

Santa Clara University	ELEN 164	Dr. Shoba Krishnan Ben Lampe
Laboratory Equipment		

I. Objectives

- To learn the common lab equipment for measuring and characterizing components.
- To learn the common lab equipment for measuring and generating DC signals.
- To become comfortable operating DMMs and Power supplies, and understanding their settings and quirks.

II. Laboratory Procedure

Measurement Instruments

Section 1: Digital Multimeter (DMM) (Agilent – 34405A)

The digital multimeter is one of the most convenient, versatile, and simple tools you will be using in a lab. For the most part, all digital multimeters are capable of measuring voltage, current, and resistance, but many can measure capacitance, frequency, and even temperature. The multimeter will soon be one of your best pals, so get to know what it can do and, perhaps more importantly, what it cannot do.

Assignment:

- ❖ **Use the multimeter to measure three random resistors. Create a table comparing each resistor's written and measured values.**

Section 2: Power Supply (PSU) (Agilent - U8002A)

The power supply is exactly that – a power ($V \cdot I$) supply. It is capable of supplying either a constant voltage (CV) or a constant current (CC) to a load. Physically, we are only capable of forcing a set voltage or current, since the other is determined by the load, which we do not have control of ($V=IR$). This can cause serious safety issues if the voltage or current goes above the rated voltage or current of our device under test (DUT). To prevent this, almost all power supplies allow the user to set an over voltage protection (OVP) and/or and over current protection (OCP) to prevent providing too much power to the DUT and either damaging the device, the power supply, or yourself. **Always use protection circuitry when operating a power supply.**

— You will notice the power supply has three terminals: positive, negative, and ground. The positive and negative terminals supply an electric potential difference, while the ground terminal is used as a reference point. Since we will only be generating positive voltages, it is necessary to tie the negative terminal to the ground terminal so that the supply voltage is not “floating” which can cause problems with circuitry, and potentially be hazardous.

Assignment:

- ❖ **Make sure the power supply is off before connecting the power supply to the circuit!**
- ❖ **Check that the negative terminal of the supply is shorted to ground by a wire!**
- ❖ **Talk with the TA for a safety and operation briefing before continuing on with this assignment!**