drawing modern air handling unit.
Week 9	Drawing modern air ducting design.
Week 10	Drawing of the evaporator for a refrigeration system.
Week 11	Drawing of the condenser for a refrigeration system.
Week 12	Drawing of the expansion valve for a refrigeration system.
Week 13	Drawing of the assembly for a refrigeration system.
Week 14	Review of all previous drawings

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Teaching Students the Basics of The Academic Subject.	No
Recommended Texts	Engineering drawing of refrigeration and air conditioning systems	No
Websites		

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	English Language		Module Delivery		
Module Type	Support		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	NTU301				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		3	Semester of Delivery		5
Administering Department		PM	College	TEMO	
Module Leader	Wijdan Ahmed Jalal		e-mail	Mti.lec227.wajdan@ntu.edu.iq	
Module Leader's Acad. Title		Assistant Lecturer	Module Leader's Qualification		M.Sc
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number		3.0
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives		أهداف المادة الدراسية			
		1. Enhance communicative competence – Enable students to use English effectively in academic, professional, and everyday situations relevant to engineering graduates. 2. Develop integrated language skills – Improve reading, listening, speaking, and writing for both general and technical contexts. 3. Strengthen grammatical accuracy and range – Consolidate intermediate grammatical structures (tenses, modals, conditionals, passive voice, reported speech) for clarity in written and spoken English. 4. Expand technical and general vocabulary – Build word formation strategies (prefixes, suffixes, compound nouns) and phrasal verbs useful in engineering and workplace communication. 5. Foster critical thinking and discussion – Enable students to express opinions, make predictions, give advice, and discuss ethical/social issues related to technology, environment, and work. 6. Prepare for real-world interactions – Practice polite requests, small talk, phone calls, appointments, and professional writing (emails, biographies, discursive essays).			

Refrigeration and Air Conditioning syllabus

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module, students will be able to: 1. Use English effectively in academic, professional, and everyday contexts relevant to mechanical engineering. 2. Demonstrate integrated language skills – Read, listen, speak, and write accurately and appropriately in both general and technical situations. 3. Apply intermediate grammatical structures – Confidently use tenses, modals, conditionals, passive voice, and reported speech in written and spoken English. 4. Expand vocabulary strategically – Use word formation (prefixes, suffixes, compound nouns) and phrasal verbs common in engineering and workplace communication. 5. Engage in critical discussion – Express opinions, make predictions, give advice, and debate social/ethical issues related to technology and the environment. 6. Handle real-world interactions – Make polite requests, engage in small talk, arrange meetings, use phone/appointment language, and produce professional emails and short written texts.
Indicative Contents المحتويات الإرشادية	1. Understand and use a full range of tenses – Present, past, present perfect, past perfect, and <i>used to</i> through reading about world cultures, biographies (Van Gogh, Shakespeare), and telling stories. 2. Master auxiliary verbs and short answers – Practice <i>do, be, have</i> in questions, negatives, and polite short responses in everyday conversations and class surveys. 3. Apply present tenses and passive voice – Describe jobs, routines, and workplace activities using simple and continuous forms, state verbs, and the passive in professional contexts. 4. Use modal and related verbs for advice, obligation, and permission – Discuss modern dilemmas, school rules, and British laws using <i>should, must, have to, can, be allowed to, and had to</i>. 5. Express future possibilities and predictions – Use <i>will, going to, present continuous, may, might, could</i> to discuss climate change, space tourism, and life in 2060. 6. Form and use conditionals – Practice second and third conditionals as well as <i>might/could/should have done</i> to talk about hypothetical past and present situations. 7. Build vocabulary through word formation and phrasal verbs – Learn suffixes, prefixes, compound nouns, and separable/inseparable phrasal verbs (literal and idiomatic). 8. Develop reading comprehension strategies – Extract information from articles about families, royalty, technology, architecture, crime, and famous people (jigsaw reading). 9. Enhance listening skills – Follow interviews, conversations, radio dramas, weather forecasts, and personal narratives to identify opinions, predictions, and key details. 10. Participate in spoken interactions – Make small talk, give and soften opinions, agree/disagree politely, make requests and offers, and arrange meetings through roleplays and discussions. 11. Write various text types – Produce informal letters, emails, short biographies, descriptions of people/places, stories, and discursive essays (pros and cons) with correct organization and linking words. 12. Master pronunciation and everyday English – Recognize vowel sounds, lost sounds, silent letters, word stress changes, and use polite expressions, clichés, and numbers (percentages, fractions, decimals).
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Task-based and communicative activities – Engage students in pair work, group discussions, roleplays, and surveys to practice real-life language use in engineering and professional contexts.

