Semester	JAN 2022
Open to semester	4
Course code	**PH2223**
Course title	**Thermal & Statistical Physics**
Credits	3 /
Course Coordinator & participating faculty (if any)	Vijayakumar Chikkadi, Sachin Jain*
Nature of Course	Lectures
Pre-requisites	Basic calculus and probability and basic level physics learnt upto class 12
Objectives (goals, type of students for whom useful, outcome etc)	It is an introductory course on thermodynamics for 2nd year physics major students. Objectives: Introduction to the key concepts in thermal physics. The emphasis would be on mathematical principles and problem-solving aspects. At end of the course a student will be able to appreciate the statistical aspects of thermodynamics and certain advanced topics such as kinetic theory and phase transition. It will prepare the students for advanced courses in statistical physics.
Course contents (details of topics /sections with no. of lectures for each)	Laws of thermodynamics, Concept of work, heat and internal energy, State and path-dependent functions, Quasi-static, Reversible and irreversible processes (4 Lectures) Concept of entropy, Equation of state, Thermodynamic potentials, Legendre transformation, Maxwell relations, Minimum principle for Helmholtz, Gibbs and enthalpy free energy, Extensivity, Homogeneous functions, Stability conditions (4 Lectures) Phase transition – van der Waals equation of state, Maxwell's construction, continuous and discontinuous phase transitions. (4 Lectures) Introduction, Probability, Concept of temperature and Boltzmann factor (3 Lectures) Kinetic theory of gases – Maxwell Boltzmann distribution, Pressure, Mean free path and collisions. (4 Lectures) Transport properties of gases – viscosity, thermal conductivity and diffusion (4 Lectures) The no. of lectures may vary a little depending on the pace of

	teaching
Evaluation /assessment	End-Sem Examination-50% Mid-Sem Examination-50% Others-%
Suggested readings (with full list of authors, publisher, year, edn etc.)	[1] Concepts in Thermal Physics by Stephen J. Blundell Katherine M. Blundell (2009) Oxford Publishing. [2] Thermodynamics and An Introduction to Thermostatistics by Herbert Callen (2006), Wiley Publishing. [3] Fundamental of Statistical and Thermal Physics: F. Reif (2008) Waveband Pr Inc These are just indicative references. Any additional references will be conveyed at the time of lecture.