PHYS 212 S2013 Study Guide for Test #4     Chapters 28,29 & 30

Test will consist regular questions, derivations, and problems.

1. Chapter Reading. 2. Practice WileyPlus assignments.

Chap 28:

Electric force on a charge: $ \vec{F}=q\vec{E}$ Magnetic force on a moving charge: 

Net force on a moving charge in electric and magnetic fields: $\vec{F}=q\vec{E}+q\vec{v}×\vec{B}$

Vector cross product: $ \hat{i}×\hat{j}=\hat{k}$ $\hat{j}×\hat{i}=-\hat{k}$ $\hat{i}×\hat{i}=0$

Vector dot product: $\vec{a}∙\vec{b}=ab\cos(θ;)$ $\hat{i}∙\hat{i}=1$ $\hat{i}∙\hat{j}$ = 0
 where *θ* is the angle between the vectors.
$$a=\sqrt{a\_{x}^{2}+a\_{y}^{2}+a\_{z}^{2}}$$

A Charged Particle Circulating in a Magnetic Field:

**Magnetic Force on a Current-Carrying Wire** A straight wire carrying a current *i* in a uniform magnetic field experiences a sideways force

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| http://edugen.wiley.com/edugen/courses/crs1650/art/common/pixel.gif |
| http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c28/math159.gif |  |

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| **Chap 29: Magnetic Field of a Long Straight Wire:**  |
| http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c29/math011.gif  |    |
| http://edugen.wiley.com/edugen/courses/crs1650/art/common/pixel.gif |



Finding magnetic field using Ampere’s law and Biot-Savart law.

**Chapter 30: Magnetic Flux** The *magnetic flux* through an area *A* in a magnetic field is defined as



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| **Faraday's Law of Induction** If the magnetic flux http://edugen.wiley.com/edugen/courses/crs1650/art/math/halliday8019c30/math008.gifthrough an area bounded by a closed conducting loop changes with time, a current and an emf are produced in the loop; this process is called *induction*. The induced emf is http://edugen.wiley.com/edugen/courses/crs1650/art/common/pixel.gif |
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**Lenz's Law** An induced current has a direction such that the magnetic field *due to the current* opposes the change in the magnetic flux that induces the current. The induced emf has the same direction as the induced current.