MODULE DESCRIPTOR FORM

Module Information معلومات المادة الدراسية					
Module Title	Thermodynamic			**Module Delivery**	
Module Type	Core			☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☒**Practical** ☒**Seminar**	
Module Code	Zu-Sc-MPHY2103				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level	2	**Semester of Delivery**	1		
Administering Department	MPHY	**College**	College of Science		
Module Leader	Methaq Talib Matrood	**e-mail**	methaq.talib@alzahu.edu.iq		
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	Master		
Module Tutor		**e-mail**			
Module Reviewer		**e-mail**			
Peer Reviewer Name		**e-mail**			
Review Committee Approval		**Version Number**			

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. Teaching the student the principles of thermodynamics. 2. Identify the main laws related to the science of heat and work. 3. Learn about real-life practical applications of thermodynamics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student can distinguish between states of matter in addition to the difference between a real gas and an ideal gas. 2. The student can understand the laws of thermodynamics and the mechanism of their application. 3. The student can explain the mechanism between movement and heat and their effects 4. The student can explain the physical difference between heat and cooling. 5. Students' ability to apply what has been calculated theoretically in a practical way in the future.
Indicative Contents المحتويات الإرشادية	- Important terms, Reversible and Irreversible processes, Ideal Gas. [15 hrs.] - Heat Transformation, 1st Law of thermodynamics, The State Equation. [15 hrs.] - Adiabatic Processes, Specific Heat Capacity, Specific Heat Capacity in Adiabatic Processes. [20 hrs.] - 2nd Thermodynamics Law and Carnot Cycle Thermal Machines and Refrigerators. [15 hrs.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	- Discussing the topics of the curriculum book and supporting references Theoretical lectures including problem solving and discussion of homework. - Asking students a set of thinking questions during the lectures for specific topics. - Giving student's homework that requires finding self-solutions.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	Continuous	All
	Online Assignments	1	5% (5)	Continuous	All
	Lab	1	15% (15)	Continuous	All
	Seminar	1	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	14	LO # 1-13
	Final Exam	4hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Important terms.
Week 2	Reversible and Irreversible processes.
Week 3	Ideal Gas.
Week 4	Exercises.
Week 5	Heat Transformation.
Week 6	1st Law of thermodynamics.
Week 7	The State Equation.
Week 8	Adiabatic Processes.
Week 9	Specific Heat Capacity.
Week 10	Specific Heat Capacity in Adiabatic Processes.
Week 11	Work and Heat Relationship.
Week 12	2nd Thermodynamics Law.
Week 13	Carnot Cycle Thermal Machines and Refrigerators.
Week 14	Mid Exam
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	Lab 1: Determination of the coefficient of apparent cubic expansivity of a liquid by Mathieson's sinker method
Week 3-4	Lab 2: Entropy of system
Week 5-6	Lab 3: measurement of thermal conductivity by lees disc method
Week 7-8	Lab 4: experiment to measure specific heat capacity of a liquid by method of cooling
Week 9-10	Lab 5: the specific heat capacity of copper by calendar method
Week 11-12	Lab 6: experiment to measure specific heat capacity of a metal by method of mixtures
Week 13	Lab 7: coefficient of linear expansion of copper
Week 14	Mid Exam
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Francis Weston Sears, Thermodynamics, The Kinetic Theory of Gases, and Statistical Mechanics , 2rd edition, 1953	YES
Recommended Texts	Heat and Thermodynamics, Mark W. Zemansky, McGraw Hill, 1968	YES
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB 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.