

Tentative Outline for Physics 602
Solid State Physics
Spring 2008

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Serin 275E ; 445-2514

Numbers [**in brackets**] indicate sections in text: TH = Taylor & Heinonen, K = Kaxiras.

- (I) Interacting Electrons
 - Review second quantization [TH 2.1-3, 3.1]
 - Electron gas; Hartree-Fock; RPA; plasmons [TH 2.4-7]
 - Dielectric response; Kubo formula
 - Correlation functions; $S(q, \omega)$; correlation energy
 - Greens Functions
 - Fermi liquid theory
 - Density functional theory [TH 5; also K 2.5]

- (II) Magnetism [TH 3.10-11; also K 7]
 - Coulomb, Heisenberg, and Hubbard Hamiltonians
 - Magnetic response functions
 - Magnetic order

- (III) Electron-Phonon Interaction [TH 6]

- (IV) Superconductivity [TH 7; also K 8]
 - Review of experimental properties
 - BCS theory
 - Bogoliubov-Valatin formalism
 - Ginzburg-Landau theory