

Renewable Energy 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		1
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		01/06/2025	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.				

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مخرجات التعلم للمادة الدراسية	3. Apply the principles of static equilibrium to solve problems involving forces and moments acting on rigid bodies in two and three dimensions. 4. Analyze and calculate the internal forces, such as axial forces, shear forces, and bending moments, in statically determinate structures using methods such as the method of sections and the method of joints. 5. Utilize free-body diagrams to model and analyze the forces acting on a structure or a rigid body, and determine the resultant forces and moments at specific points. 6. Analyze and calculate the centroid and moment of inertia of various two-dimensional shapes, including rectangles, triangles, and circles, and apply these concepts to determine the stability and strength of structures. 7. Apply the concepts of friction and its effects on the equilibrium of bodies in statics, including calculating static and kinetic friction forces and determining the angle of friction. 8. Analyze and calculate the forces in trusses and frames, including the method of joints and the method of sections, and determine the stability and structural integrity of these systems. 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

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	• Calculating moments of inertia for simple shapes • 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			

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

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	problems in the core topics		
	Demonstrate an understanding of how to communicate mathematical ideas clearly and coherently		
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.		
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)			
المنهاج الاسبوعي 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		

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Module Information					
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.			

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	demonstrating the ability to apply theoretical knowledge in a practical setting. 6 .Problem-Solving Ability: 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 للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب 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.		

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Week 6	Analysis of DC circuits: Ohm's law, resistivity & conductivity, temperature effect.
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		
بنظام ECTS				
SWL (hr/sem)		50		
مستوى المقرر		1		فصل تقديم المقرر
القسم الإداري المسؤول		PM		الكلية
مسؤول المقرر		أ.م. د. محمد عبد الموجود حسن		إيميل
اللقب الأكاديمي لمسؤول المقرر		أستاذ مساعد		الشهادات العلمية لمسؤول المقرر
مدرس المقرر		أ.م. د. محمد عبد الموجود حسن		إيميل
اسم المراجع النظير		د. عمار حسن سهيل		إيميل
تاريخ اعتماد اللجنة العلمية		2025/06/01		رقم الإصدار
3.0				
العلاقة مع المواد الدراسية الأخرى				
المقرر السابق المطلوب		لا يوجد		
المقررات المتزامنة		لا يوجد		
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، وأصولها التاريخية ونشأتها. 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 تطورهما 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، فضلًا 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.		

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استراتيجيات التعلم والتعليم

1. المحاضرات النظرية: تقديم المفاهيم الأساسية لحقوق الإنسان والديمقراطية، مدعومة بالمناقشات الصفية وتحليل الأمثلة الواقعية.	استراتيجيات
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

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

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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		1	
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						

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	Reduce fear of making mistakes
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module, students will be able to: - Identify main ideas in short reading passages - Use basic grammar correctly in sentences - Communicate simple ideas in spoken English - Write a short paragraph with correct structure - 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 للطلاب محسوب لـ ١٥ اسبوعا	
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	33
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	17
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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

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	- Grammar: Modal verbs (can, must, should) - 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		

Renewable Energy 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 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	107	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب 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.		

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Week 3	First law of thermodynamics
Week 4	Steady flow energy equation for open system, non-flow energy equation for closed system, Ideal gas and equation of state
Week 5	Ideal gas, Boyle's law and Charles law and equation of state
Week 6	Specific heat at constant pressure and constant volume, closed system Processes using ideal gas. Isometric and isobaric processes.
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		2	
Administering Department		PM		College		TEMO	
Module Leader		Safa Akram Younis		e-mail		safa.altutunji@ntu.edu.iq	
Module Leader's Acad. Title		Assist. Lecturer		Module Leader's Qualification		M.Sc.	
Module Tutor				e-mail			
Peer Reviewer Name		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		To learn about computers and their characteristics and features, compare different types of computers. 1. To learn about the computer's Hardware, Identify the factors that affect the computer's performance, Learn about the numerical systems and data representation. 2. Learn about the computer's Hardware (2), CPU, Memory 3. Learn about operating system software 4. Learn about the utility software programming languages, application software. 5. Learn the Microsoft office2020(Word, Excel, PowerPoint)					
Module Learning Outcomes		1. Demonstrates knowledge of the Introduction to computer, computer component (hardware, software) 2. Demonstrates knowledge of the Operating system (windows), 3. Able to install windows (formatting) 4. Able to use the following items: Start menu, desktop, taskbar, mouse applications, My computer, My documents, drivers, folders, files, cut, copy, paste, shortcut, right click menu, Setting menu, control panel 5. Able to use Microsoft word 2020, Microsoft excel 2020, Microsoft PowerPoint 2020 6. Able to use Internet, Internet explorer, starting, menus of internet explorer, E-Mail: Yahoo, Hotmail, google, yahoo, search information					
Indicative Contents		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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	3. To knows the CPU, types of memory modules, learn about input and output units, Learn about storage media, learn the components of the motherboard [11 hrs] 4. 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] 5. 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] 6. Learn to use the Microsoft office2020 [15hrs] ● Word [5 hrs] ● Excel [5 hrs] ● Powerpoint [5 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	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) المناهج الاسبوعي 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		

