

Guidelines for
ECE
Teaching Assistants



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Welcome! The ECE Department appreciates your time and effort serving as a teaching assistant. We want the experience to be fun and beneficial for you and for the students with whom you interact. Please review the following information, and contact your course instructor, advisor, or the Department Head (Dr. Maher) if you have any questions or comments.

Lab Safety

Although the experiments in our instructional laboratories are believed to be safe, you must share responsibility for your own well-being and for the well-being of your students. Safety in the laboratory includes not only preventing physical harm to yourself and your students, but also avoiding damage to equipment and lab components.

Our basic electrical laboratory safety guidelines include the following:

- 1) Rule of Three—At least three people need to be present when the lab is in use: one able to assist the injured person and one to go for help.
- 2) Know what to do in an emergency. Remember the Three C's: Check, Call, Care. Call 911 from a campus phone, or 994-2121 from a mobile phone.
- 3) No food or drink is allowed in the lab. You must enforce this rule rigorously!
- 4) Keep the aisles and tables clear: have students put their belongings out of the way.
- 5) Always wear suitable clothing and protective gear, especially when soldering or using tools. Particular care must be employed when working with high voltage, high temperatures, lasers, chemicals, rotating machinery, etc.

For the Power Lab, no loose scarves, ties, high-heel or open-toe shoes, or decorative jewelry are allowed. The Clean Room facilities have additional special rules for chemical safety, and special laser safety rules apply in the Optics Lab.

- 6) All electrical apparatus that connects to the AC power line must have a protective ground through a three-wire power cable.
- 7) Always double-check circuit wiring before applying power. Always have a single switch or button that will immediately remove power from the circuit in case of trouble.
- 8) Always switch the circuit power off before changing components or connections. It is tempting to get in the habit of changing connections in low-power circuits with the power on, but this habit is asking for trouble in the form of unintentional short circuits and blown components—or serious injury in the case of high-power circuitry.
- 9) Always ask for directions or help if you are unsure of the correct measurement procedure or circuit connection. *Be honest with yourself*: if you don't understand what you are doing, seek assistance from the course instructor or from another TA.

- 10) If you feel that a lab component needs to be altered, first get the approval of the course instructor. Do not open the cover of any equipment, deliberately modify connections, or attempt to bypass safety or fuse circuits.
- 11) Soldering must not be allowed on the anti-static mats or countertops: students must use a heat-safe work area.

Responsibilities—Lab TA

- Plan to meet with the course instructor each week before the first lab session, and attend the course lectures as your schedule allows. Ask the course instructor prior to the lab day if there are any special announcements or details.
- Conduct the entire lab experiment in advance, noting any important details, equipment setup, and likely student errors or misunderstandings. If extra equipment or components are needed, make sure these are available prior to the start of the lab period. If you don't understand any part of the experiment, consult the course instructor BEFORE the lab day.
- Arrive at least 10 minutes before the official start of the lab, and be present in the lab during the entire assigned lab period.
- Start each lab by making some oral announcements about the experiment, suggest things to watch out for, and explain any areas of possible confusion.
- During the lab, circulate around the room to make sure the experiment is being conducted properly and to answer questions.
- From time-to-time please ask students to explain what they are doing. If you notice one lab partner is always doing the hands-on work while the other partner sits back, help to be sure that everyone gets to be in the “driver’s seat.”
- As noted above, we have a firm policy that there can be NO food or beverages in the instructional laboratories. Water bottles are also not allowed. If you see students bringing food or beverages into the lab, remind them that they must keep these items away from the lab benches at all times. Students are welcome to take a break and eat and drink out in the hallway if they desire.
- If a piece of test equipment appears to be broken, label the device and notify the ECE Stock Room (Brent Olson). Obtain a spare device, or have the students switch to a different lab station.
- Always have students "check out" with you before they leave. Go to their lab station and verify that the equipment is in its proper place, the oscilloscope probes are carefully coiled, that all cables and other temporary use items have been returned to the rack, and no papers or other debris is left on or under the lab station.
- When the lab period is over, walk through the lab to make sure that all test equipment is properly powered off (computers can stay on), all stools/chairs are in the proper place, and that the overall status of the lab is in better condition than when you arrived.

