Topics for Today:

- Announcements
  - EE5200-L@mtu.edu is up and working. Use it.
  - Web page: http://www.ece.mtu.edu/faculty/bamork/ee5200/
  - Bring calculator to lectures, for in-class sample calculations.
  - Buy a 3-ring binder for course materials.
  - Office hrs: M,W,F 2-3pm Eastern Time
  - Office: EERC 614. Phone: 906.487.2857
  - Ch.1 Solutions posted on web page, finish review Sept. 10th.
  - Set of exercises CKTS posted, due Mon Sept 15th.
  - Ch.2 material - aggressively review it, Ch. 2 solutions posted.

- Coverage for Review:
  - Chapter 1 problems (solutions posted)
  - Click on Pre-Req Mat’ls - Euler’s Identity, EE3120 Review
  - Matlab quickstart tutorial, will be using Matlab starting Week 3.
  - Plan on initiating a survey to get a handle on your skill levels.
Prerequisite Material, Useful References (see course web page)

- Euler's Identity - The foundation of phasor analysis, as well as hyperbolic functions (used for long transmission lines)
- Basic Circuit Analysis, Thevenizing, Phasor Analysis, Impedance, P,Q,S, etc.: EE3120 pre-req practice problems | Solutions
- Basic 3-Phase Phasor Analysis - Review problem from EE3120
- Magnetic Circuits - quick review and introduction of how a transformer works
- Mutual Inductance - concept handout from EE3120 (refer to Section 2.2 of your text)
- Transformers 101 - Everything you wanted (or suddenly need to know) about transformers but were afraid to ask...
- Delta-Wye Transformer - detailed example with solution from EE3120
- EE 4221 Pre-Req Course Description
- EE 4222 Pre-Req Course Description
- Pre-Req Review Videos with Notes (from 2003 Archives)
  - Basic Circuit Analysis, Phasors, Three Phase Phasors: Lect 1 (skip first 12 mins) | Lect 1 Notes
  - Phasor Diagrams, Ideal Transformers, Nodal Analysis: Lect 2 (skip first 6:20) | Lect 2 Notes
  - Nodal Analysis, 3-phase circuits, Deltas and Wyes, Per Unit System: Lect 3 (skip first 3 mins) | Lect 3 Notes
  - Active & Passive Sign Convention for power flow, Per Unit, Transformers, Symmetrical Components: Lect 4 (skip first 2 mins) | Lect 4 Notes
  - Transformers, Induced Voltage & Polarity Marks, Phase Shift: Lect 5 (skip 3:45 - 5:20) | Lect 5 Notes
  - Phase Shift in Transformers, Phasor Diagrams, Application of Symmetrical Components: Lect 6 (skip first 3 mins) | Lect 6 Notes
- Sample .m files from above tutorials: for_ex.m | r2p.m | for_if_ex.m | while_ex.m | ft.m
- Symmetrical Components - the basics.
\[
\begin{align*}
S_1 &= S_2 \\
\text{(in)} &= \text{(out)} \\
\tilde{V}_1 \tilde{I}_1^* &= \tilde{V}_2 \tilde{I}_2^* \\
\text{IDEAL!}
\end{align*}
\]

Non-Ideal

- Flux Leakage
- Winding Resistance
- Magnetic Saturation
- Core Losses < Eddy Currents
- Hysteresis
Lenz's Law

Induced voltage causes a current, if coil is shorted, that produces a flux which cancels the voltage in that induced the voltage in first place.
\[ i = \frac{\text{Lenz}}{	ext{Faraday}} \]

\[ \frac{\Delta \phi}{\Delta t} = -\frac{\phi}{C} \]

\[ E_{\text{ind}} = N \frac{\Delta \phi}{\Delta t} \]

\[ i_2 = i_1 + i_n \]

\[ \phi_{\text{cont}} \]

\[ \phi \]
\[ \mu = \frac{\mu_0 m}{A} \]

\[ R = \frac{1}{n \omega L} \]

Diagram:
- A coil labeled with "A"
- Another coil with a symbol "\( \lambda \)"
- A circuit diagram with components labeled "L1", "R1", "R2", and "Rc"
- A linear circuit with resistors and inductors
Next: Ampere's Law