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Week 12	Introduction to Internet and Web Browsers: 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	

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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		
القسم الإداري المسؤول		PM		TEMO
مسؤول المقرر		أ.م. د. محمد عبد الموجود حسن		dr.mohmmmed67@ntu.edu.iq
اللقب الأكاديمي لمسؤول المقرر		أستاذ مساعد		الشهادات العلمية لمسؤول المقرر
مدرس المقرر		أ.م. د. محمد عبد الموجود حسن		dr.mohmmmed67@ntu.edu.iq
اسم المراجع النظير		د. عمار حسن سهيل		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		
المقررات المتزامنة		لا يوجد		
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 للطالب محسوب لـ ١٥ اسبوعا			
2	الحمل الدراسي المنتظم للطالب أسبوعيا	33	الحمل الدراسي المنتظم للطالب خلال الفصل
1	الحمل الدراسي غير المنتظم للطالب أسبوعيا	17	الحمل الدراسي غير المنتظم للطالب خلال الفصل
50		الحمل الدراسي الكلي للطالب خلال الفصل	
المناهج 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/	

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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	
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	
Module Tutor			e-mail	MASTER
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/Dynamics:			
	1. Understand the fundamental concepts and principles of dynamics, including motion, forces, and acceleration. 2. Apply kinematic equations to analyze the motion of particles and rigid bodies in various scenarios. 3. Determine the relationship between forces, mass, and acceleration using Newton's laws of motion. 4. Apply the principles of work and energy to analyze and solve dynamic problems. 5. Analyze and calculate linear and angular momentum, and apply the principle of impulse and momentum to dynamic systems. 6. Understand and apply the principles of vibrations and oscillations in mechanical systems. 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.			

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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		

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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		
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. 3. Teaching students to draw geometrically according to accurate measurements. 4. To understand the basic principle for descriptive geometry. 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. 3. Enables the students to learn the techniques and standard practices of technical graphics. 4. To develop the student's abilities of engineering imagination. 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. 7. To teach the student diversity in the way of thinking and finding solutions for drawing each form.			
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A -</u> Introduction to (CAD), components of computer aided drawing (CAD), Exercises. [8 hrs.] Introducing the most important geometric shapes and their components, and how to			

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	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 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)

المنهاج الاسبوعي 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
Week 15	Semester exam

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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] Fire Safety and Emergency Preparedness, Electrical Safety in Engineering Machine and Equipment, Safety Construction, Safety in Engineering Projects, Hazardous Materials			

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	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]		
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.		
Student Workload (SWL)			
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	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". NIOSH Workplace Safety and Health Topics. National Institute of Occupational Safety and Health.</i>		

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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. 10. Diagnose common operational problems and maintenance issues in			

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	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 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		

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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													
	<table><tr><td></td><td>Text</td><td>Available in the Library?</td></tr><tr><td>Required Texts</td><td>2. Refrigeration & Air Conditioning Technology 3. Introduction to Refrigeration and Air Conditioning Systems</td><td>No</td></tr><tr><td>Recommended Texts</td><td>Introduction to Refrigeration and Air Conditioning Systems (2023).</td><td></td></tr><tr><td>Websites</td><td colspan="2"></td></tr></table>		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		
	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													

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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.				

