

ECE

Lab Safety Manual

PURDUE
UNIVERSITY.
FORT WAYNE

Department of Electrical and Computer Engineering
COLLEGE OF ENGINEERING, TECHNOLOGY AND COMPUTER SCIENCE

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Introduction

All University employees, which include but not limited to faculty members, LTLs, staff members, graduate assistants, etc., should read this manual before using any facility/equipment in ECE departments. Students using these labs should be trained by their supervisors. For example, Senior Design Team students should be trained by their faculty advisor(s).

The Department Lab Safety Committee is composed of Dr. Guoping Wang, Dr. Yanfei Liu and Mr. Maurice Ralston.

For any lab safety questions, first please contact the Department Safety Committee. For any additional questions, you can reach out to REM Department which is located at SB G48/G50/G51.

The contact information of ECE Lab Safety Committee is:

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The contact information of PFW REM staff is:

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Environmental Health & Safety Specialist
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1. Training

The University employees (paid by the university which may include faculty/staff, GA, etc.) shall pass and complete annual safety training, which include Hazard Communication, Hot work, Compressed Gas Cylinder, Electrical Safety, Machine Guard, and Personal Protective Equipment (PPE) training may be required if necessary. All the training materials are available on REM website, <https://www.pfw.edu/offices/rem/safety-training/engineering>.

2. Office Self-Audit

All University employees shall complete a self-audit for their offices. The self-audit form can be downloaded at:

<https://www.pfw.edu/offices/rem/integrated-safety-plan/doc/ISP-self-audit.pdf>

3. Soldering Safety in ET 335

Soldering work should only be conducted in ET 335 and in designated workbenches only. The soldering work station SHALL NOT be moved to another location. Before using the soldering station, employees should pass the hot work program training and PPE Training. Students should be trained by their supervisor(s). Please follow the Soldering Iron Safety in Appendix when you do any soldering work.

Please discard lead/silver solder and dross in the metal container with lid which is labeled as “Lead/Silver Solder Waste for Recycling”. Please close the lid after solder is dropped.

Please dispose any used solder sponges and contaminated rags in the other metal container labelled as “Solder Sponges and Rags Waste” and close the lid.

Please contact REM Department for solder/solder waste recycle/disposal.

Please wash your hand with soap after you finish soldering.

Please wear safety glasses or goggles when you do the electric soldering.

No flammable materials such as card box, wooden chairs, etc. can be stored within 15 feet of the soldering station.

Steps of PPE Training and Hot work training in ET 335, the training materials are available online at: <https://www.pfw.edu/offices/rem/safety-training/engineering>

- 1) Complete annual Hazard Communication and Hot Work training.
- 2) Read through the Purdue PPE Policy, which is available online at:

<https://www.purdue.edu/ehps/rem/documents/programs/PPEPolicy.pdf>

- 3) If you need any assistance about Hot Work training and PPE policy, please contact the Department Safety Committee.
- 4) After you finish the above steps, please sign and date the original PPE Appendix B “Personal Protective Equipment Certification of Training” hanging on the wall in ET 335.

4. Electrical/Power Testing Station in ET 105

Anyone who will use the Power Rotating Machine (in ET 105) shall go through the training procedures listed below.

- 1) Complete annual Hazard Communication, Electrical Safety and Machine Guard trainings.
- 2) Read through the Purdue PPE Policy, which is available online at:
- 3) <https://www.purdue.edu/ehps/rem/documents/programs/PPEPolicy.pdf>
- 4) If you need any assistance about Electrical Safety/Machine Guard training and PPE policy, please contact the Department Safety Committee.
- 4) After you finish the above steps, please sign and date the original PPE Appendix B “Personal Protective Equipment Certification of Training” hanging on the wall in ET 105.

5. Chemicals in ET 331/335

The definition of chemicals is very broad, which may include correction fluid, cleaners, furniture polish, paint, solders, dish detergent, etc. For any such chemicals, after your purchase, please obtain a Material Safety Datasheet (MSDS) from the manufacturer’s website and put/organize them in the Chemical MSDS folder in ET 335. Please also update the chemical inventory when you purchase it in the MSDS folder. The inventory should also be updated annually in the end of fall semester by the responsible faculty of that room. The responsible faculty/staff member for ECE room with chemicals is:

ET 335 – Maurice Ralston

If you or your students purchase any chemicals, it is the purchaser’s responsibility to update the inventory sheet, print a hardcopy of MSD, and put them in the MSDs folder.

6. High Voltage Equipment ($\geq 50V$) in ET 331

Before you use this high voltage equipment, please go through the High Voltage Training:

Go and visit: <https://www.pfw.edu/offices/rem/safety-training/engineering> to find information about the Purdue Electrical Safety Program.

