

نموذج وصف المادة الدراسية

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 course, students will be able to: 1. Understand fundamental principles of the thermodynamics system and the control volume, Properties and state of a substance. Processes and cycles. Units for mass, length, pressure, and temperature 2. Definition of work, units for work. Work done at the moving boundary of a simple compressible system. Definition of heat, unit of heat.



	- Analyze the conduction heat transfer, thermal conductivity, One dimensional steady state conduction in plane and composite walls, - Understand the first law of thermodynamics. For a system undergoing a cycle, and for a change in state of a system. Internal energy, enthalpy and specific heat and apply them to engineering problems. - Understand fundamental principles of statics, including force systems, equilibrium, and vector operations. - Apply Newton's laws of motion to analyze particles and rigid bodies under various force conditions. - Understanding the concept of static equilibrium. - Modelling forces and moments acting on a body at rest. - Solving problems related to stability and equilibrium of structures.						
Module Learning Outcomes مخرجات التعلم للمادة الدراسية 	<table border="1"> <tr> <td data-bbox="517 663 616 1352">Knowledge</td><td data-bbox="616 663 1509 1352"> A2 A2.1: Understand the fundamental principles of the thermodynamics system and the control volume, Properties and state of a substance. Processes and cycles. Units for mass, length, pressure, and temperature. A2.2: Use the first law of thermodynamics. For a system undergoing a cycle in engineering mechanics problems. A2.3: Analyze the conduction heat transfer, thermal conductivity, One dimensional steady state conduction in plane and composite walls A2.4: Analyze forces acting on particles and rigid bodies, followed by the construction of free-body diagrams for problem solving. A2.5: Analyzing the rate of heat transfer in various applications A2.6: Solve problems related to stability and equilibrium of structures. A2.7: Analyze the modelling forces and moments acting on a body at rest. A2.8: Explain the basic concepts of static equilibrium.. A2.9: Identify first moments and centroids. Area moments of inertia. Mass moment of inertia and their effects on engineering components. </td></tr> <tr> <td data-bbox="517 1352 616 1599">Skills</td><td data-bbox="616 1352 1509 1599"> B1 B1.1: Function efficiently as an individual. B1.2: Function as a member of multidisciplinary and multicultural teams. B2 B2.1: Communicate effectively—graphically—with a range of audiences using contemporary tools. B2.2: Communicate verbally and in writing with a range of audiences using contemporary tools. </td></tr> <tr> <td data-bbox="517 1599 616 1850">Ethics</td><td data-bbox="616 1599 1509 1850"> C1 C1.1: Define professional and ethical responsibilities. C1.2: Demonstrate diversity in their commitment to ethical responsibilities. C2 C2.1: Plan engineering projects, taking into consideration other trades' requirements. C2.2: Supervise and monitor engineering projects, taking into consideration other trades' requirements. </td></tr> </table>	Knowledge	A2 A2.1: Understand the fundamental principles of the thermodynamics system and the control volume, Properties and state of a substance. Processes and cycles. Units for mass, length, pressure, and temperature. A2.2: Use the first law of thermodynamics. For a system undergoing a cycle in engineering mechanics problems. A2.3: Analyze the conduction heat transfer, thermal conductivity, One dimensional steady state conduction in plane and composite walls A2.4: Analyze forces acting on particles and rigid bodies, followed by the construction of free-body diagrams for problem solving. A2.5: Analyzing the rate of heat transfer in various applications A2.6: Solve problems related to stability and equilibrium of structures. A2.7: Analyze the modelling forces and moments acting on a body at rest. A2.8: Explain the basic concepts of static equilibrium.. A2.9: Identify first moments and centroids. Area moments of inertia. Mass moment of inertia and their effects on engineering components.	Skills	B1 B1.1: Function efficiently as an individual. B1.2: Function as a member of multidisciplinary and multicultural teams. B2 B2.1: Communicate effectively—graphically—with a range of audiences using contemporary tools. B2.2: Communicate verbally and in writing with a range of audiences using contemporary tools.	Ethics	C1 C1.1: Define professional and ethical responsibilities. C1.2: Demonstrate diversity in their commitment to ethical responsibilities. C2 C2.1: Plan engineering projects, taking into consideration other trades' requirements. C2.2: Supervise and monitor engineering projects, taking into consideration other trades' requirements.
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Indicative Contents المحتويات الإرشادية	Understanding the basic concepts of thermodynamics such as work, heat, energy, and entropy.						