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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)	93	Structured SWL (h/w)	6
الحمل الدراسي المنتظم للطلاب خلال الفصل		الحمل الدراسي المنتظم للطلاب أسبوعيا	
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	4
الحمل الدراسي غير المنتظم للطلاب خلال الفصل		الحمل الدراسي غير المنتظم للطلاب أسبوعيا	
Total SWL (h/sem)	150		
الحمل الدراسي الكلي للطلاب خلال الفصل			
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		

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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	أهداف المادة الدراسية				
	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	مخرجات التعلم للمادة الدراسية				
	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	المحتويات الإرشادية				
	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				

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	hydrostatic 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.

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Week 3	Lab 3: Determination of Centre of Pressure and Hydro-static Force on Plane surface (Part One).	
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		

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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		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. 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	مخرجات التعلم للمادة الدراسية				
	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		

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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		

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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		50		
الحمل الدراسي للفصل (بالساعات)				
مستوى المقرر		الثاني	الفصل الدراسي	
القسم المسؤول		PM	TEMO	
اسم مدرس المقرر		سجي 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		
مقررات مرافقة		لا توجد		
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 المناهج 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	

Renewable Energy syllabus

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					
Administering Department		PM		Semester of Delivery		3	
Module Leader		Wijdan Ahmed Jalal		College		TEMO	
Module Leader's Acad. Title		Assistant Lecturer		e-mail		Mti.lec227.wajdan@ntu.edu.iq	
Module Tutor				Module Leader's Qualification		M.Sc	
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:					

Renewable Energy syllabus

	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

Renewable Energy syllabus

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		

Renewable Energy syllabus

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				

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	- Bearing stress - 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 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	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

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Week 3	Lab 3: Compression Test								
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									
	<table><tr><th>Text</th><th>Available in the Library?</th></tr><tr><td>Required Texts - Strength of Materials, By Andrew Pytel and Ferdinand L. Singer 4th edition. </td><td>No</td></tr><tr><td>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. </td><td>No</td></tr><tr><td>Websites</td><td>https://seia.org/</td></tr></table>	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/
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		4
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

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	• Polyethylene Terephthalate (PET): Ethylene Glycol, Terephthalic Acid 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. 9. Scaffolded Learning: Break down complex concepts into smaller, more manageable

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

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	Collaborate and communicate efficiently within teams and group environments 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		
Week 3 & 4	Computer Troubleshooting: Identifying and solving common hardware and software		

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	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	

Renewable Energy syllabus

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 المترتبة	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. • التواصل الفعال كتابيًا وشفهياً: التعبير عن الأفكار بطريقة منظمة ودقيقة باستخدام اللغة العربية			مخرجات التعلم للمادة الدراسية

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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، الهززة، 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 حفني ناصف وآخرون	الكتب المطلوبة
لا	قواعد اللغة العربية والاملاء للدكتور محمد عبد الله الشال	الكتب المقررة / الكتب الموصى بها
Websites https://shamela.ws/ المكتبة الشاملة		

Renewable Energy 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			
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. 7) Communicate design solutions effectively through technical documentation and			

Renewable Energy syllabus

	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		
Delivery Plan (Weekly Syllabus)				

Renewable Energy 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. 4. Evaluation of how changes in parameters affect the overall system performance. 5. Comparison of model predictions with theoretical, empirical, or experimental			

Renewable Energy syllabus

	results to ensure validity. 6. An evaluation of the results in relation to the design objectives and requirements. 7. Cost-benefit analysis to select the most efficient design. 8. Suggested actions, such as design modifications, material changes, or further testing to mitigate risks. 9. Clear statements of limitations, such as steady-state vs. transient, linear vs. non-linear, or assumed boundary conditions. 10. Definition of what is included and, crucially, what is excluded from the analysis.		
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
Strategies	1. Detailed explanation of the scientific material. 2. Students’ participation in solving mathematical problems during the class lecture time. 3. Discussion and dialogue about vocabulary related to the topic.		
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. - Formulate and solve steady and transient heat conduction problems in one and				

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مخرجات التعلم للمادة الدراسية	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 conduction, convection, and radiation. Practical applications of heat transfer include 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 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, 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

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	Empirical Equations for Natural Convection Heat Transfer	
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	