Refrigeration and Air Conditioning syllabus

	Integrated skills development – Combine reading, listening, speaking, and writing within each unit through jigsaw reading, dictation, storytelling, and project-based tasks. Grammar in context – Present and practice grammatical structures (tenses, modals, conditionals, passive voice, reported speech) through authentic texts, audio materials, and guided exercises. Vocabulary building strategies – Teach word formation (prefixes, suffixes, compound nouns), phrasal verbs, and pronunciation patterns (word stress, silent letters, lost sounds) using vocabulary records and drills. Student-centered and interactive learning – Encourage active participation through class surveys, interviews, presentations, and peer correction, with teacher acting as facilitator and model.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Practice present, past, and present perfect tenses with auxiliary verbs through a world quiz and class survey.
Week 2	Develop question forms, short answers, and word families while reading jigsaw texts about two families.
Week 3	Differentiate present simple vs. continuous and use adjectives to describe jobs and daily routines.
Week 4	Apply present passive voice and adverbs of frequency while discussing salaries and interviewing about jobs.
Week 5	Contrast past simple, past continuous, and past perfect tenses through biography reading and storytelling.
Week 6	Use "used to" for past habits and practice giving strong opinions with question tags.
Week 7	Use modal verbs (should, must, have to) and phrasal verbs to give advice on modern dilemmas.
Week 8	Express past obligation with "had to" and write a short biography of a famous person.
Week 9	Review Units 1–4 through mid-term assessment and error analysis.
Week 10	Express future predictions using will, going to, may, might, and could while reading about life in 2060.
Week 11	Build vocabulary with suffixes, prefixes, and word stress changes, then practice arranging meetings.
Week 12	Form information questions and write a descriptive paragraph about a favourite room.
Week 13	Apply present perfect tenses and verb patterns while discussing personal passions and hobbies.
Week 14	Construct second/third conditionals and write a short discursive essay on pros and cons.
Week 15	Review Units 5–10 and complete final assessment covering all four skills.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	New Headway Intermediate	Yes
Recommended Texts		
Websites		

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	Refrigeration & Air Conditioning			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	RAC 302				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level	3	Semester of Delivery			
Administering Department		PM	College	TEMO	
Module Leader	Dr. Ayad Suleiman Abdullah		e-mail	Ayad.selman@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number		3.0
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives أهداف المادة الدراسية	Module Objectives for Refrigeration & Air Conditioning:				
	12. Understand the fundamental principles of thermodynamics and heat transfer as applied to refrigeration and air conditioning systems. 13. Identify and explain the main components of vapor compression refrigeration cycles, including compressors, condensers, expansion devices, and evaporators. 14. Analyze and evaluate the performance of refrigeration systems using key parameters such as COP (Coefficient of Performance) and refrigerating effect. 15. Recognize different types of refrigerants, their properties, environmental impact, and proper handling procedures in accordance with safety standards. 16. Design and select appropriate air conditioning systems for residential, commercial, and industrial applications based on load calculations. 17. Apply psychrometric principles to analyze and control air properties such as temperature, humidity, and enthalpy in HVAC systems. 18. Troubleshoot common faults in refrigeration and air conditioning systems and propose suitable maintenance and energy-efficiency solutions.				

