PHYSICS 210

Sriram Shastry

ISB 214 sriram@physics.ucsc.edu Office Hours: Tuesdays 2PM to 3PM or by appointment

Tu-Th 11:40 AM to 1:15 PM ISB 231 09/27/2018 to 12/07/2018

Classical and Statistical Mechanics

Classical Mechanics (~5 weeks)

Lagrangian and Hamiltonian formulations

Conservation laws, Kepler's problem

Poisson Brackets, passage to Quantum Theory

Bohr-Sommerfeld quantization rules, phase space, connection to Gas theory

Hamilton Jacobi theory, action angle variables (Time permitting only)

Statistical Mechanics (~5 weeks)

Review of Thermodynamic potentials and Legendre transformations

Entropy and Boltzmann's Probabilistic arguments for Equilibrium

Standard Gibbs ensembles and link to thermodynamic potentials

Free spins in a Zeeman field, dominance by largest terms in the partition function, Boltzmann's democracy at work

Statistical Mechanics of Ideal Quantum gases (Fermi, Bose, Maxwell)

Blackbody radiation, Heat capacity of solids

Ideal Bose Condensation

Ideal Fermi gas, Sommerfeld expansion at low T

Grading

Expect to have 4 Homeworks (two weeks apart, starting end of second week) 50%

Final examination 50%

Books used:

For Classical mechanics, we will follow the Landau Lifshitz Mechanics as the main and rather concise book

Roughly Chapters I,II,III,(VI.35,36,39),(VII.40,42.45,46,47,48,49)

We will also use Goldstein, Poole & Safko for as an elaboration of topics and for HW problems.

For Stat Mech, we will use the small book by Kerson Huang and the Kittel and Krohmer book