PHYS 2604
Practice Questions on Nuclear Physics

1. Read Examples 12.2 and 12.3 for use of the approximate empirical relation for nuclear radius. As an independent example, compute the approximate radius of $^{16}_{8}O$.

2. Read Examples 12.4 and 12.7 about binding energy. As an independent example, compute the binding energy and binding energy per nucleon for $^{13}_{6}C$.

3. Find the energy required to remove a neutron from $^{44}_{20}Ca$. (Give your result in units of MeV.) What is this energy called?

4. The counting rate from a radioactive source is 4000 counts per second at time $t = 0$. After $10\ s$, the counting rate is 1000 counts per second. *(a)* What is the half life? and *(b)* What is the counting rate after 20 seconds?

5. A sample of a radioactive isotope is found to have an activity of $115.0\ Bq$ immediately after it is pulled from the reactor in which it was produced. Its activity 2 hours and 15 minutes later is measured to be $85.2\ Bq$. *(a)* Calculate the decay constant and the half life of the sample. *(b)* How many radioactive nuclei were there in the sample initially?

6. Calculate the kinetic energy of α particles emitted in the decay of $^{222}_{86}Rn$.

Additionally, the following problems from Thornton and Rex Chapter 12 are solved in the Student Solution Manual. They are also good practice (I will post the solutions for those who do not have the SSM).

12.25, 12.30, 12.39, 12.40 (For the last two, read Example 12.15.)