

Materials 100A Midterm Study Guide:

Chapter 2:

1. Filling of electrons in atoms. To go from the atomic number to an electronic configuration. To develop the electronic configuration of ions from atoms.
2. Ideas of electronegativity and the formation of ionic solids: the origins of attraction and repulsion.
3. Covalent solids; hybridization, and how metallic systems are understood.
4. Van der Waals interactions.

Chapter 3:

1. SC, BCC, FCC structures. HCP and CCP. Drawing structures in sections, understanding coordination number, distances, relations between the cell length a and the radius r of the atoms, calculating packing efficiency and densities.
2. Some idea of crystal systems: Certainly cubic, tetragonal, and orthorhombic.
3. Expressing the coordinates of points, describing directions and (hkl) planes (skip these in hexagonal systems).
4. Diffraction and the Bragg law, and the distance between (hkl) planes d_{hkl} and a , b , and c , in orthorhombic systems (ability to go to tetragonal and cubic). Formulae will be provided.
5. Reflection conditions for SC, BCC, and FCC (no need to remember these).

Chapter 4:

1. Vacancies and self-interstitials: The exponential formula (Boltzmann).
2. The Hume-Rothery rules for substitutional alloys.
3. Interstitial alloys and the idea of the radius of interstitial sites.
4. Dislocations.
5. Stacking faults