Refrigeration and Air Conditioning syllabus

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Module Learning Outcomes for Refrigeration & Air Conditioning: 15. Knowledge: Demonstrate a thorough understanding of the thermodynamic principles governing refrigeration cycles and air conditioning systems, including the vapor compression and absorption cycles. 16. Comprehension: Explain the function and interaction of key system components such as compressors, evaporators, condensers, and expansion valves within a complete refrigeration circuit. 17. Application: Apply psychrometric charts and heat load calculations to design and size air conditioning systems suitable for various building types and climatic conditions. 18. Analysis: Analyze system performance data to evaluate the Coefficient of Performance (COP), energy efficiency ratios, and overall system effectiveness under varying operating conditions. 19. Synthesis: Select appropriate refrigerants and system configurations based on environmental regulations, safety requirements, and application-specific demands. 20. Evaluation: Assess and diagnose common operational faults in refrigeration and air conditioning systems, and recommend corrective maintenance strategies to restore optimal performance. 21. Professional Skills: Apply industry standards and best practices in the safe installation, commissioning, and maintenance of refrigeration and air conditioning equipment.
Indicative Contents المحتويات الإرشادية	Indicative Contents for Refrigeration & Air Conditioning: 1. Introduction to Refrigeration & Air Conditioning • Historical development and applications • Basic concepts and terminology • Types of refrigeration and air conditioning systems 2. Thermodynamic Principles • Laws of thermodynamics as applied to refrigeration • Heat transfer mechanisms (conduction, convection, radiation) • Thermodynamic cycles (Carnot, Reversed Carnot) 3. Vapor Compression Refrigeration System • Cycle analysis and P-h diagrams • System components: compressor, condenser, expansion valve, evaporator • Performance evaluation and COP calculation 4. Refrigerants • Types and classification of refrigerants (CFCs, HCFCs, HFCs, Natural) • Properties and selection criteria • Environmental impact and international regulations (Montreal & Kyoto Protocols) 5. Absorption Refrigeration Systems • Operating principles and cycle analysis • Lithium Bromide–Water and Ammonia–Water systems • Comparison with vapor compression systems 6. Psychrometrics • Properties of moist air and psychrometric chart • Air conditioning processes (heating, cooling, humidification, dehumidification) • Psychrometric calculations and applications 7. Cooling Load Calculations • Heat gain sources (solar, internal, infiltration) • Load estimation methods • Design parameters and safety factors 8. Air Distribution Systems • Duct design and airflow principles • Types of air handling units (AHU)

Refrigeration and Air Conditioning syllabus

	- Fan selection and ventilation requirements 9. Types of Air Conditioning Systems - Window, split, central, and VRF systems - Industrial and commercial refrigeration systems - Energy efficiency and green building standards 10. Maintenance & Troubleshooting - Preventive and corrective maintenance procedures - Common faults and diagnostic techniques - Safety regulations and handling of refrigerants
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	1. Lectures (المحاضرات) - Delivery of core theoretical concepts through structured classroom sessions - Use of visual aids, animations, and diagrams to illustrate refrigeration cycles and system components - Integration of real-world engineering examples to reinforce understanding 2. Tutorials & Problem-Solving Sessions (حصة التمارين وحل المسائل) - Guided worked examples on COP calculations, psychrometric problems, and heat load estimations - Small group discussions to encourage analytical thinking - Regular practice problems to consolidate lecture material 3. Laboratory & Practical Work (العمل المختبري والعملي) - Hands-on experiments using refrigeration and air conditioning test rigs - Measurement and analysis of real system performance data - Safety training for handling refrigerants and operating equipment 4. Case Studies (دراسات الحالة) - Analysis of real HVAC and refrigeration system designs - Evaluation of energy efficiency solutions in commercial and industrial settings - Discussion of environmental impact and sustainable refrigerant alternatives 5. Self-Directed Learning (التعلم الذاتي) - Assigned readings from textbooks, technical standards, and research articles - Independent research on emerging technologies in refrigeration and air conditioning - Use of online simulation tools and psychrometric software 6. Group Projects & Presentations (المشاريع الجماعية والعروض التقديمية) - Collaborative design projects for air conditioning system selection and sizing - Student presentations to develop communication and technical reporting skills - Peer evaluation to promote critical assessment abilities 7. Assessment & Feedback (التقييم والتغذية الراجعة) - Continuous assessment through quizzes, assignments, and mid-term examinations - Constructive feedback on submitted work to guide student improvement - Final examination covering all theoretical and applied aspects of the module
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	77	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	123	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	8
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	200		

Refrigeration and Air Conditioning syllabus

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Site Survey of Air-Conditioned Space, Relation Between Heat Gain and Cooling Load.
Week 2	Site Survey of Air-Conditioned Space, Relation Between Heat Gain and Cooling Load.
Week 3	Site Survey of Air-Conditioned Space, Relation Between Heat Gain and Cooling Load.
Week 4	Cooling Load Estimation
Week 5	Cooling Load Estimation
Week 6	Duct Design, Methods of Design
Week 7	Duct Design, Methods of Design
Week 8	Fan
Week 9	Distribution Air Diffuser
Week 10	Pipe Design, Methods of Design
Week 11	Pipe Design, Methods of Design
Week 12	Pump
Week 13	Food Preservation
Week 14	Cold Storage Dimension Calculation
Week 15	Pallet Method And Shelving Method In Cold Storage Dimension Calculation

