Faculty of Engineering & Technology

Engineering Thermodynamics

Information :

Course Code :	MPR 251	**Level :**	Undergraduate	**Course Hours :**	4.00- Hours

Department : Department of Mechanical Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	Anas Mohamed Abdelrahman Ali	6
Assistant Lecturer	Moustafa Raafat Aziz Shousha	3

Area Of Study :

The Main Goals of this course are:
ÅEnrich studentsôknowledge about thermodynamics.
ÅTrain students to apply the fundamental principles of thermodynamics.
ÅAllow students to explore the fundamental principles of thermodynamics through experimentation.
ÅDevelop students' skills for analyzing experimental data and working in teams.

Description :

Introduction, Fields of application, Fundamental concepts and definitions, Thermo-dynamics Systems; System Classification, Properties and State Processes and Cycles, Properties of a Pure substance; Vapor - Liquid - Solid - Phases of Pure substance, Ide-al gas relations, Work and Heat; definitions, kinds of work, heat transfer modes, The first law of thermodynamics; closed system analysis, Control - Volume analysis and applications, Transient process analysis, The second law of Thermodynamics; Heat Engines and Refrigerators, Carnot cycle, Reversed Carnot cycle, Entropy, Irreversibility and availability, Mixtures of gases.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Identify basic applied and engineering science related to thermodynamics.
2 -	Define new terms in thermodynamics.
3 -	List different types of energies found in nature.
4 -	Distinguishes between ideal and real gases.
5 -	Demonstrate different methods to obtain the thermodynamic properties for different substances and phases.
6 -	Define the zeroth, first and second laws of thermodynamics.
7 -	Identify applications related to thermodynamics, considering the constraints which mechanical engineers have to judge to reach an optimum operation.
b.Intellectual Skills: :	
1 -	Deduce the equations of the first, second laws of thermodynamics.
2 -	Solve different engineering problems related to thermodynamics.
3 -	Analyse different engineering systems using thermodynamics principles.

4 -	Relate the energy efficiency ratio of a given system to Carnot efficiency.
c.Professional and Practical Skills: :	
1 -	Practice basic experiments related to thermodynamics.
2 -	Follow up safety requirements at experimental work and observe the appropriate steps to manage risks.
3 -	Analyse experimental results.
4 -	Write a technical report on a project or an assignment.
d.General and Transferable Skills: :	
1 -	Collaborate effectively within multidisciplinary team in preparing researches in heat transfer.
2 -	Refer to relevant literature.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Property and state, processes and cycles.	6	3	3
Definition of work and heat transfer.	9	6	3
Ideal gases; state equation; specific heat at constant pressure and volume.	6	3	3
Pure substances and phase equilibrium.	6	3	3
Tables of thermodynamic properties.	6	3	3
First law of thermodynamics; closed and open systems.	6	3	3
Applications of first law of thermodynamics.	6	3	3
Transient system analysis.	9	6	3
Second law of thermodynamics.	9	6	3
Basic concepts and definitions; system types.	6	3	3
Entropy.	12	6	6

Teaching And Learning Methodologies :

Interactive lecture
Discussion
Problem-based learning
Laboratory experiments
Research activity

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	5.00		
Final Exam	40.00	15	
Lab. Experiments	5.00		
Mid- Exam 1I	15.00	11	
Mid- Exam I	15.00	6	

Oral Exam	5.00		
Participation	10.00		
Quizzes	5.00		

Recommended books :

1) Fundamentals of Thermodynamics, Richard E. Sonntag, Claus Borgnakke, and Gordon J. Van Wylen , John Wiley &Sons, Inc., 2003
2) Applied Thermodynamics for Engineering Technologists,
T.D. Eastop and A.McConkey, Longman Group, Ltd. 1998