Renewable Energy syllabus

Module Information								
معلومات المادة الدراسية								
Module Title		Biofuels		Module Delivery				
Module Type		Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☒ Seminar				
Module Code		RE 300						
ECTS Credits		6						
SWL (hr/sem)		150						
Module Level		3		Semester of Delivery		5		
Administering Department		PM		College		TEMO		
Module Leader		Dr. Omar Abdulhadi Mustafa		e-mail		omerahayaly1@ntu.edu.iq		
Module Leader's Acad. Title		Lecturer		Module Leader's Qualification		Ph. D		
Module Tutor				e-mail		E-mail		
Peer Reviewer Name				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			
Co-requisites module		None			Semester			
Module Aims, Learning Outcomes and Indicative Contents								
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية								
Module Objectives		Module Objectives for Biofuels: 12. Students will learn the fundamentals of bio fuel. 13. Students will learn how can design the systems using this type of fuel. 14. Students will become familiar with the operation of activators using bio fuels. 15. Students will make the calculations deals with bio fuels.						
Module Learning Outcomes		Module Learning Outcomes for biofuel: 1. Knowledge and Understanding - Explain the fundamental principles of biofuels: sources, types (biodiesel, bioethanol, biogas), and production processes. - Understand biomass transformation into energy products and compare with fossil fuels. - Identify plant composition and properties relevant to biofuel production. - Evaluate environmental impacts of biofuel use, including greenhouse gas emissions and sustainability. 2. Technical and Analytical Skills						
مخرجات التعلم للمادة الدراسية								

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	- Analyze different biofuel production technologies (fermentation, transesterification, anaerobic digestion). - Assess efficiency and energy yield of biofuels compared to conventional fuels. - Interpret data in multiple formats (numerical, graphical, multimedia, web-based). - Apply life-cycle assessment (LCA) to evaluate biofuel sustainability. 3. Critical Thinking and Application - Debate socio-economic and political issues surrounding biofuel adoption (food vs. fuel, land use, energy security). - Assess the role of biofuels in renewable energy strategies and climate change mitigation. - Evaluate integrated biorefineries that produce both biofuels and biomaterials. 4. Communication and Research Skills - Present scientific information clearly in written, oral, and digital formats. - Engage in informed debate on biofuel-related issues using evidence-based arguments. - Collaborate in multidisciplinary contexts (engineering, environmental science, economics).
Indicative Contents المحتويات الإرشادية	Indicative Contents for biofuel: 1. Introduction to Biofuels - Definition and classification of biofuels (solid, liquid, gaseous). - Historical development and global trends in biofuel use. - Comparison with fossil fuels: energy density, renewability, and emissions. 2. Biomass Resources - Types of feedstocks: crops (corn, sugarcane, rapeseed), lignocellulosic biomass, algae, and waste materials. - Availability, cultivation, and harvesting methods. - Food vs. fuel debate and land-use implications. 3. Biofuel Production Technologies Bioethanol: fermentation of sugars and starches. Biodiesel: transesterification of vegetable oils and animal fats. Biogas: anaerobic digestion of organic waste. Advanced biofuels: cellulosic ethanol, algal biofuels, synthetic fuels. 4. Conversion Processes - Thermochemical methods: pyrolysis, gasification, liquefaction. - Biochemical methods: enzymatic hydrolysis, microbial fermentation. - Process optimization and efficiency improvement. 5. Properties and Applications - Fuel characteristics: calorific value, viscosity, cetane/octane number. - Compatibility with existing engines and infrastructure. - Case studies of biofuel use in transport, heating, and electricity generation. 6. Environmental and Economic Aspects - Life-cycle assessment (LCA) of biofuels. - Impact on greenhouse gas emissions and climate change mitigation. - Economic viability, subsidies, and market competitiveness. 7. Policy and Global Perspectives - International biofuel policies and standards. - Role of biofuels in energy security and sustainable development. - Future prospects: integration with biorefineries and circular economy.
Learning and Teaching Strategies	

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استراتيجيات التعلم والتعليم

Strategies	1. The recipient of this material will be able to adapt to modern learning methods and create non-standard models, similar to those encountered in the early years of education. 2. By learning this material, they will be able to keep up with scientific advancements and integrate with modern patterns adopted in the job incubator. 3. This material enables them to design the systems using this type of fuel.
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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)

