Course Notes: Etiquette and Safety

Etiquette

Etiquette is the set of rules or procedures that define polite behavior within a particular setting. The etiquette for the ECE 110 Lab is outlined below and has been specifically designed to foster a healthy and productive environment in the laboratory. Please take the time to read and follow the lab etiquette so that you and your peers will have the best possible experience in the lab.

Respect Your Peers

In the field of engineering, most projects are too large for any one engineer to accomplish on their own. As a result, most engineering projects (both the academic and professional) require the collaborative efforts of a team of engineers. Effective collaboration is not possible without respect between peers.

Since the University of Illinois is both large and prestigious, you will find that your classmates come from wide variety of backgrounds. Although differences in cultural background or personality can sometimes lead to tension between peers, a diverse team benefits greatly from the diverse ideas it generates. Your classmates will approach problems differently and have strengths that are different from your own. Embrace your diversity, learn from the strengths of others, and allow others to learn from you.

Cooperate with Your Lab Partner

Laboratory courses are intended to be a place where students can gain “hands-on” experience with engineering concepts. Take turns with your lab partner leading hands-on activities within the lab. This should be done when wiring the breadboard, using laboratory equipment, and in using the computer for data analysis and graphing.

If you find that your partner is not participating enough or perhaps not letting you participate enough, communicate the issue to your partner or discuss the issue with one of your lab instructors.

No Food or Drink

Food and drink are generally prohibited in the lab, with the exception of bottles of water with a tight-fitting screw-top lids. Other beverages such as pop and sugary drinks can result in a sticky mess that ruins the furniture while posing an added danger

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to expensive lab equipment. Food should NEVER enter the lab. Besides the risk of spreading germs through the practice of eating in a hands-on laboratory, there are other issues with respect to toxic-poisoning discussed below in Safety Considerations. Furthermore, it makes the lab look sloppy and unprofessional to those who observe through the windows and the financial supporters of ECE and its laboratory facilities.

Any exceptions to the food and drink policy must be explicitly granted by your head lab instructors. Most TAs will allow you to have food and drink in 1005 ECEB (the lecture area adjacent to the lab). Please finish your snack and dispose of trash **before** going into the lab as 1005 ECEB also gets used for office hours during lab time. Thanks!

Respect Property and Lab Equipment

Through each lab session, do your best to be respectful of the workspaces being used by your classmates and minimize clutter that might serve as a tripping hazard. At the end of each lab, your workbench (and any common bench areas you have used) should appear as if you had never been there. Place cables in their proper storage location, put away your circuit components and toss any waste into the trash can. A neat and clean workbench is much easier to use when troubleshooting. Show respect to the students in the other lab sections by helping them keep the lab clean!

Suggestion: Regularly conversing with others will enhance your education!

Collaborate with Classmates

Technical discussions and collaborative learning are among the most effective ways to build and affirm your command of the material. Discuss your experiment procedures, questions, and observations with other lab groups. Take time to talk with your neighbors regularly to ensure good scores on your assignments.

Cheating

Collaboration does ***not*** imply that you may submit work done by your lab partner or another classmate. Collaboration is a give-and-take procedure where two-way discussions enhance student understanding of the material. One-way conversations (like asking for an answer to a question or copying from your teammate or another student's lab report) is just ***cheating***. Any student caught cheating will be subject to disciplinary action.

The following list contains just a few actions prohibited in ECE110 and subject to disciplinary action: copying pre-lab answers from your lab partner or another student in ECE110, submitting data recorded by another lab team, submitting code or graphs written or produced by another lab team from this or any past semester. Furthermore, you must not mislead the grader with respect to the amount of design work accomplished by your team. For example, while it is generally good to research and utilize interesting circuits from outside sources, **you must not submit** these aspects as part of your final project design **without crediting the source**! To do so would amount to plagiarism.

Dealing with Problems

Although the vast majority of students in ECE110 are considerate, hard-working, intelligent young adults, some may have picked up bad habits. Others may make a serious error in judgment when under the pressures that a top institution like the University of Illinois may present. If you encounter a difficulty with a teammate or another student in the course that cannot be resolved, you have several actions of recourse. For example, you can ask to be paired with a different student within the first six weeks of the semester (or later, if the situation is more serious). Alternately, you might meet with your professor or an advisor in ECE where he/she can act as a moderator to help rectify the problems. In any case, it is better to address any issues as soon as they appear.

Safety Considerations

What are the hazards in an electrical engineering laboratory? Here, we explain how several (specific to ECE) may affect you.