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي العملي

	Material Covered
Week 1	Calculation the Capacity of Condenser for Heat Pump
Week 2	Calculating the Cooling Effect in The Heat Pump.
Week 3	Effect of The Types of Expansion Devices on The C.O.P. In The Refrigeration System
Week 4	Cooling Tower
Week 5	Calculation of chilled water refrigeration capacity, With studying the sensible cooling process
Week 6	Study the pressure drop in ducting system accessories
Week 7	Actual refrigeration cycle
Week 8	Processes of Air Conditioned
Week 9	Parallel & Series pumps connection, and the relation between the heads and their flow
Week 10	Calculation of Chiller Load water pump on
Week 11	Calculation of Chiller Load water pump off
Week 12	Performance of Air Conditioning Unit with Varies Expansion Devices
Week 13	Adsorption Refrigeration
Week 14	<i>Refrigeration system Unit</i>
Week 15	Effect of Changing Cooling Water Flow Rate for Condenser on Performance of Refrigeration System

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Stoecker, W.F. & Jones, J.W. - Industrial Refrigeration Handbook, McGraw-Hill. - Dossat, R.J. & Horan, T.J. - Principles of Refrigeration, Prentice Hall. - Arora, C.P. - Refrigeration and Air Conditioning, Tata McGraw-Hill. - Whitman, W.C., Johnson, W.M. & Tomczyk, J.A. - Refrigeration and Air Conditioning Technology, Cengage Learning.	No

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Recommended Texts	- ASHRAE Fundamentals Handbook - American Society of Heating, Refrigerating and Air-Conditioning Engineers. - Hundy, G.F., Trott, A.R. & Welch, T.C. - Refrigeration, Air Conditioning and Heat Pumps, Butterworth-Heinemann. Cengel, Y.A. & Boles, M.A. - Thermodynamics: An Engineering Approach, McGraw-Hill.	No
Websites	- ASHRAE Official Website: www.ashrae.org - Engineering Toolbox: www.engineeringtoolbox.com - MIT Open Course Ware – Thermodynamics & Heat Transfer: ocw.mit.edu	

Module Information					
معلومات المادة الدراسية					
Module Title	Maintenance of Refrigeration & Air Conditioning Systems			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	RAC 303				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	Semester of Delivery		6
Administering Department		PM	College	TEMO	
Module Leader	Dr. Ammar Hassan Suhail		e-mail	ammarsuhail@ntu.edu.iq	
Module Leader's Acad. Title		Lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Abdullah Adel Badr		e-mail	abdulladel06@ntu.edu.iq	
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/6/2025	Version Number	3.0	
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives أهداف المادة الدراسية	By the end of this module, students should be able to: Studying the subject of "Refrigeration and Air Conditioning Maintenance" provides students with a wide range of skills and knowledge. Here is some of what students will learn: 1. Students learn the basics of refrigeration and air conditioning systems, which include: - Basic principles of refrigeration and air conditioning. - How refrigeration and air conditioning systems work and maintain. 2. Troubleshooting: - Identify common malfunctions in refrigeration and air conditioning systems. - Use tools and equipment to accurately identify problems. 3. Preventive Maintenance Procedures:				

Refrigeration and Air Conditioning syllabus

	- Students learn how to develop periodic maintenance plans to maintain the efficiency of systems. - Students learn to implement preventive maintenance procedures to reduce future malfunctions. 4. System Repair: - Students learn how to repair and replace damaged components. - Students learn the correct procedures for restarting systems after repair. 5. Dealing with Different Coolants: - Identify the different types of refrigerants and their properties. - Learn how to handle refrigerants and adhere to environmental regulations safely. 6. Reading technical drawings and documents: - Understanding and reading electrical and hydraulic drawings for refrigeration and air conditioning systems. - Identifying technical documents and using them in maintenance and repair operations. 7. Using measuring and diagnostic tools: - Dealing with measuring tools such as multimeters and pressure gauges. - Using diagnostic devices to determine the efficiency and performance of systems. 8. Occupational safety principles: - Identifying safety procedures when working with electrical systems and refrigerants. - Taking the necessary precautions to avoid accidents and injuries. 9. Practical applications: - Gaining practical experience through training in workshops or laboratories. - Implementing applied projects that allow students to apply what they have learned in real-life scenarios. 10. Modern technologies and innovations: - Viewing the latest technological developments in the field of refrigeration and air conditioning. - Identifying smart and sustainable systems that contribute to improving energy efficiency.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: Behavioural objectives for studying the subject of refrigeration and air conditioning maintenance: 1. Knowledge and understanding: - Introducing the student to the components of refrigeration and air conditioning systems and their various functions. - Understanding the basic principles of operation of refrigeration and air conditioning systems. - Identifying the types and causes of common malfunctions in refrigeration and air conditioning devices. 2. Practical skills: - Developing skills for examining and diagnosing malfunctions in refrigeration and air conditioning systems. - Acquiring the ability to use the correct tools and equipment to maintain and repair devices. - Learning how to read and understand electrical and mechanical diagrams related to refrigeration and air conditioning systems. 3. Attitudes and values: - Enhancing commitment to safety and security standards when dealing with refrigeration and air conditioning systems. - Developing a sense of accuracy and attention to detail in maintenance operations. - Encouraging the principle of sustainability by maintaining the efficiency of systems and reducing energy consumption. Learning outcomes for studying the subject of refrigeration and air conditioning maintenance:

