Chapter 30: Nuclear Physics

1. Be able to describe the forces experienced by a proton in an atomic nucleus, and the same for a neutron.
2. Describe qualitatively the nuclear force experienced by protons and neutrons.
3. Why do alpha particles have such high speeds?
4. Be able to write the nuclear reaction expressions for α, β, and γ decays for nuclides given in this form: ${}^{A}_{Z}\mathrm{X}$.
5. You should be able to describe the penetrating power of α and β particles and γ rays.
6. You should be able to describe the general nature of α decay and β decay, noting differences between these two modes of nuclear decay.
7. You should be able to state the meaning of "binding energy."
8. Given a table of nuclear masses, you should be able to determine the difference between product mass and reactant mass in a nuclear reaction and to account for any difference in mass.
9. You should be able to use "half-life" and $N = N_0 e^{-\lambda t}$ to compare the amount of a particular nuclear species to its daughter species after a given amount of time.

Chapter 31: Nuclear Energy

1. Be able to describe nuclear fission in terms of particles and in terms of how we get energy from it.
2. Be able to describe nuclear fusion in terms of particles and in terms of how we get energy from it.