Course Description	
Course title	Thermodynamics
Course code	Phys 243
College	Engineering
Department / Program	Electrical/Renewable Energy
Year/ Level	3/5
Course Type	**A.** ☐ University ☐ College ☐ Department ■ Program ☐ Others b. ■ Required ☐ Elective
Credited Hours	(3 Cr. Hrs)
Contact Hours	(LT:2, LB:2 ,TR:0)
Pre-requisites (if any)	Phys102
Co-requisites (if any)	---
Course description	Introduction to thermodynamics concepts of systems, pressure, temperature scale, zeroth law of thermodynamics, thermodynamic equilibrium, internal energy, work, and heat.

	Properties of a pure substance, phases and their transitions, p-V-T relation for a gaseous medium, Heat capacity, specific heat, and latent heat. The first law of thermodynamics and its application to different systems. Cycles of Heat engines, thermal efficiency, the Carnot heat engine, refrigerators, and heat pumps. Kinetic theory for gases. Equilibrium between phases. Phase diagrams. Clausius-Clapeyron equation. Entropy; disorder on a microscopic scale. The Second Law; entropy as a state function. Corollaries of the second law of thermodynamics, reversible processes, and irreversible processes. The third law of thermodynamics and absolute entropy. Example of a power generation system. <u>Thermodynamic lab</u> Bomb calorimeter (measurement of calorific value), first law of thermodynamics (Joule experiment: work to heat and turbine shaft power), characteristic of the power turbine, turbine efficiency, calculate the exhaust velocity of nozzle, Marcet boiler (study the relation between pressure and temperature), vapor compression refrigeration cycle (demonstration of the effect of air in a cooling system and effect of evaporation and condensation temperature in the cooling rate and in the heat transfer at the condenser) and two-stage reciprocating compressor.
Course Main Objectives	This course introduces the basic knowledge of the energy production and conversion and application of the basic principles of thermodynamics systems. The students will be able to: 1. Study the conservation of energy based on the first law of thermodynamics. 2. Know whether a process is possible based on the second law of thermodynamics. 3. Apply the 1st and 2nd laws of thermodynamics in performance analysis of various power plants, engines, and refrigeration systems.
Learning Outcomes	**Knowledge and Understanding** Define the concepts and laws of thermodynamic. Record thermodynamic experimental results and represent data graphically.
	Skills: Apply thermodynamic concepts and laws to solve problems.
	Values: Work individually or in teams in laboratories and on research projects professionally.

References	1- Physics for Scientists and Engineers, Raymond A. Serway, Thomson Brooks/Cole © 2004; 6th Edition 2- College Physics, Raymond A. Serway, Ninth Edition, 2012 3- Applied Thermodynamics for Engineering Technologists, Fifth Edition, T.D. Eastop, A. McConkey 4- Roy B. N (2002), Fundamental of classical and statistical thermodynamics, J. Wiley& Sons,UK.