Refrigeration and Air Conditioning syllabus

	1. Know the basic components of refrigeration and air conditioning systems and their functions. 2. Understand the physical and chemical principles on which refrigeration and air conditioning processes are based. 3. Identify common malfunctions in refrigeration and air conditioning devices and suggest appropriate solutions to repair them. 4. Use the necessary tools and equipment for maintenance correctly and safely. 5. Read and understand the electrical and mechanical diagrams of refrigeration and air conditioning systems. 6. Implement preventive maintenance procedures to ensure that systems operate efficiently. 7. Apply occupational safety standards when dealing with refrigeration and air conditioning systems. 8. Improving energy efficiency in refrigeration and air conditioning systems through advanced maintenance techniques.
Indicative Contents المحتويات الإرشادية	Indicative Contents for Engineering Mechanics/Dynamics: 1. Tools and equipment used in maintenance 2. Identify the compression cycle and all its parts 3. Identify the electrical cycle and how to connect it to all its parts 4. Domestic refrigeration appliances (domestic refrigerator and water refrigerator) and how to maintain mechanical and electrical parts 5. Refrigeration and air conditioning devices (window air conditioners and wall split air conditioners) and how to maintain mechanical and electrical parts 6. Refrigeration and air conditioning devices (inverter split and vertical split), and how to maintain mechanical and electrical parts 7. Car air conditioning and refrigeration equipment (for old and new systems), and how to maintain mechanical and electrical parts 8. Cooling towers used in cooling systems and how to maintain mechanical and electrical parts 9. Types of compressors used in refrigeration systems and how to maintain mechanical and electrical parts 10. Types of condensers and evaporators used in refrigeration systems and how to maintain them 11. Types of expansion devices used in refrigeration systems and how to maintain them 12. Water chillers used in refrigeration processes, and how to maintain mechanical and electrical parts 13. Water boilers used in air conditioning and how to maintain mechanical and electrical parts 14. Variable Refrigerant Flow (VRF) Refrigeration and Air Conditioning Equipment and How to Maintain Mechanical and Electrical Parts 15. How to apply occupational safety standards during maintenance and repair operations. As well as handling refrigerants used in the field of refrigeration and air conditioning safely and correctly.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and Teaching Strategies

Refrigeration and Air Conditioning syllabus

	The primary strategy for delivering this unit is to encourage students to initially participate in ho appliance maintenance while honing their critical thinking skills and expanding them to central syste This is achieved through classroom instruction, interactive lessons, and visits to construction site scientific visits. The course covers various types of refrigeration and air conditioning syste maintenance methods, and potential malfunctions, including practical activities of interest to stude
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Tools and equipment used in maintenance
Week 2	compression cycle and all its parts
Week 3	electrical cycle and how to connect it to all its parts
Week 4	Domestic refrigeration appliances
Week 5	Refrigeration and air conditioning devices
Week 6	inverter split and vertical split
Week 7	Car air conditioning and refrigeration equipment (for old and new systems).
Week 8	Cooling towers used in cooling systems
Week 9	Types of compressors used in refrigeration systems
Week 10	Types of condensers and evaporators
Week 11	Types of expansion devices
Week 12	Water chillers used in refrigeration processes
Week 13	Water boilers used in air conditioning
Week 14	Variable Refrigerant Flow (VRF) Refrigeration and Air Conditioning Equipment
Week 15	Apply occupational safety standards during maintenance and repair operations. As well as handling refrigerants used in the field of refrigeration and air conditioning safely and correctly.
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Andrew D. et. al Modern Refrigeration and Air Conditioning.	No
Recommended Texts	Refrigeration and Air Conditioning Technology (2016, Cengage Learning)	No
Websites		

