Review for the Final Exam

Below you will find a list of topics that you will be responsible for knowing for the Final as well as a list of topics that will not be covered. Remember that you are allowed <u>two</u> formula sheets for the test!

Although I've tried to cover everything, anything not explicitly mentioned is your responsibility

<u>Everything listed on the Review Sheet for Exam 1</u>

<u>Everything listed on the Review Sheet for Exam 2</u>

<u>Chapter 8</u>

Classical Statistics*
- Boltzmann distribution
- Density of states, g(E)
- Maxwell distribution of molecular speeds
- Maxwell distribution of kinetic energy
- Heat capacities of gases and solids

Quantum Statistics
- Bose-Einstein and Fermi-Dirac distribution functions
- Finding the density of states

Properties of a Fermion gas

Not included: Bose-Einstein condensation, photon gas, quantization of energy states of matter, understanding specific heats of gases

*Note: even though I will give the integrals on the exam, the math is sufficiently dense that you should spend the time you need to understand it.

<u>Chapter 10</u>

Structure of Solids
- Ionic and covalent solids
  - o Madelung constant
  - o Ionic potential energy
  - o Dissociation and cohesive energy
- Metallic bonding

Classical theory of conduction
- electrical conduction
- drift velocity, v_d
- Ohm's law $j = ?E$
- Mean free path

Free electron gas in metals
- one dimension
  - o Fermi energy, E_F
  - o Density of states, $g(E)$

- o Average energy, $\langle E \rangle$
- o Fermi temperature, T_F
- o Fermi speed, u_F
- three dimensions
  - o Fermi energy, E_F
  - o Density of states, $g(E)$
  - o Average energy, $\langle E \rangle$
  - o Fermi temperature, T_F
  - o Fermi speed, u_F

Not included: Quantum theory of conduction and heat capacity, magnetism, band theory of solids, impurity semiconductors, semiconductor junctions and devices, superconductivity

Chapter 14

The Sun
- Solar luminosity, solar constant
- Effective temperature, T_E
- Proton-proton cycle

Stellar evolution
- Hertzsprung-Russell diagram
- Relationships between stellar mass, luminosity, radius, and lifetime

Cataclysmic events
- Novae
- Supernovae

Final states of stars
- white dwarfs
- neutron stars and pulsars
- black holes

Not included: Active sun, stars, parallax method, galaxies, Hubble's Law, gravitation and cosmology, cosmogenesis