

PHYS5313 - Statistical Physics

[PHYS 5313](#) Statistical Physics (3 semester credit hours) Phase space, distribution functions and density matrices; microcanonical, canonical and grand canonical ensembles; partition functions; principle of maximum entropy; thermodynamic potentials and laws of thermodynamics; classical and quantum ideal gases; non-interacting magnetic moments; phonons and specific heat of solids; degenerate electron gas, its specific heat and magnetism; statistics of carriers in semiconductors; Bose-Einstein condensation; Black-body radiation; Boltzmann transport equation and H-theorem; relaxation time and conductivity; Brownian motion, random walks and Langevin equation; Einstein's relation; fluctuations in ideal gases; linear response and fluctuation-dissipation theorem; virial and cluster expansions, van der Waals equation of state; Poisson-Boltzmann and Thomas-Fermi equations; phases, phase diagrams and phase transitions of the first and second order; lattice spin models; ordering, order parameters and broken symmetries; Mean-field theory of ferromagnetism; Landau and Ginzburg-Landau theories; elements of modern theory of critical phenomena. (3-0) Y