NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Course Title	STATISTICAL MECHANICS		
Course Code	PHMI14	No. of Credits	4
Department	Physics	Faculty	Dr. R. Sankaranarayanan
Pre-requisites Course Code	Basics of Hamiltonian and quantum mechanics		
Course Coordinator(s) (if, applicable)	Dr. A. Chandra Bose		
Course Teacher(s) / Tutor(s) E-mail	sankar@nitt.edu	Telephone No.	0431-250-3609
Course Type	☑ Core course	☒ Elective	

COURSE OVERVIEW

Any system that interacts with surroundings reaches thermal equilibrium asymtotically. If a system is imagined to be made up of very large number of particles, then the bulk or measurable state of the system in equlibrium can be systematically associated with the state of constituent particles in statistical sense. In this frame work, only three kinds of statistics (Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac) are suffecient to uncover the intriguing connection between macroscopic and microscopic behaviour of a system.

COURSE OBJECTIVES

To learn the connection between bulk (macroscopic) state and microscopic state of a system of large number of particles at thermal equilibrium.

COURSE OUTCOMES

Students will be able to understand various properties of matter and radiation in thermal equilibrium through appropriate statistics. Students will be prepared to understand solid state physics and technology.

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	*Week*	*Topic*	*Mode of Delivery*
1	1 – 3	I & II law, entropy, potentials	Chalk & Talk
	4 – 6	Microcanonical, canonical and grand canonical ensembles	Chalk & Talk
	7 – 9	Maxwell-Boltzmann Statistics & applications	Chalk & Talk
	10 – 12	Bose-Einstein Statistics & applications	Chalk & Talk
	13 – 15	Fermi-Dirac Statistics & applications	Chalk & Talk

COURSE ASSESSMENT METHODS				
S. No.	*Mode of Assessment*	*Week / Date*	*Duration*	*% Weightage*
1	I Cycle Test (thermdynamics & three ensembles)	6th week	1 Hour	20 %
2	II Cycle Test (MB & BE statistics and applications)	12th week	1 Hour	20 %
3	Assignment / Quiz	4th and 8th week	-	10 %
4	Semester Examination	16th week	3 Hours	50 %

Retest (Unit I – IV) with the weightage 20% will be conducted *only* for those who are absent in I / II Cycle Test with prior intimation on genuine grounds.

ESSENTIAL READINGS

Text Books

1. M.W. Zeemansky and R.H. Dittman, Heat and Thermodynamics, 8th edition, Mc-Graw Hill (2011).
2. K. Haung, Statistical Mechanics, 2nd edition, Wiley India (2010).
3. F.W. Sears and G.L. Salinger, Thermodynamics, Kinetic Theory and Statistical Thermodynamics, 3rd edition, Narosa Publishing House (1998).

Reference Books

1. Enrico Fermi, Thermodynamics, Dover (1956).
2. R.K. Pathria and Paul D. Beale, Statistical Mechanics, 3rd edition, Academic Press (2011).
3. F. Reif, Fundamentals of Statistical and Thermal Physics, International Students edition, Tata McGraw-Hill (1988).
4. S.J. Blundell and K.M. Blundell, Concepts in Thermal Physics, Oxford University Press (2006).
5. L.D. Landau and E.M. Lifshitz, Statistical Physics – Part I, 3rd edition, Elsevier (2010).

COURSE EXIT SURVEY

1. Feedback from students.
2. Identifying scope for improvement through self assessment.

COURSE POLICY (including plagiarism, academic honesty, attendance etc.)

1. 75% attendance is mandatory to write semester examination.
2. Interactive learning in lecture session.
3. Students should solve problems in tutorial session.

ADDITIONAL COURSE INFORMATION

Interaction with the staff is highly encouraged inside / outside the class room.

FOR SENATE'S CONSIDERATION

Course Faculty _____ CC-Chairperson _____ HOD _____