An Electrical Safety PowerPoint presentation is available for training. Please contact the Department Safety Committee for additional information and training materials on High Voltage and Electrical Safety.

7.ECE Lab General Rules and Safety

Please read Appendix B ECE lab general rules and safety.

Appendix

Appendix A: Soldering Iron Safety

Soldering Iron Safety

- Never touch the element or tip of the soldering iron. They are very hot (about 400 degree C)
- Hold wires to be heated with tweezers or clamps.
- Keep the cleaning sponge wet during use.
- Always return the soldering iron to its stand when not in use. Never put it down on your workbench.
- Turn unit off or unplug it when not in use.

Work Safety with Solder, flux and cleaners

- Wear safety glasses or goggles
- Use lead free solder.
- Keep cleaning solvents in dispensing bottle to reduce inhalation hazards.
- Always wash your hands with soap and water after soldering.
- Read and understand the MSDS for all materials before beginning work.

Dangers of Lead Exposure

- Lead on your skin can be ingested and lead fumes can be given off during soldering. Other metal fumes can also be hazardous. Lead can have serious chronic health effects, such as reproductive problems, digestive problems, nerve disorders, memory and concentration problems, muscle and joint pains.

Avoid Toxic Fumes

- Work in a well ventilated area. The smoke formed is mostly from the flux which can be irritating, a sensitizer and aggravates asthma. Avoid breathing it by keeping your head to the side of, not directly above your work.

Reduce Risk From Electricity

- Always use a grounded outlet and grounding prong to reduce the risk of electrical damage if a short circuit occurs in the equipment.
- Prevent damage to electrical cords during soldering. Keep them away from heated tips.

Fire Prevention

- Work on a fire proof or nonflammable surface that is not easily ignited.
- Wear nonflammable or 100% cotton clothing that covers your arms and legs to prevent burns.

First Aid

- Immediately cool the affected area under cold water for 15 minutes.
- Do not apply any creams or ointments. Cover with a band-aid.
- Seek medical attention if the burn covers an area bigger than 3 inches across.
- **Contact instructor or Laboratory Technician.**

Waste (See instructor or Laboratory Technician for discarding of Waste)

- Discard lead and silver solder and dross in a metal container with a lid.
- Label the container: "Lead (silver) Solder waste for Recycling".
- Used solder sponges and contaminated rags must be disposed of as hazardous waste.

Appendix B. ECE Laboratory General Rules & Safety

General Laboratory Safety Rules

- No eating or drinking in the laboratory
- Maintain orderly movement around the laboratory and access corridors at all times
- Keep walkways clear (of bags, coats, etc)
- Safety goggles must always be worn when handling harmful chemicals or moving parts
- Report any accident or breakage to the instructor immediately
- If in doubt about any verbal or written instruction, ask before carrying it out

Electrical Safety

- Do not wear personal audio devices and turn off cell phones (There is a time delay if you can't quickly hear a warning or call for help).
- Do not touch any exposed circuit with the power applied this does not apply to low voltage circuits below +/- 15 Volts.

- Use one hand only (Do not insert probes with both hands, keeping one hand behind your back or under the test bench will reduce the chance of fatal electrocution).
- Do not leave any objects loose on the equipment, such as screws, nuts, or washers.
- Ground/earth yourself properly before handling or replacing integrated circuits, or electronic parts do this by touching the outside metal casing of the equipment and, if possible, use an anti-static wrist strap that is connected to the chassis/case/earth/ground.
- Make sure that the equipment is grounded prior to removing its case this minimizes the chance of Electrostatic Damage (ESD).
- Get instructor approval before working on any equipment
- Have the appropriate documentation before troubleshooting electronic equipment.
- Always maintain a clean and safe work area.
- Don't rush your work as this increases the risk of problems.
- If you are unsure about a procedure, ask for help IF IN DOUBT, DON'T TOUCH/DO IT - ASK FOR HELP
- Know the location of first aid kits - ET 217 Tech Office.

Circuit Building

- Get your circuits checked by the teacher before switch-on
- Beware of overheating components
- Handle components carefully.
- Remove integrated circuits by carefully levering with a small screw driver
- Handle wire cutters, pliers, and tools with care.

Electric Shock

- In a college lab environment, this will be very unlikely unless someone has ignored the safety rules.
- If possible, switch off the supply without touching the victim
- Disconnect the victim without making electrical contact, use a non-conducting lever or pull on dry clothing
- Call for help 911
- Electric shocks are rarely fatal if the victim is resuscitated quickly.

Evacuation Procedures

- As soon as you hear the fire alarm or tornado alarm, leave the laboratories at once, DO NOT delay to pick up book, coats, etc.

- See bulletin board for evacuation information
- Know the location of the nearest fire alarm box
- Know the emergency phone number 911