**Transformed E&M I materials**

**Biot-Savart Law**

**(Griffiths Chapter 5)**

**TIMELINE**

Prof A covers this in lectures 29.

Prof B. covers this in lecture 27.

Transformed course covered in lectures 30-31.

**LEARNING GOALS**

* 1. Students should be able to state when the Biot-Savart Law applies (magnetostatics; steady currents, dp/dt=0).
  2. Students should be able to compare similarities and differences between the Biot-Savart law and Coulomb’s Law.
  3. Students should be able to choose when to use Biot-Savart Law versus Ampere’s Law to calculate B fields, and to complete the calculation in simple cases.

**CLASS ACTIVITIES**

**Discussion**

**Biot-Savart**

Had them "think like an 18th century physicist" to \*come up\* with Biot-Savart.

**Demonstration**

**Compass and dip angle**

Brought a dip-compass needle to see the dramatic dip angle in the room (and brief discussion of geo-magnetic field).

**Tutorials**

**Magnetic Field due to a Spinning Ring of Charge” activity**

***Oregon State University***

Working in small groups students are asked to consider a ring with charge Q, and radius R rotating about its axis with period T and create an integral expression for the magnetic field caused by this ring everywhere in space. Students also develop the power series expansion for the potential near the center or far from the ring.

**Visualization**

**Stokes’ Theorem**

<http://www.math.umn.edu/~nykamp/m2374/readings/stokesidea/>