Refrigeration and Air Conditioning syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	Engineering Computer Applications		Module Delivery		
Module Type	Basic		☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	PM 303				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		3	Semester of Delivery		6
Administering Department		PM	College	TEMO	
Module Leader	Husam Naufal Saleh Yassien		e-mail	husam.naufal@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	Module Leader's Qualification		MASTER
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number	3.0	
Relation with other Modules					
العلاقة مع المواد الدراسية الأخرى					
Prerequisite module		None		Semester	
Co-requisites module		None		Semester	
Module Aims, Learning Outcomes and Indicative Contents					
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية					
Module Objectives أهداف المادة الدراسية	1. To develop students fundamental knowledge for modeling the mechanical different parts in 2D & 3D. 2. To develop students fundamental knowledge of insight into drawing the mechanical different parts in 2D & 3D. 3. To understand the basic principles of simulation and creating mechanical parts systems in 2D & 3D using developed design software. 4. This course deals with the basic concept of mechanical drawing. 5. Identify and describe the icons components of a typical insertion of different mechanical parts into different mechanical structures. 6. To explain different important mechanical parts involved in mechanical systems processes.				

Refrigeration and Air Conditioning syllabus

	7. To develop students' fundamental knowledge of analyzing and calculating the important strength of materials factor that is very significant in manufacturing of designed mechanical parts in 2D & 3D.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Define mechanical parts and identify their applications. 2. Define and calculate mechanical parts using developed design software. 3. Recognize how to use the icons components of a typical insertion of different mechanical parts. 4. Analyze the important strength of materials factor that is very significant in manufacturing of designed mechanical parts in 2D & 3D. 5. Describe the significance the accurate successfully 2D & 3D designation of mechanical parts in the manufacturing. 6. Identify the employing of the successful 2D & 3D designation way of the mechanical parts in the manufacturing.		
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Define and show significance, of [Fasteners {Nuts, Screws, Washer}; {Shaft generators: Cylinder, Wrench, thread, gear, chamfer and fillet}; {Shaft Component: Roller Bearing, (Key: Parallel and Woodruff Key), Seals}; {Drill Bushing: Assembly Drawing}; {Springs: Compression, Extension and Torsion}; {Deflection Line}; {moment of inertia}]. - Calculation and analysis of [Fasteners {Nuts, Screws, Washer}; {Shaft generators: Cylinder, Wrench, thread, gear, chamfer and fillet}; {Shaft Component: Roller Bearing, (Key: Parallel and Woodruff Key), Seals}; {Drill Bushing: Assembly Drawing}; {Springs: Compression, Extension and Torsion}; {Deflection Line}; {moment of inertia}]. - Create, design and inert of [Fasteners {Nuts, Screws, Washer}; {Shaft generators: Cylinder, Wrench, thread, gear, chamfer and fillet}; {Shaft Component: Roller Bearing, (Key: Parallel and Woodruff Key), Seals}; {Drill Bushing: Assembly Drawing}; {Springs: Compression, Extension and Torsion}; {Deflection Line}; {moment of inertia}].		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
Strategies	The Creation, designation and insertion of mechanical parts 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 mechanical designing 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 interactively module promotes equipping students with the knowledge and skills necessary for success in the field of designation of mechanical parts.		
Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	3.2
Unstructured SWL (h/sem)	52	Unstructured SWL (h/w)	3.46

Refrigeration and Air Conditioning syllabus

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل		100	
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
	Material Covered		
Week 1	Fasteners: - Nuts - Screws - Washer - Screw connection		
Week 2	Shaft generators - Cylinder - Cone		
Week 3	Shaft generators - Wrench - Thread		
Week 4	Shaft generators Gears		
Week 5	Shaft generators Chamfer and Fillet		
Week 6	Assembly Drawing		
Week 7	Shaft Component Roller Bearing and Bearing calculations		
Week 8	Shaft Component Key: Parallel , Woodruff Key		
Week 9	Shaft Component Seals		
Week 10	Drill Bushing and Assembly Drawing		
Week 11	Springs: Compression		
Week 12	Springs: Extension		
Week 13	Springs: Torsion		
Week 14	Moment of Inertia		
Week 15	Deflection Line		
Learning and Teaching Resources مصادر التعلم والتدريس			
	Text	Available in the Library?	
Required Texts	Autodesk Mechanical Desktop Program.	No	
Recommended Texts		No	
Websites			

