

**Outline for Physics 601**  
**Solid State Physics**  
**(Fall 2007)**

Instructor: David Vanderbilt  
Serin 275E ; 445-2514

- (I) Crystal Symmetries [Ziman Ch. 1] [Optional: Altmann Chs. 3-4]
  
- (II) Electron States [Kaxiras Chs. 3-5]
  - Bloch waves
  - Consequences of symmetries
  - Nearly-free-electron and tight-binding limits
  - Density of states
  - Band structures of metals, semiconductors, and insulators
  
- (III) Lattice Vibrations [Kaxiras Ch. 6]
  - Classical theory
  - Phonons
  
- (IV) Electron Dynamics and Transport [Ziman Chs. 6-7]
  - Semiclassical model
  - Boltzmann equation
  
- (V) Screening and Optical Properties [Kaxiras Ch. 5, Ziman Ch. 8]
  - Screening
  - Optical response
  - Impurities and excitons