Today:	**Ch 22** E&M Induction 2nd ½	**HW 15 Redo; HW17**
Friday:	**Ch 22 & 20** RC & AC Circuits	**HW 16 Redo; HW 18**
Lab:	**5** Magnetic Fields and Inductors	

22.3 Magnetic Flux & Faraday's Law

- **Mathematically,**
  - **Flux**
    - **Units:**
    - **Direction of Area**
- **Conceptually,**
  - **Field Lines - B**
  - **Field Lines through Area of Current Loop**
  - **Rain analogy**

Demo: Flux of Earth's field

Example 1: The class room door is about 0.9 m wide and 2.1 m tall and facing, roughly due North. The Earth's magnetic field points North and down at an angle of about 50° below the horizontal. If the Earth's field strength is about 8×10^{-4} Tesla, what is the Magnetic Flux through the door?

22.4 Faraday's Law of Electromagnetic Induction (magnitude of induced *emf*)

- **Faraday's Law:**
- **General Strength of Faraday's Law, N loops**

Demo / Example 2: Flip coil. I have a coil of 30 turns of wire, with an area of 0.035 m^2. Below it I have some magnets providing an average magnetic field of ~ 0.01 Tesla. It takes about 0.05 s to flip through 180°. What is the average *Emf* produced?

22.5 Lenz's Law (direction of induced *emf*)

HW 18, Ch 22. Pr 12, 18, 28

12. A house has a floor area of $112 m^2$ and an outside wall that has an area of $28 m^2$. The Earth's magnetic field here has a horizontal component of 2.6×10^{-5}T that points due north and a vertical component of 4.2×10^{-5}T that points straight down, toward the Earth. Determine the magnetic flux through the wall if the wall faces (a) north and (b) east. (c) Calculate the magnetic flux that passes through the floor.

18. In each of two coils, the rate of change of the magnetic flux in a single loop is the same. The emf induced in coil 1, which has 184 loops, is 2.82 V. The emf induced in coil 2 is 4.23 V. How many loops does coil 2 have?

28. The drawing shows that a uniform magnetic field is directed perpendicularly into the plane of the paper and fills the entire region to the left of the y axis. There is no magnetic field to the right of the Y axis. A rigid triangle ABC is made of copper wire. The triangle rotates counterclockwise about the origin at point C. What is the direction (clockwise or counterclockwise) of the induced current when the triangle is crossing (a) the +y axis, (b) the −x axis, (c) the −y axis, and (d) the + x axis? For each case, justify your answer.