المناهج الأسبوعي النظري

	Material Covered
Week 1	Overview of Energy Sources & Utilization, Climate Change & the Impact of Carbon Dioxide
Week 2	overview of biofuel/bioenergy, Fundamental concepts in understanding biofuel/bioenergy production
Week 3	Biofuel crops & potential ecological impacts, Introduction to molecular genetics
Week 4	History of Fossil Fuels, Renewable Energy Sources & Utilization
Week 5	Chemistry & Biochemistry of Hydrocarbons, Industrial Agriculture, Part 1, Industrial Agriculture, Part 2, History of Biofuels,
Week 6	1 st Generation Biofuels – Corn Ethanol & Sugarcane Ethanol, 1 st Generation Biofuels – Biodiesel, Alternative Sources of Biomass
Week 7	Mid. examine
Week 8	2 nd Generation Biofuels – Cellulosic Ethanol, 3 rd Generation Aquatic Biomass – Cyanobacteria, Diatoms & Algae, Metabolic Engineering of Photosynthetic Organisms
Week 9	Bio prospecting, Genetic Modification & Synthetic Biology.
Week 10	Thermochemical Conversion Technologies, Biogas & Bio hydrogen
Week 11	Biodiesel – Chemistry and Analysis.
Week 12	Production Processes for Biofuels from Algae, Bioenergy, Water & the Environment
Week 13	Lifecycle Assessment of Biofuels, Policy & Politics of Energy
Week 14	Nutrient Utilization and Recycling, Value-added processing of biofuel residues and co-products, Fuel Conversion and Future Technology
Week 15	Final examines

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Biofuels production, trade and sustainable development: emerging issues, Annie Dufey, 2006	No
Recommended Texts	Biofuel Technology Handbook, Dominik Rutz & Rainer Janssen 2008	No
Websites		

Renewable Energy syllabus

Module Information					
معلومات المادة الدراسية					
Module Title	Renewable Energy		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	RE 301				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		3		Semester of Delivery	5
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. Understand the differences between conventional and renewable energy sources. 2. Explain the fundamental physical principles governing renewable energy conversion. 3. Analyze the working principles and design considerations of solar thermal and photovoltaic systems. 4. Describe wind energy systems, including turbine types and power characteristics. 5. Understand geothermal, hydro, and biomass energy generation processes. 6. Examine emerging technologies such as tidal, wave, and hydrogen energy. 7. Evaluate energy storage methods and their importance in renewable systems. 8. Assess the efficiency and performance of various renewable technologies. 9. Investigate environmental and economic impacts of renewable energy systems. 10. Recognize the role of renewable energy policies in achieving sustainable energy

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goals.	
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: 1. Define and classify different renewable energy resources. 2. Apply thermodynamic and fluid mechanics principles to energy conversion systems. 3. Compute solar radiation parameters and design solar collectors. 4. Evaluate the performance of photovoltaic systems. 5. Interpret wind turbine performance curves and calculate power output. 6. Analyze geothermal and hydroelectric power systems. 7. Compare various biomass conversion methods and biofuel production processes. 8. Explain the mechanisms of ocean, tidal, and wave energy conversion. 9. Describe hydrogen production, storage, and utilization systems. 10. Discuss energy storage technologies and their integration in hybrid systems. 11. Assess the environmental and economic viability of renewable energy projects. 12. Demonstrate understanding of global trends and national policies supporting renewable energy development.
Indicative Contents المحتويات الإرشادية	Indicative Contents for Engineering Mechanics/Dynamics: 1. Introduction to global energy demand and sustainability challenges 2. Overview of renewable energy resources and technologies 3. Solar energy: thermal collectors, PV systems, efficiency analysis 4. Wind energy: turbine types, aerodynamic principles, and performance curves 5. Geothermal energy: heat extraction and power generation methods 6. Hydroelectric systems: small- and large-scale applications 7. Biomass and bioenergy: resources, conversion techniques, and biofuels 8. Ocean energy: tidal, wave, and thermal gradient systems 9. Hydrogen energy: production methods and fuel cell technologies 10. Energy storage: mechanical, chemical, and electrical methods 11. Environmental impact assessment and life-cycle analysis 12. Economic evaluation and renewable energy policy frameworks
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and Teaching Strategies: • Lectures: to introduce theoretical principles and engineering fundamentals. • Laboratory Work: to perform experiments on solar, wind, and hydraulic energy. • Group Projects: to encourage teamwork and design thinking. • Student Seminars: presentations by students on selected renewable energy topics. • Independent Study: guided research and technical report writing.
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا	
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100
Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Conventional and Renewable Energy Sources
Week 2	Solar Energy – Solar Collectors
Week 3	Solar Energy – Photovoltaic Systems
Week 4	Solar Energy – Efficiency Calculations of Solar Collectors
Week 5	Wind Energy – Fundamentals and Principles

