Course Title	**STATISTICAL PHYSICS**
Course Code	**MPHY-443**
Credit Hours	**CH3**
Pre- requisites	**MPHY-332, MPHY-342**
Learning outcomes	This course will develop basic knowledge of statistical mechanics at the undergraduate level and to this knowledge to describe macroscopic systems, thermodynamic potentials and ensembles.
Contents	**Review of concepts of thermodynamics**: heat, work, energy, entropy, laws of thermodynamics, thermodynamic potentials, chemical potentials, Maxwell relations. **Classical statistics:** Phase space description of physical systems, Conserved Quantities and Accessible, phase Space, Ensemble and its averages, Liouville's theorem, Ergodic Hypothesis, Statistical Entropy. **Statistical ensembles:** Micro canonical Ensemble, Canonical Ensemble and Grand canonical ensemble calculation of partition functions and its relation with thermodynamic quantities, Simple Applications of Ensemble Theory, Entropy of Mono atomic ideal gas , Gibb's paradox ,Sackur-Tetrode Equation, Equipartition theorem and examples (ideal gas, harmonic oscillator), specific heat of solids. **Quantum statistics:** Basic concept of quantum statistics, Pauli exclusion principle, Bose-Einstein and Fermi-Dirac distributions, frequency spectrum of a black body and Planck's radiation law, energy distribution of conduction electrons in metals, degree of gas degenerations, completely degenerate Fermi-Dirac gas, concept of fluctuations, Bose-Einstein condensation. Density matrix Formalism.
Teaching-learning Strategies	Classroom teaching / Lecturing
Assignments- Types and Number	Problem sheet: 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. Elementary Statistical Physics, C. Kittle John Wiley, New York, 1958. 2. Statistical Mechanics, R. K. Pathria, Butterworth-Heinemann, 2001 3. Statistical Mechanics, K. Haung, John-Wiley and sons, 2002. 4. Statistical Mechanics, W. Brewer, F. Schwabl, Springer, 2006. 5. Statistical Physics of Fields by M. Kardar, Cambridge University Press, 2007. 6. Fundamentals of Statistical and Thermal Physics, F. Reif, Waveland Pr Inc, 2008. 7. Statistical Mechanics in a Nutshell by L. Peliti, Princeton University Press, 2011.