Learning objectives for lectures in EAS 199A

1. Introduction, Ohm's Law
   - Know how to contact instructors: email, telephone, office hours
   - Understand the goals and expectations of the class
   - Be able to explain the mechanism for conduction of electricity in solids
   - Be able to read data from the Periodic Table of elements
   - Be able to define current in terms of electron flows (in number and direction)
   - Be able apply Ohm's law to the prediction of voltage, current and resistance in simple DC circuits.
   - Understand the homework format

2. Power consumption in resistors. Resistors in series and parallel.
   - Be able to compute the power dissipation (or consumption or use) when current flows through serial and parallel combinations of resistors.
   - Be able to compute the equivalent resistance for two resistors in series.
   - Be able to compute the equivalent resistance for two resistors in parallel.

3. Multimeter Demo, Breadboarding an LED Circuit, Resistor Color Codes
   - Be able to use your multimeter to measure voltage and resistance
   - Be able to build circuits of resistors on the breadboard from the Sparkfun Inventor's Kit
   - Be able to write an Arduino program to make an LED blink

4. Kirchoff's Voltage Law, Breadboard circuits
   - Be able to use your multimeter to measure voltage drops around a circuit
   - Be able to compare predicted and measured voltages for simple resistor circuits
   - Be able to define and create a voltage divider on a breadboard

5. Arduino Programming, Kirchoff's Current Law, Binary Numbers
   - Be able to describe the role of the <code>setup</code> and <code>loop</code> functions in an Arduino sketch
   - Be able to list at least two Arduino variable types and describe the kinds of data they can store
   - Be able to convert from binary to decimal and decimal to binary number formats
   - Be able to predict current flow into junctions for simple resistor circuits
   - Be able to find the programming reference on the main Arduino we site
   - Be able to write Arduino programs to control the micro servo motor in the Experimenter's kit

6. Review of DC circuit analysis, Arduino programming
   - Be able to analyze and compute the power dissipated by any resistor in an arbitrary combination of series and parallel resistors
   - Be able to explain the differences between <code>int</code> and <code>float</code> variable types in an Arduino sketch
   - Be able to choose <code>int</code> or <code>float</code> appropriate for a coding task
   - Be able to write <code>for</code> loops in an Arduino sketch
   - Be able to write a <code>for</code> loop to compute the average of analog input measurements in an Arduino sketch

7   Plotting in Excel, Desktop Fan Introduction, Breathing LED
   - Be able to set up a spreadsheet in Excel that is organized and easy to read
   - Be able to construct a plot in Excel
   - Be able to describe the main steps in constructing the desktop fan project
   - Be able to derive the coefficients of, and evaluate the v(t) curve that describes a breathing LED.

8   Breathing LED
   - Be able to derive the coefficients of, and evaluate the v(t) curve that describes a breathing LED.
   - Be able to use PWM to control the brightness of an LED
   - Be able to implement codes to simulate a breathing LED with straight line segments

9   DC Motor control, Soldering the DC motor leads
   - Be able to safely solder extension leads onto the DC motor
   - Be able to use a potentiometer to control the speed of the DC motor from the Sparkfun kit

10   Servo motor control, Begin Solidworks drawing
   - Be able to identify characteristics that distinguish a servo and a DC motor
   - Be able to describe the difference a conventional servo and a continuous rotation servo
   - Be able to use the Arduino Servo library to control servo position
   - Be able to launch Solidworks to begin drawing of the fan parts