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Week 6	Wind Energy – Turbine Components and Characteristics
Week 7	Wind Energy – Power Curve and Turbine Performance
Week 8	Midterm Examination
Week 9	Geothermal Energy – Principles and Power Plants
Week 10	Hydroelectric Energy
Week 11	Biomass Energy and Biofuels
Week 12	Tidal, Wave, and Ocean Energy
Week 13	Hydrogen Energy
Week 14	Energy Storage Systems
Week 15	Economic, Environmental, and Policy Aspects of Renewable Energy
Week 15	Final Examination

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Solar radiation intensity
Week 2	Lab 2: Flat plate water based solar collector
Week 3	Lab 3: Flat plate, air-based solar collector
Week 4	Lab 4: Cylindrical solar collector
Week 5	Lab 5: Characteristics of a Single Solar Cell
Week 6	Lab 6: Solar Cell connection in series
Week 7	Lab 7: Solar Cell connection in parallel

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Kanoğlu, M., Çengel, Y. A., & Cimbala, J. M. (2021). Fundamentals and Applications of Renewable Energy.	No
Recommended Texts	- Rajput, R. K. (2017). Non-Conventional Energy Sources and Utilisation. (1st edition) - Duffie, J. A., & Beckman, W. A. (2013). Solar Engineering of Thermal Processes (4th ed.)	No
Websites	https://seia.org/	

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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	NTU301			
ECTS Credits	2			
SWL (hr/sem)	50			
Module Level	3	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 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).			
Module Learning	By the end of the module, students will be able to: 1. Use English effectively in academic, professional, and everyday contexts			

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Outcomes مخرجات التعلم للمادة الدراسية	relevant to mechanical engineering. Demonstrate integrated language skills – Read, listen, speak, and write accurately and appropriately in both general and technical situations. Apply intermediate grammatical structures – Confidently use tenses, modals, conditionals, passive voice, and reported speech in written and spoken English. Expand vocabulary strategically – Use word formation (prefixes, suffixes, compound nouns) and phrasal verbs common in engineering and workplace communication. Engage in critical discussion – Express opinions, make predictions, give advice, and debate social/ethical issues related to technology and the environment. 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	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. 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. 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. 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>. 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. 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. Build vocabulary through word formation and phrasal verbs – Learn suffixes, prefixes, compound nouns, and separable/inseparable phrasal verbs (literal and idiomatic). Develop reading comprehension strategies – Extract information from articles about families, royalty, technology, architecture, crime, and famous people (jigsaw reading). Enhance listening skills – Follow interviews, conversations, radio dramas, weather forecasts, and personal narratives to identify opinions, predictions, and key details. 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. 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. 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	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. Integrated skills development – Combine reading, listening, speaking, and writing within each unit through jigsaw reading, dictation, storytelling, and project-based

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	tasks.
	3. Grammar in context – Present and practice grammatical structures (tenses, modals, conditionals, passive voice, reported speech) through authentic texts, audio materials, and guided exercises.
	4. 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.
	5. Student-centered and interactive learning – Encourage active participation through class surveys, interviews, presentations, and peer correction, with teacher acting as facilitator and model.

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	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		

Renewable Energy syllabus

Module Information					
Module Title	Photovoltaic Energy		Module Delivery		
Module Type	Basic		☒ Theory ☐ Lecture ☒ Tutorial ☒ Lab ☐ Seminar		
Module Code	RE 302				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level		3	Semester of Deliver		6
Administering Department		PM	College	TEMO	
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 Suhail	e-mail	ammarsuhail@ntu.edu.iq	
Scientific Committee Approval Date		01/06/2024	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. Understanding Scientific Fundamentals: Learn the principles of physics and chemistry that explain how light energy is converted into electrical energy. 2. Solar Energy Technology Applications: Study the various systems used to convert solar energy, such as solar cells (photovoltaics) and solar mirrors. 3.System Design: Learn how to design solar energy conversion systems, including selecting appropriate materials and components. 4. Performance Analysis: The ability to evaluate the performance of different systems and analyze their efficiency in converting light energy 5. Environmental and Economic Challenges: Understand the environmental and economic impacts of using solar energy compared to conventional energy sources. 6. Future Directions: Explore recent innovations and developments in the field of converting light energy into electricity.			
Module Learning		1.Fundamental Concepts: Understand the basic principles of photovoltaic (PV)			