Electric shock

Some of the instruments are capable of providing currents high enough to cause ventricular fibrillation of the heart (greater than 0.1 A through the heart). Fortunately, the lower voltages (< 10 V) provided by this equipment coupled with the typically-high resistance of the body to current flow makes this risk very low in ordinary conditions.

A greater concern is involved when plugging something into the 110-V, 60-Hz wall socket which is capable of providing much higher currents. Never remove the case of any electrical device or design your own system that draws power from a wall outlet

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Comment: Using someone else's code on the final project is not necessarily cheating. It is okay as long as you make it clear to the grader that certain portions are accredited to another person and are not part of your own contribution to the work. ALWAYS credit another person's work.

If you ever feel discouraged and don't know who to turn to, contact the course director, Prof. Schmitz, at cdschmit@illinois.edu

without proper supervision. Do not assume that because you are training to be an engineer, that you are inherently trained to handle high-power devices.

Large capacitors (like those also found in large appliances like CRT televisions or microwave ovens) are also capable of providing high voltages and correspondingly-high current. Many other devices contain marginally-large capacitors, but are often discharged automatically by a "bleed resistor". If you find yourself in the presence of a capacitor much thicker than your little finger, you should ask your lab instructor if it is safe to handle or use in your project.

Burns

While the power drawn from the sources in the lab are not typically a shock hazard, they can indirectly cause burns. Electrical devices are designed to dissipate a certain amount of electrical power without overheating. If a device is pushed beyond these limits by being wired incorrectly or being supplied with too much power, they can become very hot to the touch and often begin to burn and produce smoke. If you smell something burning and suspect it might be your circuit, quickly ***disconnect the power from your circuit***. Be careful when disconnecting power from a circuit in this situation as the power source itself (a battery, perhaps) may be very hot. The best practice is to use a pencil or other non-conducting object to physically disconnect the power source. ***DO NOT TOUCH*** any part of the circuit as it may remain hot for some time, but rather look for wiring errors, melted plastic or visibly burnt devices. If you find none, have your TA present before you plug it back in.

The most common serious mistake in wiring is connecting directly connecting the positive and negative terminals of a battery (generally called a *short*) through a non-obvious path on the breadboard. Most desktop power supplies have protective circuits that will limit the current or disable the output when the positive and negative terminals are shorted. Batteries typically have no such protection and can supply enough current to burn up components or melt a breadboard. Shorting a battery not only can cause burns due to hot devices, but can even result in the battery bursting into flames. Our batteries should be augmented with a thermal fuse, but do not rely on it! Be sure to use care with batteries. **Transport or store batteries in a manner in which they cannot short**.

During the semester, several students may wish to take the opportunity to learn the basics of soldering. While most people recognize the inherent danger of the hot end of the soldering iron, they often fail to recognize how much of that heat is transferred to the solder joint and adjoining metal parts of the circuit and how long it may take for those parts to cool. The larger the volume of metal being joined, the longer it will take to heat and then cool the parts when soldering. **Allow at least three times as long to cool as it took to heat and solder the joint**.

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Suggestion: Use a pencil or other non-conducting object to physically disconnect the power source from a hot-smelling circuit.

Suggestion: Transport or store batteries in a manner in which they cannot short.

Suggestion: When soldering, allow at least three times as long to cool as it took to heat and solder the joint.

Chemical Poisoning

Soldering is closely related to main source of chemical danger in the electrical engineering laboratory, lead (chemical element Pb). This heavy metal, when inhaled or ingested, is highly toxic and can lead to a multitude of problems affecting the nervous system and internal organs and can even cause death. Women who may be pregnant should remain especially mindful of the damage lead poisoning may cause to a developing fetus.

Many solders today are produced lead-free (but not necessarily toxin-free), but it is highly recommended that you learn proper soldering techniques that protect you from the ill-effects of potential toxins. Take precautions to **avoid breathing the fumes when soldering** and always **wash your hands** as soon as possible after soldering or handling soldered components. It should be evident that you should **never bring food** into any electrical engineering laboratories!

Cuts and Puncture Wounds

There are a few sharp objects in the lab that students are likely to handle. Carelessness around such sharp objects can lead to unnecessary injuries and possible infections.

The ends of the wires (often called *leads* and pronounced LEEDS) of the different components used such as resistors and integrated circuits are often sharp enough to puncture skin when enough pressure is applied. It is important to handle all components with care.

A wire stripper is a scissors-like device with notches cut into the blades to allow the experimenter to remove wire insulation without cutting the wire by mistake. Handle the wire strippers as you would scissors and be careful to keep your fingers away from the sharp cutting edges.

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Warning: Students found with food or drink in 1001 ECEB (the lab side) will be automatically deducted 1 lab point for that day.