

Number of units 8	T 5	Pr 2	Th 3	Number of weekly hours	Annual System 30 weeks	Al-Esra'a University College Department: Engineering of Refrigeration and Air Conditioning Technologies
				Thermodynamics-1		First stage
Studying the principles of thermodynamics including, thermal systems according to energy interactions with their direct surroundings, the differences in the properties of both the system and the surrounding with their engineering applications.						

Week	Topic	Practical Subjec	Notes
1	Introductions, references, units , General notations , about pressure, force, work etc.		
2	Temperature, unit of temperature and conversion, temperature measurements. Zeorith law of Thermodynamics. Energy, types of energy, positional, kinetic, internal and flow energy energies. Heat and work, power, enthalpy.	Measurement and instruments	
3	First law of thermodynamics		
4	Steady flow energy equation for open system, non-flow energy equation for closed system, Ideal gas and equation of state		
5	Ideal gas, Boyle's law and Charles law and equation of state	Types of temperature measurements	
6	Specific heat at constant pressure and constant volume, Closed system Processes using ideal gas. Isometric and isobaric processes.		
7	Isothermal and adiabatic processes		
8	Polytropic processes	Measuring the velocity of air	
9	open system processes		
10	Vapour, phase of substance, Phase change curve on P-V diagram.		
11	Dryness fraction, liquid and vapour lines, wet vapour	Calibration of thermocouple	
12	Steam tables and Examples on steam tables		
13	Super-heated vapour, tables of super-heated tables.	Joule experiment	
14	Processes using two phase system, processes on P-V diagram, Irreversible processes Closed system		
15	Second law of thermodynamics, heat engine, heat pump	Boyle Experiment	

Half-year Break

16	Carnot cycle and reversed Carnot cycle.	Measuring of C.V of fuel	
17	Irreversible and reversible processes	Measuring specific heats	
18	Clausius in equality for second law		
19	Entropy on T-S and entropy calculations.	Finding the law of expansion	
20	Entropy for vapour,		
21	Entropy for system and surroundings		
22	Adiabatic efficiency	Measuring the latent heat of evaporation	
23	Air standard cycle, Otto cycle.	Heat pump	
24	Diesel and Dual cycles		
25	Steam power plants- Rankin Cycle		
26	Rankin Cycle with superheated. Modified Rankin Cycle		
27	Modification on Carnot to use as vapour compression cycle.	finding of the degree of superheating	
28	Vapour compression cycle,	Performance of simple compression cycle	
29	Combustion, combustion equations, equilibrium of combustion equation.		
30	Volumetric analysis on combustion process.	Actual vapour compression cycle	