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Outcomes	technology, including the physics of solar energy conversion and the operation of solar cells. 2 .Types of PV Technologies: Identify and differentiate between various types of photovoltaic technologies (e.g., monocrystalline, polycrystalline, thin-film, and emerging technologies). 3. System Components: Describe the key components of photovoltaic systems, including solar panels, inverters, batteries, and balance of system (BOS) components. 4. System Design: Develop the ability to design a photovoltaic system for different applications, considering factors such as site assessment, energy needs, and system sizing. 5. Performance Analysis: Analyze the performance of photovoltaic systems using metrics such as efficiency, capacity factor, and energy yield. 6. Installation Practices: Understand best practices for the installation and maintenance of photovoltaic systems to ensure optimal performance and safety.
Indicative Contents	Part A: Introduction to Solar Energy [20 hours] Principles of Photovoltaics [20 hours] Revision Session and Quiz [1.5 hours] Part B: 4. Photovoltaic System Components [20 hours] System Design and Sizing [10 hours] Revision Session and Quiz [1.5 hours] Revised Description: Part A of the course focuses on building a strong foundation in Photovoltaics Energy. Students will start by understanding the basic principles of This indicative content outline provides a comprehensive framework for understanding photovoltaic energy systems, their applications, and their broader implications for society and the environment. Depending on the course structure, some topics may be expanded or condensed to suit specific learning objectives or audience needs.
Learning and Teaching Strategies	
Strategies	1 .Lectures and Presentations • Overview Lectures: Introduce key concepts, theories, and technologies related to photovoltaics. • Guest Speakers: Invite industry professionals or researchers to share insights on current trends and real-world applications. 2. Hands-On Laboratory Experiments • Solar Cell Testing: Conduct experiments to measure the efficiency of different types of solar cells under various conditions. • System Assembly: Provide opportunities for students to assemble small-scale photovoltaic systems, including wiring and installation. 3. Field Trips and Site Visits • Visit Solar Farms: Organize trips to local solar installations, allowing students to observe large-scale systems in operation. • Manufacturer Tours: Visit solar panel manufacturing facilities to understand production processes and technologies. 4. Project-Based Learning • Design Projects: Assign students to design a photovoltaic system for a hypothetical building or community, including site assessment and economic analysis. • Research Projects: Encourage students to investigate emerging technologies or policies affecting the solar energy sector. 5. Case Studies and Real-World Applications • Analyze Successful Projects: Use case studies of successful photovoltaic implementations to highlight best practices and lessons learned. • Problem-Solving Activities: Present real-world challenges related to photovoltaic energy and have students propose solutions. 6. Collaborative Learning • Group Discussions: Facilitate discussions on current events, policy changes, or technological advancements in photovoltaics. • Peer Teaching: Have students work in pairs or small groups to teach each other about specific topics within the module.

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Student Workload (SWL)			
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)			
Week	Material Covered		
Week 1	Introduction to Solar Energy		
Week 2	Principles of Photovoltaics		
Week 3	Types of Solar Cells		
Week 4	Solar Cell Manufacturing		
Week 5	System Components		
Week 6	System Design and Sizing		
Week 7	Performance Analysis		
Week 8	Economic Aspects of PV Systems		
Week 9	Policy and Regulation		
Week 10	Environmental Impact		
Week 11	Emerging Technologies		
Week 12	Types of solar PV systems		
Week 13	Physics of shading and Shading of a single cell		
Week 14	Blocking diode		
Week 15	By-Pass diode		
Week 16	Future Trends and Conclusion		
Delivery Plan (Weekly Lab. Syllabus)			
Week	Material Covered		
Week 1	Lab 1: Characteristics of a Single Solar Cell		
Week 2	Lab 2: Effect of solar irradiance on solar PV Module		
Week 3	Lab 3: Effect of solar irradiance on solar module based on Matlab/Simulation		
Week 4	Lab 4: Effect of temperature on solar PV module		
Week 5	Lab 5: Effect of temperature on solar PV module based on Matlab/Simulation		
Week 6	Lab 6: Series connection of solar PV modules		
Week 7	Lab 7: Series connection of solar PV modules based on Matlab/ Simulink		
Week 8	Lab 8: Parallel connection of solar PV modules		
Week 9	Lab 9: Parallel connection of solar PV modules based on Matlab/ Simulink		
Week 11	Lab 10: Solar PV fed single phase AC motor		
Week 12	Lab 11: Solar PV fed DC water pump		
Week 13	Lab 12: Solar PV clean dust		
Week 14	Lab 13: Innovations in Photovoltaics		
Week 15	Lab 14: Integration with Smart Grids		
Learning and Teaching Resources			
	Text	Available in the Library?	
Required Texts	3. Solanki, Chetan Singh. Solar photovoltaic technology and systems: a manual for technicians, trainers and engineers. PHI Learning Pvt. Ltd., 2013		

