

Laboratory Goals

- Familiarize students with lab policies and expectations
- Outline basic laboratory safety for electronics
- Familiarize students with laboratory layout and equipment

Pre-lab reading

- None

Equipment needed

- Lab notebook, pen

1. Laboratory Safety

You must be aware of safety concerns while working in the EECE lab. These include electrical shock, electrical fires, and explosion. ***These hazards can cause serious injury, and possibly death.***

If an injury occurs, immediately notify your T.A. and seek medical attention.

Below, is a list of the most likely safety issues found in the lab. For your own safety, read and understand each one of them:

Shock hazards

The circuits you will be constructing are typically low-voltage DC circuits, with low-voltage AC inputs. But they still present shock hazards. Do not touch the circuit wiring while power is applied to it. Carefully attach test leads to the circuit to avoid shorts. Make sure before you apply power to a circuit, all connections are correct, and no shorted wires exist.

The greatest shock hazard exists when you are using the AC transformers. These are plugged into the 120VAC wall outlets, and produce a stepped-down AC voltage. While this secondary voltage is usually much less than 120VAC, there is likely high current available across the output terminals. Be careful not to touch or short these output terminals while the transformer is plugged in.

Fire/smoke

Excessive current flowing through a component can cause a smoke or fire hazard. ***If you see or smell smoke, immediately turn off the power to the circuit.*** Locate the problem before applying power to the circuit again. Ask your T.A. for help finding the problem. Before applying power to a circuit, double-check your circuit for wiring or design errors. Make sure that the components you are using can handle the designed current.

The following example shows how excessive current can cause problems: Applying 12VDC to a ½-Watt, 50-Ohm resistor is a bad idea! Why? $12V/50\text{ Ohms} = 240\text{mA}$. And $12V \times 240\text{mA} = 2.88\text{ Watts}$. This resistor is designed to dissipate .5 Watt of power. And $2.88\text{ Watts} \gg .5\text{ Watts}$. The excess current will cause the resistor to overheat, smoke, and possibly cause a fire.

Explosion hazards

Electrolytic capacitors can explode if their voltage limits are exceeded, or if they are connected with reverse polarity. (Electrolytic capacitors always have a black band with “-“ Marks on them to indicate the negative connection. They are also marked with the maximum DC voltage they can handle.) Ask your T.A. to show you some electrolytic capacitors, and a ceramic disc capacitor--note the different look of each.

2. Laboratory Orientation

The EECE 206 laboratory is designed for six students to perform the lab assignments. Each student uses an assigned workstation and matching equipment cabinet. Each workstation consists of:

- ❑ A digital oscilloscope for capturing waveforms
- ❑ A digital multimeter for measuring resistance, AC or DC voltages, and current
- ❑ A function generator to create sine, square, or triangle waveforms of desired amplitude
- ❑ A DC power supply to power your lab projects
- ❑ A PC with software tools such as PSPICE and LabVIEW, and Microsoft applications

Learning how to use the equipment is outlined in later labs. And you can always ask your T.A. for specific help. Lastly, you can get more information on the equipment from the manuals in the lab, or at the website.

Each of the six equipment cabinets contain:

- ❑ Test leads with different ends, which allow you to connect your circuits to test equipment
- ❑ A digital multimeter for measuring resistance, AC or DC voltages, and current
- ❑ Transformers, analog meters, variable transformers, and other equipment used in the lab projects

While you may not use all the equipment during the semester, you need to be familiar with its name and function.

The equipment in each cabinet must be returned to its labeled location in the cabinet after each lab is completed. If any equipment is damaged or missing, please report it to your T.A.

Two other cabinets are located in the lab: One containing $\frac{1}{4}$ and $\frac{1}{2}$ -Watt resistors, and another containing assorted capacitors (both electrolytic and ceramic disc). These parts are available as needed to complete the lab experiments. Keep the components that you take from these cabinets and add them to your lab parts kit. If you can't find the component you need, ask your T.A. for help.

Clean up

Before leaving the lab, take a few minutes to make sure all equipment and test leads are returned to your cabinet, and then lock it. Return the cabinet key to your T.A. Pick up any loose parts on the workstation table, and wipe off any eraser shavings, or other debris with a paper towel. Dispose of the paper towel and debris in the wastebasket.

Place any waste printer paper that you generate in the blue recycling bin. (Only printer paper is to be put in the recycling bin. Other waste goes to the regular wastebasket)

Report writing

After completing the assignment, most of the labs require a report to summarize your work. These reports must be detailed enough so that a technical person could use them to duplicate your experiment. (An example of a typical report is found on your lab CD)

Keeping a neat lab notebook makes your report writing easier. Record the procedures used, and the results of your experiments. Make sure to create accurate drawings of waveforms, circuit schematics, and data tables.

3. Lab Assignment

Unlock your assigned equipment cabinet, and create an inventory list of the equipment. (Each student records the information in his or her lab notebook.) Ask the T.A. to show you each of the different connector types found on the test leads before you begin.

Use the following table as a guideline for your lab notebook:

Quantity	Manufacturer	Description	Model Number	Serial Number
1	Simpson	Analog multimeter	206	xxx-xxxx
2	Not Available	Test leads, BNC/EZ Hook, 3 ft, red	None	None
2	Not Available	Test leads, banana/banana, 2 ft, black	None	None
2	Not Available	Test leads, BNC/EZ Hook, 3 ft, black	None	None
1	Not Available	Test leads, BNC/BNC, 3 ft, black		

Create a similar table for the equipment found at your workstation. Record the information in your lab notebook.

When you are finished with the inventory, close and lock the equipment cabinet, and return the key to the T.A. Clean up your workstation. Finally, have your T.A. initial your lab notebook.