



2.017 Lab Rules and Safety

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Dr. Harrison H. Chin

LAB RULES



1. WORK SAFELY IN THE LAB
2. POWER TOOL USE IS RESTRICTED
3. DO NOT WORK WITH CHEMICALS ALONE
4. CLEAN UP BEFORE YOU LEAVE
5. DO NOT REMOVE ANYTHING FROM THE LAB WITHOUT PERMISSION
6. DO NOT GIVE ACCESS CODES TO ANYONE
7. DRESS APPROPRIATELY FOR LAB WORK

WORK SAFELY IN THE LAB



- The lab is available to students only when a supervisor (instructor, TA or the lab manager) is present.
- During scheduled class times, only class members may use the lab, unless granted permission by the class instructor.
- Safe and careful use of hand tools, electronic equipment, and computers is unrestricted except as specified by the instructors for safety or other reasons.
- Learn and follow safety guidelines for each tool and piece of equipment.
- Be vigilant with electricity. Electrical fires can occur with high currents and high resistance. Anything above around 40 Volts is a shock hazard.
- Use your engineering knowledge, experience and common sense to avoid dangerous situations and maintain a safe working environment.

POWER TOOL USE IS RESTRICTED



- In all circumstances, no person is to use power tools alone!
- Power tools must be kept under lock and key. Regular access to power tools is during scheduled class times, and when instructors are present.
- Students must be trained to use each power tool before using it.
- Students may not use power tools without an instructor or another trained student present.
- Students who violate these rules will lose privileges for using power tools.

DO NOT WORK WITH CHEMICALS ALONE



- In all circumstances, no person uses chemicals alone.
- Chemicals (including solvents and adhesives) are to be used only under the supervision of an instructor, or with the assistance of another student who has used the same chemicals under instructor supervision.

CLEAN UP BEFORE YOU LEAVE



- Many classes, clubs, and students use the lab. Therefore, all benches and workspaces must be kept clean and clear for others to use.
- Lab benches and workspaces must be cleared at the end of class, or when leaving for more than 1 hour. All common tools must be returned whenever you leave the lab, even for short periods of time.
- Label items on bench with name, contact info and time of return, or they may not be there when you get back!
- Project specific parts and equipment can be placed in storage locations designated for each class or student.

DO NOT REMOVE ANYTHING FROM THE LAB



- Tools, Equipment, Parts, Supplies, Books, Software and other lab property are not to leave the lab except for the purpose of class-specific fieldwork, or with specific instructor permission.
- Items removed from the lab must be logged with the student's name, email, phone number, destination, and return time.
- The only things you may freely take from the lab are your personal belongings, lab notebook, and disks containing experiment data.

DO NOT GIVE ACCESS CODES TO ANYONE



- Do not give the lab door code or access card to anyone.
- Do not give the lab computer login passwords to anyone.

DRESS APPROPRIATELY FOR LAB WORK



- Eye protection must be worn for all tool, chemical and soldering work.
- Closed-toed shoes must be worn in the lab. and whenever anyone is working with solder, chemicals, tools, power tools, or heavy items.
- Loose clothing is to be avoided in the lab, and must be secured if worn.
- Long hair must be secured when in the lab.

Safety in the Lab and in the Field



- **Awake, alert and prepared**
 - Do not try to remedy the emergency yourself
 - Notify your instructor and dial **100** to get help
- **It never hurts to be too careful in the lab**
 - Bring your concerns and/or questions to the attention of your instructor *before* you carry-out the procedure.
 - If your lab partner or any other student is not acting in a safe, responsible fashion notify your instructor immediately.
 - NEVER WORK ALONE in the lab. Someone should always be nearby, ready to help in the event of an emergency.
- **Familiarize yourself with the layout of the lab**
 - Note the location of the doors, the windows, the phone, the first-aid kit and the layout of the aisles and workbenches.
 - Note also the locations of the nearest fire alarms and security phones and the routes to the nearest exits from the building

http://web.mit.edu/environment/ehs/electrical_mechanical.html

- **THE QUANTITY OF CURRENT FLOWING THROUGH THE BODY**
 - Current (amperes) is the killing factor in electrical shock, not the voltage. The voltage only determines how much current will flow through a given body resistance. In general, the body's resistance to electrical shock is minimal (150,000 to 600,000 Ohms.) Even contact with standard 110-volt circuits can be lethal under certain conditions. Refer to the chart below.
- **THE CURRENT PATH THROUGH THE BODY FROM ENTRY TO EXIT**
 - Hand-to-hand, hand- or head-to-foot, and ear-to-ear current paths are the most dangerous because they may cause severe damage to the heart, lungs and brain. This is why it is important not to wear metal jewelry, not to lean against or use both hands on electrical equipment so as not to become part of the circuit.
- **THE LENGTH OF TIME THE BODY IS IN THE CIRCUIT**
 - The longer the body is in the circuit, the greater the damage. You may be unable to let go of a 15 to 20 milliamperes current. The body temperature may increase possibly damaging tissues, bones, and organs.
- **EFFECTS OF 60 HZ CURRENT PASSING THROUGH THE BODY (CURRENT IN MILLIAMPS)**
 - 1 or less 5 May not be felt - Maximum harmless intensity
 - 1 to 8 Sensation of mild shock, can let go at will
 - 8 to 15 Painful shock, muscles contract, may still be able to let go
 - 15 to 20 Painful shock, can NOT let go
 - 20 to 75 Intense pain, breathing may be paralyzed 100 to 200Ventricular fibrillation; holds unconscious victim to the circuit, could be fatal
 - 200 or more Heart stops, muscles contract intensely & could break bones, severe burns, breathing stops

Electrical Safety Reminders



http://web.mit.edu/environment/ehs/electrical_mechanical.html

- Re-route electrical cords or extension cords so they don't run across the aisle/corridor or over pipes or through doors.
- Turn off and unplug equipment before removing the protective cover to clear a jam, replace a part, etc.
- Don't use an electrical outlet or switch if the protective cover is ajar, cracked, or missing.
- Use dry hands and stand on a dry surface when using electrical equipment.
- Remove any combustible materials, such as paper and wood from the area. Be sure flammable liquids and gases are secured away from the area when the appliance is in use.
- Never put conductive metal objects into energized equipment.
- Remove cord from the outlet by pulling the plug instead of pulling on the cord.
- Don't carry equipment by the cord - only by the handle or base.
- Be sure extension cords are properly rated for the job and used only temporarily.
- Use extension cords with 3-prong plugs to ensure the equipment is grounded. Never remove the grounding post from a 3-prong plug so you can put it into a 2-prong.
- Don't overload extension cords, multi-outlet strips or wall outlets.
- Take seriously any warning signs, barricades or guards posted when electrical equipment is being repaired, installed, etc.

Dealing with Emergencies



- **Fire:** Evacuate the lab and building and pull the fire alarm as you exit. Do not try to put out the fire yourself.
- **Electrocution:** Dial 100, alert your instructor. Do not attempt to help the person yourself. See the detailed discussion of electrical safety published by the MIT Safety Office (http://web.mit.edu/environment/ehs/electrical_mechanical.html).
- **Injury:** If a major injury occurs, notify your instructor and dial 100 to get medical help.
- **Chemicals:** In general you should wear gloves when gluing or handling toxic chemicals.
- **Drowning:** Always work cautiously and responsibly when working near water.
- **Security:** If you see an unfamiliar person in the lab then immediately bring that person to the attention of your instructor. Don't leave personal belongings in the lab.

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