Responsibilities—Paper Grader

- Make arrangements with the course instructor regarding the schedule for receiving papers and the date the papers are expected to be graded.
- Discuss with the course instructor the manner in which the papers are to be evaluated and scored. Communicate with the instructor regularly, and discuss any course material with which you are not familiar.
- Set aside a particular time and place so that you can grade the papers efficiently and without interruption.
- Always treat the student papers confidentially. Inform the course instructor if you notice many papers with similar mistakes, or if become aware of any conduct issues such as plagiarism.

Responsibilities—Office Hours

Depending upon your assigned in-lab and paper grading duties, you may also be assigned “office hours” to help answer student questions.

- Post your office hours--and be sure to be available at those times!
- Review the homework problems and lecture notes so that you are prepared to answer student questions.
- If you do not know the answer to a question, make suggestions on how the student can get additional help: ask the instructor at the start of class or during office hours, refer to the textbook and lecture notes, seek out a classmate, etc.

Additional Comments

As a Teaching Assistant, you play an extremely important role in helping students learn and develop as engineers. Your responsibilities are many and varied, but we have confidence that you will be able to fulfill the duties and gain valuable leadership experience.

In addition to the technical and administrative aspects of the TA position, you may also encounter interpersonal situations that require special care.

- In some cases you may already be acquainted or perhaps even be friends with students who are enrolled in one of your classes. It is vitally important that you maintain your objectivity and authority when working in your TA role. Treat all students fairly and equally.
- For most of our lab courses, you will assign students to work in teams of two. If there are sufficient lab stations available, you can choose to allow students to work on their own if they so desire.

It is important that BOTH lab partners are engaged in the experimental procedures. If you see one lab partner doing all the work while the other partner

sits back and takes notes (or takes a nap!), don't be shy about reminding them to get involved.

- Among other details, Section 310.00 in the MSU Conduct Guidelines states that students must be prompt and regular in attending classes, be well prepared for classes, take exams when scheduled, and act in a respectful manner toward other students and the instructor.

In rare circumstances you may encounter a student who is disruptive, disrespectful, or who questions your authority to run the lab or to assign grades to papers. This is not acceptable behavior for our students, and you are *not* expected to allow a disruptive student to interfere with the learning experience of the other students. If this situation occurs, ALWAYS seek guidance and assistance from the faculty member in charge of your course.

- When working with students of the opposite gender, you must strive to maintain a professional teacher-student relationship. For example, some of your male students may not have had experience with a female engineering instructor, lab partner, or TA, and might act as if the lab was a social venue rather than a classroom. Inappropriate remarks, conversations, or unprofessional attire must be avoided.

Reminder: Analysis of Data and Measurement "Errors"

All lab measurements are subject to some degree of uncertainty. Although these uncertainties are casually referred to as "errors", it is better to realize that they represent a fundamental constraint on any physical measurement. Specifically, it is vital to understand and specify the uncertainties in all measurements: it is unreasonable to obtain a result using a calculator to 10 significant digits if the measurements used in the calculation have only 2 or 3 significant digits.

Each electrical component and measurement instrument has a limitation of *tolerance*, *accuracy*, and *precision*. *Tolerance* refers to the discrepancy between the marked or "nominal" value of a component and its actual value. Tolerance is often expressed as a percentage of the nominal value, such as a voltage source specified by the manufacturer to be "10 volts \pm 1%": meaning that the actual voltage is somewhere between 9.9 volts and 10.1 volts. *Accuracy* refers to the discrepancy between the actual value of a quantity and the reading given by a particular measurement instrument. Accuracy is related to the concept of calibration, where an extremely accurate instrument or measurement technique is used to adjust the accuracy of another instrument. *Precision* is different from accuracy. Precision refers to the number of significant digits available in a particular measurement. Precision can also refer to the repeatability and stability of a particular instrument, i.e., the deviation of the reading from measurement to measurement.

Help the students to learn these aspects of their laboratory work, and guide them in their laboratory note-taking and reports.