

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
Second Semester 2018–2019
Course Handout (Part II)

Date: 07.01.2019

In addition to Part I (General Handout for all courses appended to the Time Table), this portion gives further specific details regarding the course.

Course No. : PHY F312
Course Title : Statistical Mechanics
Instructor-in-Charge : K. V. S. Shiv Chaitanya

I. Course Description :

Statistical mechanics is a unique pillar of physics. While classical mechanics deals with macroscopic objects and quantum mechanics deals with microscopic objects, statistical Mechanics concerns the physical description of a large collection of objects and their relationship with measurable macroscopic thermodynamic properties. Statistical mechanics helps understand arguably the largest variety of both man-made and naturally occurring phenomena. A few examples are semiconductor diodes, why a protein molecule folds, precision detectors, the origin of White dwarfs and other astrophysical objects, phase-equilibrium of mixtures. In this course, the rudiments of this subject will be taught and their application will be shown through illustrative examples.

II. Text Books:

1. "Statistical Mechanics" by R.K.Pathria and Paul D. Beale, Elsevier India, 3rd edition, 2011

Reference Books:

1. Statistical Mechanics, Donald McQuarrie, Harper and Row Publishers, 1976.
2. Fundamentals of Statistical and Thermal Physics, F.Reif, McGraw Hill International Editions, 1985.
3. Statistical Mechanics: Entropy, order and complexity, J.P. Sethna, Clarendon Press, 2016

III. Course Plan:

Lecture No.	Topics to be covered	Chapter in the Text Book
1-4	Introduction and Review of thermodynamics	Chapter 1
5-8	Classical Statistical mechanics-Introduction to ensemble theory- Microcanonical ensemble	Chapter 2
9-15	Canonical ensemble and applications	Chapter 3
15-23	Grand Canonical ensemble and applications	Chapter 4
24-26	Formulation of Quantum statistical mechanics	Chapter 5
27-30	Theory of Gasses	Chapter 6
31-35	Ideal Bose systems	Chapter 7
36-38	Ideal Fermi systems	Chapter 8
39-40	Phase Transitions	Chapter 11

IV. Evaluation Scheme:

Component	Duration	Weight age (%)	Date & time	Nature of Component
Mid-semester test	90 minutes	35	11/3 9.00 - 10.30AM	Open Book
Quiz	20 min each	20		Open Book
Comprehensive exam	3 hours	45	01/05 FN	Closed Book

VI. Chamber consultation Hours: To be announced in the class

VII. Make-up policy:

Make up application will be considered only when it is forwarded by the chief warden.

VIII. All notices will be displayed on the Physics Group Notice Board and on CMS

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