	- Analyzing thermodynamic systems and processes. - Understanding the laws of thermodynamics and their applications. - Evaluating the efficiency of thermodynamic cycles. - Understanding the modes of heat transfer (conduction, convection, and radiation). - Analyzing the rate of heat transfer in various applications - Understanding and calculating heat transfer coefficients. - Applying principles of heat transfer in various engineering applications such as heat exchangers, power plants, and refrigeration systems - Understanding the concept of static equilibrium. - Modelling forces and moments acting on a body at rest. - Solving problems related to stability and equilibrium of structures.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Presentation and demonstration. - Interactive learning. - Discussions and Q&A. - Problems solving. - Brain storming. - Report and assignments. - Self-learning tasks.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	112	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	7.47
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3 and 7	A2.1, A2.2, A2.3, A2.4 and A2.5
	Assignments	2	10% (10)	4 and 10	A2.1, A2.2, B1.1, B1.4 and B2.1
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	5	A2.2, A2.3, A2.4, B1.2 and B2.1
	Midterm Exam	2hr	10% (10)	9	A2.1, A2.2, A2.3, A2.4 and A2.5



Summative assessment	Final Exam	3hr	50% (50)	16	A2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري		
	Material Covered	LOs
Week 1	Some concepts and definition of Thermodynamics	A2.1, A2.2, B1.1 and C1.1
Week 2	Properties of a pure substance.	A2.1, A2.2, A2.3, B2.1, C1.1 and C1.2
Week 3	Work and heat.	A2.1, A2.2, A2.3, B1.1, B1.2, C1.1 and C1.2
Week 4	Work and heat (Cont.)	A2.1, A2.2, A2.3, B2.1, C1.1 and C1.2
Week 5	The first law of thermodynamics	A2.1, A2.2, A2.3, A2.4, B2.1, C1.2 and C2.1
Week 6	Conduction heat transfer	A2.1, A2.2, A2.3, A2.4, A2.5, B2.1, C1.1, C1.2 and C2.1
Week 7	Midterm Exam #1, Conduction heat transfer (Cont.)	A2.1, A2.2, A2.3, A2.4, A2.5, B2.1, C1.1, C1.2 and C2.1
Week 8	Convection heat transfer	A2.1, A2.2, A2.5, B2.2, C1.2 and C2.1
Week 9	Convection heat transfer (Cont.)	A2.1, A2.2, A2.3, A2.4 and A2.5
Week 10	Static: Operations with forces Resultants	A2.2, A2.6, B2.1, C1.1, C1.2 and C2.1
Week 11	equilibrium of coplanar and spatial force systems	A2.2, A2.7, B2.1, C1.1, C1.2 and C2.1
Week 12	Trusses and cables	A2.2, A2.7, A2.8, B2.1, B2.2, C1.1, C1.2, C2.1 and C2.2
Week 13	Friction	A2.2, A2.7, A2.8, B2.1, B2.2, C1.1, C1.2, C2.1 and C2.2
Week 14	First moments and centroids	A2.2, A2.7, A2.8, B2.1, B2.2, C1.1, C1.2, C2.1 and C2.2
Week 15	Area and Mass moments of inertia.	A2.2, A2.7, A2.8, B2.1, B2.2, C1.1, C1.2, C2.1 and C2.2
Week 16	Preparatory week before the final Exam	All

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Engineering mechanics	
Recommended Texts	1. FUNDAMENTALS OF THERMODYNAMICS 2. HEAT TRANSFER by J.P. Holman 3. ENGINEERING MECHANICS, VOLUME 1, STATICS, by J.L. Meriam and L.G. Kraige, John Wiley and Sons	Yes



Websites	Thermodynamics of Biomolecular Systems Biological Engineering MIT OpenCourseWare Introduction to Heat Transfer Mechanical Engineering MIT OpenCourseWare
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Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 – 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 – 89	Above average with some errors.
	C - Good	جيد	70 – 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria.
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded.
	F – Fail	راسب	(0-44)	Considerable amount of work required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

