PHYS 432 Materials Physics **Spring 2019**

Homework 01

Read: Ch 1& 2

Due date: Friday, 08 Feb 2019, by 11:59 pm [note deviation from syllabus due date!]

Work problems 1.1, 1.2, 1.3, 1.4, 1.6, 1.8, 1.9, 1.10, 1.11, 1.14, 1.15 in the text.

AQ 1: Assume that a BCC structure has identical solid spheres at each lattice point such that neighboring spheres make contact at a single point (*i.e.,* the structure is close-packed). What volume of the cubical boundary is occupied by the spheres, as a percentage of total volume?

AQ2: Assume that a FCC structure has identical solid spheres at each lattice point such that neighboring spheres make contact at a single point (*i.e.,* the structure is close-packed). What volume of the cubical boundary is occupied by the spheres, as a percentage of total volume?

***Ideas to keep in mind (not collected as part of the homework!)**:*

1. What are the criteria that a material must meet to be considered a mineral? A rock?

2. What are the three main rock groups?

3. How does one determine the ground state electron configuration for an atom?

4. How do we model atoms? What are the four quantum numbers associated with electrons in atoms? What roles do the following play in electronic structure: wave/particle duality, Aufbau principle, Madelung's rule, Hund's rule, the periodic table, & the Pauli exclusion principle?

5. What are the main types of bonding that can occur between atoms & molecules?