Physics 517/617 Experiment 3
Diodes

1) Measure and graph the current through a diode vs the voltage applied across it for both forward and reserve biasing voltage. Use a DC power supply, zener diode, resistor(s) and multimeter. The forward current in the diode should not exceed 300 mA.

P517: Do one part of the next three.
P617: Do two parts of the next three.

2) Build a clipping circuit that limits the voltage swing from -0.6 V to 5.6 V. Use a 1 kΩ input resistor. Derive the 5 V reference from a 5 V source (power supply). Apply a 1 kHz sine wave. Vary the amplitude of the input voltage and capture using the PC's WAVESTAR program pictures of the input and output waveforms (2 waveforms/picture). Repeat for a triangular input waveform.

3) Build a full wave rectifier. Capture using the PC's WAVESTAR program a picture of the input and output waveforms (2 waveforms/picture). Modify the circuit so that the output voltage approximates DC. What is the ripple factor for your circuit? Use your signal generator for the voltage source. Use a transformer to couple the input voltage to your circuit. Details on rectifier circuits can be found in almost every electronics book. Here are two sources: Simpson (P187 and P857, experiment 10) and Hayes and Horwitz Student Manual (P76).

4) The following circuit is called a voltage doubler. Build it and find out why it has earned this name. Pick $RC \gg$ the period of V_{in}. What is the relationship between V_p and V_{out}? Capture using the PC's WAVESTAR program a picture of the V_{in}, V_p, and V_{out} waveforms. How could you make a voltage quadrupler? See Diefenderfer P120 for details. Also Simpson P193 for a slightly different version of this circuit.