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Recommended Texts	4. Shepherd, William, and David William Shepherd. Energy studies. World Scientific Publishing Company, 2014.	
Websites	5. www.PV-iteach.eu	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Gas Dynamics		Module Delivery
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	RE 303		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	3	Semester of Delivery	
Administering Department	AM	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		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 discuss the effect of compressibility in gas flow 2. To derive the steady one-dimensional isentropic flow equation 3. To discuss the effects of friction and heat transfer on compressible flows through constant area duct 4. To familiarize the occurrence of shocks and calculate property changes across a shock wave 5. To derive the thrust equation and discuss its application in jet and rocket.		
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. CO1: Apply the thermodynamics concepts in relation to compressible flows and derive relationships between various compressible flow parameters 2. CO2: Understanding of isentropic compressible flows in variable area ducts and		

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	apply in design of static components like nozzles and diffusers 3. CO3: Solve for compressible flow characteristics with friction and heat transfer 4. CO4: Develop relationship for shocks and determine their characteristics under various conditions 5. CO5: Analyse the performance of aircraft and rocket propulsion engines
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A -</u> Introduction to gas dynamics, Isentropic flow, Bryton cycle ideal and actual. [15hrs] Shock waves in supersonic flow, normal shock and oblique shock waves[15 hrs] Introduction to gas turbine power plant, [10 hrs] Introduction to rockets thrust equations, [15hrs] <u>Part B –</u> Fundamentals To understand the charts of oblique shock waves, [15 hrs] Types of pumps, pumps Characteristics, [7 hrs] Introduction to jet propulsion, The Kinds, Impulse Turbine, Blades Efficiency. [15 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: 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 للطلاب محسوب لـ ١٥ أسبوعا

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Conservations laws, Mass, Energy, and Momentum equations
Week 2	Introduction to Compressible Flow, classifications of fluid flow
Week 3	Wave Propagation, stagnation condition, Thermodynamics relationships
Week 4	Isentropic flow of a perfect gas in varying area duct
Week 5	Isentropic Flow in Converging-diverging Nozzles and Diffusers
Week 6	Thrust of Rocket Engine, specific thrust equation
Week 7	Introduction to Stationary Normal Shock Waves
Week 8	Stationary Normal Shock Waves in C-D Nozzles
Week 9	Stationary Normal Shock Waves in C-D Diffusers
Week 10	Moving Normal Shock Waves
Week 11	Introduction to Oblique Shock Waves relationships
Week 12	Oblique Shock Waves over wedges and inlets
Week 13	Introduction to pumps, pumps classifications
Week 14	Introduction to Compressors, types of compressors
Week 15	Introduction to Gas Turbines.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

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	Material Covered	
Week 1	Introduction of gas dynamics instruments	
Week 2	Subsonic wind tunnel pressure distribution	
Week 3	Subsonic wind tunnel velocity distribution	
Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Dynamics and Thermodynamics of compressible flow, A. Shapiro, 1980.	No
Recommended Texts	Fundamentals Of engineering thermodynamics, Michael J. Moran and Howard N. Shapiro, Fifth edition	No
Websites	https://www.linquip.com/ Linquip Content Managment Team	

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				

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	mechanical parts into different mechanical structures. 6. To explain different important mechanical parts involved in mechanical systems processes. 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	

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Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Delivery Plan (Weekly Syllabus)

المناهج الأسبوعي 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

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Recommended Texts		No
Websites		

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	
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			

Renewable Energy 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	

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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.		
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	1. An Introduction to Numerical Analysis Solutions to Exercises, Endre Suli and David F. ayers, University of Oxford. 2. Advanced Engineering Mathematics by Erwin Kreysizg	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	

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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

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 للطالب محسوب لـ ١٥ أسبوعا			
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		

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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. 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
Recommended 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	

Renewable Energy syllabus