KINGDOM OF SAUDI ARABIA
AL-IMAM MUHAMMAD BIN SAUD
ISLAMIC UNIVERSITY
FACULTY OF SCIENCES
DEPARTMENT OF PHYSICS

المملكة العربية السعودية

جامعة الإمام محمد بن سعود الإسلامية

كلية العلوم

قسم الفيزياء

Level Six

Statistical Physics

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
PHY	332	Statistical Physics	3	3	0	1	PHY 230 – STA 111

Objectives:

- To understand how the properties of large numbers of particles are analyzed .
- To appreciate how the intrinsic nature of microscopic particles influences effects observed on macroscopic scale.
- To develop a knowledge of the application of statistical techniques in examples involving solids, liquids, gases and light.

Syllabus:

- Introduction to a thermodynamic system.
- Concept of a heat bath, simple derivation of the Maxwell-Boltzmann distribution and the introduction of the partition function.
- Fluctuations in the mean value in energy of, for example, determination of a harmonic oscillator. Fermi-Dirac and Bose-Einstein statistics, photons in a box, phonons in a crystal, electrons in a metal and neutrons in a star.
- Brief review of the laws of thermodynamics, thermodynamic potentials, and the equilibrium state.
- Maxwell's relations follow, thermodynamic equation of state.
- Van der Waal's equation for gases, the Jules-Thompson experiment and liquefaction of gases.
- Changes of state: solid-liquid-gas.

References:

- Statistical Physics. F. Mandl (2nd edition, 2000 reprint, Wiley).
- An Introduction to Statistical Physics. W. Rosser (Wiley). 1982
- Statistical Physics. T. Guenault, second edition, Chapman & Hall (1995).