

## **Ph 135 – introduction to Condensed matter physics.**

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**Class meeting times:** TR 1-2:30pm 107 Downs.

### **Topics by week (roughly):**

1. Free electrons review: Fermi sea, DOS, Sommerfeld expansion, susceptibility and heat capacity.
2. Transport: Boltzmann theory, Drude law, linear response (AM chapter 1), Kubo formula
3. Phonons and phonon scattering
4. Quantum mechanics of electrons on a lattice: Bloch Theorem, tight binding models (Wannier functions), lattice symmetries.
5. Landauer-Buttiker formalism.
6. Semiconductors: Doping, diodes, and maybe transistors.
7. Spin-orbit coupling.
8. Berry phase.
9. Semi-classical transport.
10. Topological insulators.

### **Textbook:**

I will partially follow Ashcroft and Mermin, Solid State Physics. Class notes will be provided.

### **Grading:**

50% homework, 50% final.