

<b>Phys 4403</b>	<b>STATISTICAL PHYSICS</b>	<b>(CR3)</b>
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Preq.	Phys 3301, 3402/ ADP (Physics)	
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### Objectives

*This course will develop basic knowledge of statistical mechanics at the undergraduate level and to use this knowledge to describe macroscopic systems, thermodynamic potentials and ensembles.*

### Syllabus

Concepts in classical laws of thermodynamics and their application, postulates of statistical mechanics, statistical interpretation of thermodynamics, Phase space description of physical systems, macrosystems and microsystems, ensembles, entropy in statistical mechanics, microcanonical ensemble, canonical ensemble, the methods of statistical mechanics are used to develop the statistics for Bose-Einstein, Fermi-Dirac and photon gases; frequency spectrum of a black body and Planck's radiation law, Liouville's theorem, equality of probability for the perfect gas, energy distribution of conduction electrons in metals, Quantization effects in molecular gases; phonons, photons; density matrix formulation, Identical Particles, Degenerate quantum gases; Fermi liquids; Bose-Einstein condensation; superfluidity, selected topics from low temperature physics and electrical and thermal properties of matter.

### Recommended Books

1. *Statistical Mechanics*, by K. Huang, Pearson, (2008)
2. *Statistical Mechanics*, by R. K. Pathria and P. D. Beale, Academic Press, (3<sup>rd</sup> Ed.), (2011)
3. *Quantum Statistical Thermodynamics*, by K. N. Huang, Springer, (2018)
4. *Fundamentals of Statistical and Thermal Physics*, by F. Reif, Waveland, (2008)
5. *Statistical Physics of Particles*, by M. Kardar, Cambridge, (2007)
6. *Elementary Statistical Physics* by C. Kittel, Wiley (1958)