PHYS 122: Reading Assignment Cycle 3A

Monday, March 16, 2009

Reading assignment:

Here are the associated reading for Cycle 3A from *Physics for Scientists and Engineers* Third Edition, Volume 2 by Ohanian and Markert. I've organized these by Week instead of lecture since I might re-arrange the order they are covered in class, slightly:

I strongly recommend that you complete each reading assignment prior to the associated lecture. The lectures will be presented under the assumption that you have already read the assigned text.

Week 9: Starting March 16th:

- Read **Chapter 26** as follows:
  - **Review Sections 26.1, 26.2**. At this point your goal is to be "entirely comfortable" with capacitors, since we will use them over and over during the next several weeks to demonstrate key concepts. In particular, make sure you understand Example 1. You want to be able to calculate the capacitance for any "pair of conductors" system.
  - **Read carefully Section 26.3**. We use the capacitor to explore the phenomena of dielectric materials. Make sure you know what "kappa" represents. Make sure you understand Example 9.
  - **Review Section 26.4** You want to get to the point of instinctively recognizing a capacitor as an energy storage device.
- Read **Read Selected parts of Chapter 28** as follows:
  - **Read Carefully Section 28.7**. This time, we want to follow the details of the time-dependence of RC circuits. The key idea is that any time-dependent value (voltage, current, charge) will evolve *exponentially* to equilibrium.
  - **Review Section 28.8**. Make sure you understand the difference between voltage and current here. Your life may depend on it some day.

Week 10: Starting Mar 23rd:

- Read selected sections of **Chapter 29** as follows:
  - **Review Sections 29.3 and 29.4** Make sure you can do the "solenoid" problem with Ampere's loop if you did not catch this last time around. Also **Read Carefully page 942** which describes the magnetic field due to a circular loop of current, otherwise known as a magnetic dipole.
  - **Read Section 29.5**. Actually, concentrate on pages 948 and 949 and make sure you understand how the field in the center of a loop is calculated.

- Read selected sections of **Chapter 30** as follows:
  - **Review Section 30.2**. I might ask you for forces on several "segments" of wire.
  - **Read Carefully Section 30.3**. It's time to get used to working with torque again.
  - **Read Carefully Section 30.4**. We use an analogy with dielectrics to explain the magnetic properties of materials. Make sure you understand all of the defined terms here: susceptibility, ferromagnetism, paramagnetism, diamagnetism, and permeability.
- Read selected sections of **Chapter 31** as follows:
  - **Review Section 31.2** Make sure you are very happy with the concept of flux and the concept of Faraday's Law with changing B-field and/or changing area.
  - **Read Carefully Section 31.3**. Make sure you can "quickly" infer the direction of the induced voltage when the flux changes for any reason, including angle change. Be very sure that you understand Example 4, the simple AC generator.
  - **Read Carefully Section 31.6**. Once again, we are dealing with exponential forms.
- Read selected sections of **Chapter 32** as follows:
  - **Read Section 32.1**. We are not getting too deeply into AC circuits, but you do need to know what all of the terms like frequency and RMS voltage mean.
  - **Read Section 32.6**. Transformers are an example of mutual inductance. They only work with AC current.

Week 11: Starting Mar 30st:

- Read selected sections of **Chapter 33** as follows:
  - **Read Carefully Section 33.1**. This is a really "meaty" section of the text, and everything here is quite important. Again we use the capacitor to introduce a key concept of the displacement current, which is *not* a current.
  - **Read Carefully Section 33.2**. This is my favorite section of the whole text, and is the reason I picked it. Read carefully. Make sure you *understand* what is shown in Figure 33.5.
  - **Read Carefully Section 33.4**. The Spectrum.
  - **Read Carefully Section 33.5**. Here we define the Poynting vector. Yes, light waves carry energy.
  - **Read Carefully Section 33.6**. Here we derive the exact for of the light wave from first principles. You need to be able to describe what Equation 33.33 means.