MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Thermodynamics-1			**Module Delivery**	
Module Type	C			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☐ Seminar	
Module Code	UOMU0206033				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Fuel and Energy Techniques Engineering Department	**College**		Technical Engineering College
Module Leader	Essam Muhe Mohammad		**e-mail**		esam.muhe@uomus.edu.iq
Module Leader's Acad. Title		Assistant Professor Dr.	**Module Leader's Qualification**		Ph.Dr. Mechanical Engineering
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		1

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 Aims أهداف المادة الدراسية	1. To familiarize the students with basic concepts of the first and second laws of thermodynamics and their applications in engineering problems. 2. To Develop a practical ability to solve energy balance problems , minimum work. 3. To Students will demonstrate basic understanding of basics and definitions of thermodynamics and properties of pure substances. 4. To Describe the reversible and irreversible processes (macroscopic description of an ideal and real processes)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Ability to familiarize the students with basic concepts of the first and second laws of thermodynamics and their applications in engineering problems. 2. Ability to Develop a practical ability to solve energy balance problems , minimum work. 3. Ability to Students will demonstrate basic understanding of basics and definitions of thermodynamics and properties of pure substances. 4. Ability to Describe the reversible and irreversible processes (macroscopic description of an ideal and real processes)
Indicative Contents المحتويات الإرشادية	**Basic Concepts** The terminologies of thermodynamics, the variables and quantities of thermodynamics, categorization of systems and processes. [12 hrs.] **First law of Thermodynamics** The first law and internal energy, statements of first law for the non-flow and flow systems, enthalpy and heat capacity limitations of the first law. [10 hrs.] **Second Law Thermodynamics** Statements of the second law of thermodynamics, available and unavailable energies, and the entropy function, applications of the second law. [10 hrs.] **Thermodynamic Formulations** Measurable quantities, basic energy relations, maxwell relations, thermodynamic formulations to calculate enthalpy, [15 hrs.] **Thermodynamic Properties of Real Gases** The pvt behavior of fluids, laws of corresponding states and equation [12 hrs.] **Course Schedule Week Topic** states approaches to the pvt relationships of non-ideal gas problems, compressibility factors, generalized equations of state [15 hrs.]

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 are 1. Teamwork 2. Visualization 3. Inquiry-Based Teaching 4. Student-led Classroom 5. Implementing Technology in the Classroom 6. Auditory strategies 7. Reading & Writing

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	180		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic Concepts The terminologies of thermodynamics the variables and quantities of thermodynamics
Week 2	categorization of systems and processes Energy classifications
Week 3	point and path properties energy in transition
Week 4	heat and work reversible and irreversible processes, phase rule.
Week 5	First law of Thermodynamics The first law and internal energy statements of first law for the non-flow and flow systems,
Week 6	enthalpy and heat capacity limitations of the first law.
Week 7	Second Law Thermodynamics Statements of the second law of thermodynamics available and unavailable energies
Week 8	and the entropy function applications of the second law.
Week 9	Thermodynamic Formulations Measurable quantities, basic energy relations maxwell relations
Week 10	thermodynamic formulations to calculate enthalpy internal energy and entropy as function of pressure and temperature,
Week 11	other formulations involving cp and cv complex thermodynamic formulations
Week 12	thermodynamic properties of an ideal gas entropy change in reversible and irreversible process.
Week 13	Thermodynamic Properties of Real Gases The pvt behavior of fluids laws of corresponding states and equation
Week 14	Course Schedule Week Topic states approaches to the pvt relationships of non-ideal gas problems compressibility factors,
Week 15	generalized equations of state property estimation via generalized equation of state
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Temperature measurement
Week 2	Pressure measurement
Week 3	Air velocity measurement
Week 4	Boyle's law experimentally
Week 5	Charles's law experimentally
Week 6	Vapor-Liquid Equilibrium (VLE)
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	[1] Abbott, Michael M., Joseph M. Smith, and Hendrick C. Van Ness. "Introduction to chemical engineering thermodynamics." McGraw-Hill. [2] Elliott, J. Richard, and Carl T. Lira. "Introductory chemical engineering thermodynamics". Upper Saddle River, NJ: Prentice Hall PTR. [3] Narayanan, K. V.A chemical engineering thermodynamics. PHI Learning Pvt. Ltd..	yse
Recommended Texts		
Websites		

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.