Centre for High Energy Physics
Faculty of Science
University of the Punjab, Lahore

Course Outline

Program	BSCP	**Course Code**	CPHY 241	**Credit Hours**	3
Course Title	**Thermal Physics**				

Course Introduction

This course encloses the basic physical understandings about thermodynamical laws and principles with applications.

Learning Outcomes

1. Study bulk properties of matters.
2. Study the laws of thermodynamics and its applications to simple system.
3. Be able to solve relevant numerical problems.

Course Content

Week 1	Bulk Properties of Matter: Elastic properties of matter;
	Elasticity; Tension; Compression & Shearing
Week 2	Elastic modulus; Elastic limit
	Poisson's ratio
Week 3	Relation b/w three types of elasticity.
	Fluid Statics and Dynamics
Week 4	Fluids; Pressure and density
	Variation of pressure in a fluid at rest
Week 5	Pascal and Archimedes principles
	surface tension; Viscosity
Week 6	Fluid flow, streamlines and equation of continuity
	Bernoulli's equation and its applications. problems.
Week 7	Entropy and Temperature:
	Thermal Equilibrium, temperature, entropy,
Week 8	Law of thermodynamics.
	Boltzmann distribution: Boltzmann factor,
Week 9	Pressure, Helmholtz free energy,
	Ideal gas. Chemical potential and Gibbs distribution:
Week 10	Definition of chemical potential,
	Gibbs factor and Gibbs sum; related examples and problems.
Week 11	Heat and work: Energy and entropy transfer,

	heat and work at constanttemperature and pressure;
Week 12	Related examples
	Gibbs free energy and chemical reactions
Week 13	Gibb free energy, Equilibrium in reactions,
	Equilibrium for ideal gas
Week 14	Related examples and problems.
	Phase transformation
Week 15	Vapor pressure equation
	Van der wall equation of states
Week 16	Related examples and problems
	Landau theory of phase transition definitions of heat and work,

Textbooks and Reading Material

Recommended Books:

1. Physics Vol.1 (4^{th}edition), Halliday and Resnic, *John Wiley and Sons* (1992).
2. Physics Vol.1 (5^{th}edition), Halliday and Resnic, *John Wiley and Sons* (2002).
3. Fundamentals of Physics (5^{th}edition), Halliday&Resnic, *John Wiley and Sons* (1999).
4. Thermal Physics (2^{nd}edition) Charles Kittle and Herbert Kroemer, *W. H. Freeman company* (2000)
5. Thermal and Statistical Physics Simulations, Bruce Hawkins and Randall Jones, *John Wiley & Sons* (1995).

Teaching Learning Strategies

The instructor is required to make use of Mathematica/Maple/Python to teach the concepts through visualization/antimutation and symbolic/numerical calculations. The students are required to solve a large portion of related exercises/questions/problems of the main textbooks.

Assignments: Types and Number with Calendar

At least two assignments and two quizzes. A course project may also be assigned

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.

3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.