**Basic Industrial Electricity**

1. What is electricity?
   1. Atomic Structure
   2. Electrical Charge
   3. Resistance and Conductance
      1. What makes a material resist electrical flow?
      2. What makes a material a good conductor of electricity?
      3. Resistors connected in series and parallel
   4. What is voltage?
      1. DC Voltage Sources
         1. Batteries
         2. DC Power supplies
      2. AC Voltage sources
         1. Generator
         2. Function generator
   5. What is current?
2. Simple DC electrical circuits
   1. Ohms Law
   2. Power sources, switches, grounds and loads
   3. Power sources in series
   4. Power sources in parallel
   5. Series resistive circuits
      1. Kirchhoffs voltage divider
   6. Parallel resistive circuits
      1. Kirchhoffs current divider
   7. Electrical Power
      1. Watts and Horsepower
3. Using Meters to measure electrical parameters
   1. What is a VOM?
   2. Safety concerns
      1. Voltage rating
      2. Selecting the correct scale
      3. Connect the meter properly
      4. Loading effects
   3. Measuring resistance and continuity
   4. Measuring DC and AC voltage
   5. Measuring small currents with a VOM
   6. Measuring large currents with a clamp-on ammeter
4. DC Circuits Lab
   1. Use a breadboard to construct various series and parallel electrical circuits. Calculate voltage levels and current flows. Measure the voltages and currents to verify the calculations.
5. AC Circuits
   1. Capacitance
      1. What is a capacitor?
      2. Charging a capacitor
      3. Capacitors in series and in parallel
      4. Capacitors in DC circuits
   2. Inductance
      1. What is an inductor?
      2. Magnetic fields and inductors
      3. Inductors in series and in parallel
      4. Inductors in DC circuits
   3. Single phase sinusoidal voltage source
      1. How is AC voltage produced?
      2. Sinusoidal waveforms
         1. Instantaneous value, average value, peak value, RMS value
         2. Frequency and period
      3. Resistors in AC circuits
      4. Capacitors in AC circuits
      5. Inductors in AC circuits
   4. Real power, reactive power and apparent power
      1. Power factor
   5. Transformers
      1. Magnetic coupling and induced voltage
      2. Construction
      3. Turns ratio
         1. Effects on voltage
         2. Effects on current
      4. Power flow
   6. Three phase systems
      1. Three phase generation
      2. Y and Delta configurations
      3. Phase sequence
      4. Balanced loads
      5. Unbalanced loads
   7. Final Exam

Course grading will be as follows:

* + - 1. 1/3 on attendance
      2. 1/3 on DC lab
      3. 1/3 on final exam
      4. A pre-test will be given at the start of the course, which will be similar to the final exam to establish a baseline of knowledge.