Refrigeration and Air Conditioning syllabus

Module Information				
معلومات المادة الدراسية				
Module Title	Numerical Analysis		Module Delivery	
Module Type	Basic		☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM 304			
ECTS Credits	4			
SWL (hr/sem)	150			
Module Level	3	Semester of Deliver		6
Administering Department	PM	College	TEMO	
Module Leader	Qais A. Yousif		e-mail	kaisyusuf@ntu.edu.iq
Module Leader's Acad. Title	Asst. Prof.	Module Leader's Qualification	Ph.D.	
Module Tutor			e-mail	
Peer Reviewer Name	Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date	01/06/2025	Version Number	3.0	
Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module	None		Semester	
Co-requisites module	None		Semester	
Module Aims, Learning Outcomes and Indicative Contents				
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية				

Refrigeration and Air Conditioning syllabus

Module Objectives أهداف المادة الدراسية	By the end of the semester, the student should not only be familiar, but more confident, in effectively using numerical tools to solve problems in their own field of interest. In particular, the students will become proficient: 1. To understand the theoretical and practical aspects of the use of numerical methods. 2. To introduce the fundamentals of numerical methods used for the solution of engineering problems. 3. To introduce various techniques for solving; linear, non-linear, and difference equations using various numerical methods. 4. To apply gained knowledge to solve practical problems. 5. To recognize the difference between analytical and numerical solutions. 6. To recognize the difference between true relative error ε_t, approximate relative error ε_a, and acceptable error ε_s, and 7. To understand how ε_a and ε_s are used to terminate an iterative computation. 8. To know the relationship between finite divided differences and derivatives. 9. To be able to analyze how errors are propagated through functional relationships.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successfully completing the module, students will be able to: 1. demonstrate knowledge and critical understanding of the well-established principles within a wide range of basic numerical methods, including iterative methods, interpolation, quadrature, finite difference approximation of initial-value problems for ordinary differential equations (ODEs); 2. demonstrate the capability to use a range of established techniques and a reasonable level of skill in calculation and manipulation of the material to solve problems in the following areas: root finding, interpolation, numerical quadrature, finite differences, initial-value problems for ODEs; 3. apply the concepts and principles in basic numerical approximation in well-defined contexts beyond those in which they were first studied, showing the ability to evaluate critically the appropriateness of different tools and techniques; 4. make appropriate use of MATLAB commands to implement numerical methods.
Indicative Contents المحتويات الإرشادية	11. Specific goals, such as verifying a design, improving performance, or investigating a failure. 12. Translating a physical system into a mathematical model. 13. Equations governing the system's behavior, such as Newton's laws of motion, Fourier's heat transfer laws, or Maxwell's equations. 14. An evaluation of the results in relation to the design objectives and requirements. 15. Cost-benefit analysis to select the most efficient design. 16. Definition of what is included and, crucially, what is excluded from the analysis.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	

Refrigeration and Air Conditioning syllabus

Strategies	4. Detailed explanation of the scientific material. 5. Students' participation in solving mathematical problems during the class lecture time. 6. Discussion and dialogue about vocabulary related to the topic.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (hr./w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (hr./w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem)	100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Definition and significance of numerical analysis.
Week 2	Iteration Methods for Solving linear Equations (Jacobi's or Gauss- Jacobi and Gauss-Seidel Method). Strictly Diagonally Dominant Matrix.
Week 3	Quiz
	Iteration Methods for solving Nonlinear Equations (Root Finding); Graphical approach.
Week 4	Bracketing Methods: Bisection Method, False-Position (Regula Falsi) Method.
Week 5	Quiz
	Open Methods: Newton-Raphson Method, Secant Method, Fixed-point iteration.
Week 6	Quiz
	Iteration Methods for solving System of Nonlinear Equations: Newton-Raphson and Fixed-point method.
Week 7	Quiz
	Numerical Differentiation: Approximation of First Order Derivative (Finite difference formulas; Forward, Backward, Central differences).
Week 8	Quiz
	Numerical Differentiation: Approximation of Second Order Derivative (Finite difference formulas; Forward, Backward, Central differences).
Week 9	Quiz
	Numerical Solution of Differential Equations (Runge-Kutta method).
Week 10	Quiz
	Numerical Integration: Newton-Cotes formulas (Trapezoidal Rule, Simpson1/3 rd , Simpson3/8 th Rule, and Boole's Rule).
Week 11	Midterm Exam
Week 12	Composite integration
Week 13	Quiz

