Course Title	**THERMAL PHYSICS**
Course Code	**MPHY-213**
Credit Hours	**CH 3**
Pre- requisites	**FSc / A-Level (Physics) or equivalent**
Learning outcomes	The objective of this course is to develop an understanding about the laws and methods of thermodynamics and enable the student to apply their knowledge to practical systems.
Contents	**Temperature and heat:** Temperature and thermal equilibrium, thermometers, kelvin scales, thermal expansion, Ideal gas, quantity of heat, calorimetry, phase changes, heat transfer. **Thermal properties:** Equations of states, van der Waals equation, molecular properties of matter, molecular view of pressure, mean free path, kinetic model of ideal gas, heat capacities, molecular speeds and energies. **First law of thermodynamics:** Thermodynamics systems, work done, Thermodynamics states, internal energy, Zeroth and First law of Thermodynamics, Thermodynamics processes, internal energy and heat capacities of an ideal gas, Adiabatic processes, **Second Law of thermodynamics:** Heat engines, combustion engines, refrigerator, Second law of thermodynamics, Perpetual motion, Carnot Cycle, Carnot engine, Entropy, Microscopic interpretation of entropy, Efficiencies of real engines, thermoelectricity, Seebeck effect, Peltier effect, thermocouple. **Applications of thermodynamics:** Thermodynamics functions and equations, TdS equations, Joule-Thomson effect, Stephan law, Adiabatic demagnetization, production and measurements of low temperatures, Third law of thermodynamics, Clausius-Clapeyron equation.
Teaching-learning Strategies	Classroom teaching / Lecturing
Assignments- Types and Number	Problem sheets: 3-4
Assessment and Examinations	Mid-Term Assessment: 35% Formative Assessment: (25%): It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc. Final Term Assessment: 40%
Text Books	1. Physics (Volume 1 & 2) by R. Resnick, D. Halliday and K. S. Krane (5th Edition), Wiley (2002) 2. Concepts in Thermal Physics, by S. J. Blundell and K. M. Blundell, Oxford, (2009) 3. University Physics with Modern Physics by H. D. Young, R. A. Freedman (14th Edition), Addison-Wesley (2015). 4. Principle of Modern Thermodynamics by B. N. Roy, Institute of Physics, London (1995) 5. Physics for Scientists and Engineers by R. A. Serway and J. W. Jewett (8th Edition), Golden Sunburst Series (2010). 6. An Introduction to Thermal Physics, D. V. Schroeder, Pearson, (1999). 7. Heat and Thermodynamics by M. W. Zemansky (7th Edition), McGraw Hill (1999).