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	Approximating Definite Integrals Using Left, Right, and Midpoint with Riemann Sums.
Week 14	Quiz
	Numerical Integration: Gaussian Quadrature
Week 15	Quiz
	Review
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	An Introduction to Numerical Analysis Solutions to Exercises, Endre Suli and David F. ayers, University of Oxford. Advanced Engineering Mathematics by Erwin Kreyszig	No
Recommended Texts	Fundamental Numerical Methods and Data Analysis, by George W. Collins, II	No
Websites	http://www.numerical-methods.com	

Module Information

معلومات المادة الدراسية

Module Title	Theory of Machines and Vibrations			Module Delivery	
Module Type	Core			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	PM 305				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level		3	Semester of Delivery		
Administering Department		PM	College	TEMO	
Module Leader	Dr. Yasir Hassan Ali		e-mail	Yha2006@ntu.edu.iq	
Module Leader’s Acad. Title		Lacturer	Module Leader’s Qualification		Ph.D.
Module Tutor			e-mail		
Peer Reviewer Name		Dr. Ammar Hassan	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2025	Version Number	3.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Refrigeration and Air Conditioning syllabus

Module Objectives أهداف المادة الدراسية	The main purpose of this course : 1- Acquiring the skill and ability to interact with devices and machines and use them, calculate vibrations and ways to reduce and treat them, and demonstrate the student's ability to use knowledge to prepare scientific and applied research. 2. The ability to use electronic programs to solve problems in mechanical systems. 3. The ability to think critically to develop engineering solutions to problems related to mechanical parts. 4. The ability to keep pace with scientific and technological advancements. 5. Teaching leadership skills and the value and quality of commitment, love of work, and dedication		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- To develop student's fundamental knowledge and insight into the theory of machines. 2. The ability to design belts and calculate balancing of rotating masses to be used in machines design. 3. The ability to use experiments, obtain results, and analyze them. 4. The ability to provide comfortable working conditions within the work environment, free from problems such as vibration, noise, etc. 5. The ability to calculate mechanical loads 6. The ability to design mechanical parts without vibration.		
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A -</u> Introduction to Theory of Machines and Vibrations. [hrs] Introduction to Theory of Machines and Vibrations, Balancing . Belts, [hrs] Velocity and Acceleration, [hrs] Equation Of Motion, Two - degree of freedom system [hrs] <u>Part B –</u> Fundamentals - To understand the modern technologies of Theory of Machines and Vibrations [hrs] - Ability to design different types of Machines and calculate the Vibrations [hrs]		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
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) الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	123	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	200		
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري			
	Material Covered		
Week 1	Introduction and Definition. Graphical Representation of Displacement, velocity, and acceleration with respect to time. Solved problems.		
Week 2	Velocity and Acceleration in mechanisms.		
Week 3	Velocity and Acceleration in mechanisms.		
Week 4	Balancing of rotating masses. Balancing of a single rotating mass by a single mass rotating in the same plane.		

Refrigeration and Air Conditioning syllabus

	Balancing of a single rotating mass by two masses rotating in different planes. (a) Analytical method. (b) Graphical method.	
Week 5	Balancing of several masses rotating in the same plane. (a) Analytical method. (b) Graphical method.	
Week 6	Belts	
Week 7	Belts	
Week 8	Basic concepts of vibration	
Week 9	Introduction to oscillatory motion, Free vibration of an undamped single degree of freedom system	
Week 10	Energy method (Rayleigh Principle)	
Week 11	Free vibration of a viscously damped single degree of freedom system	
Week 12	Equivalent springs and dampers, Forced vibration of a single degree of freedom system	
Week 13	Two - degree of freedom system	
Week 14	Two - degree of freedom system	
Week 15	Two - degree of freedom system	
Week 16	Preparatory week before the final Exam	
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر		
	Material Covered	
Week 1	Gyroscopic	
Week 2	bearings	
Week 3	balance	
Week 4	belt	
Week 5	springs	
Week 6	simple pendulum	
Week 7	damping of water	
Week 8	damping of air	
Week 9	Bifilar	
Week 10	Machinery soft foot	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1-Theory of Vibration with Applications 2- Theory of Machines	No
Recommend ed Texts	1-Theory of Vibration with Applications 2- Theory of Machines	No
Websites	1- https://svantek.com/academy/vibration-guide/ 2- https://ocw.mit.edu/courses/2-003sc-engineering-dynamics-fall-2011/pages/syllabus/ 3- https://www.scribd.com/document/431196398/Vibration-Lecture-1	