

# Soldering

- All wire solder contains deoxidizing flux. Fumes from the flux can cause eye and respiratory tract irritation.
- The undergraduate labs within the ECE department are not equipped to safely handle these fumes.
- **Soldering is not permitted in any undergraduate lab within the department.**
- The IEEE Student Branch (room ITB-141) has a soldering station with fume extractor available to everyone.

## **Safety Guidelines for Soldering in ITB-141**

- Read the Material Safety Data Sheet for lead solder.
- Wear appropriate personal protective equipment (PPE) including protective eyewear, a long sleeved shirt, pants and closed shoes.
- Avoid skin burns by not holding components to be soldered with your fingers.
- Never fling excess molten solder off the iron. Use the damp sponge for cleaning the iron.
- Shut off iron and wipe off work surface when finished.
- Do not eat or drink while soldering. Wash hands immediately after completing soldering work. Lead is toxic and accumulates in the body through ingestion.

## **No Power Tools**

Do not bring power tools (electric drills, saws, etc.) into the lab. Few (if any) projects should require them. If you decide that you absolutely need them, use them at home.

## **Other Safety Issues**

Working alone, especially after hours is discouraged. Always work with someone else in the room. Experiments should only be left unattended when it is safe to do so. Generally, the stations are shared by multiple groups as needed. Do not tie up a station by putting a “Do Not Touch” sign on it and leaving the lab. When you leave the lab, take everything with you and leave the station clean for the next group.

## **Response for Minor Cuts and Bruises**

1. Go to nearest first aid station for treatment. In ITB, see Kerri Hastings in room A111B or Robert Li/Derek Lipiec in room 242.
2. Complete an “Injury/Incident Report” and provide a copy to the Chair and EOHSS (Environmental & Occupational Health Support Services) within 24 hours.

## Response for Critical Injuries

1. Power down equipment, secure area to prevent further injury.
2. Immediately arrange for medical and emergency assistance by calling Security at “88” using the phone in the lab room.
3. Apply first aid as required.
4. Notify supervising professor immediately.
5. Notify EOHSS immediately. (Extension 24352)
6. Complete an “Injury/Incident Report” and provide a copy to the Chair and EOHSS within 24 hours.

## In Case of Fire Alarm

- Immediately vacate the building via the nearest exit.
- **DO NOT USE ELEVATORS!**
- Everyone is responsible for knowing the location of the nearest fire extinguisher, the fire alarm, and the nearest fire escape.
- The safety of all people in the vicinity of a fire is of foremost importance. **But do not endanger yourself!**

## In Case of Fire in Your Area

- In the event of a fire in your work area, shout "FIRE" and pull the nearest fire alarm.
- Do not attempt to extinguish a fire unless it can be done quickly and safely using a hand held fire extinguisher.
- **Make sure the room is evacuated, close the door and exit the building using the stairs.**
- Notify Security by calling "88" on a campus phone or at extension 24281. In a panic, 911 is better than nothing.
- When reporting a fire, give exact building and room location along with the nature of the fire.
- Report all incidents to your supervisor.
- Complete an "Injury/Incident Report" and provide a copy to the Chair and EOHSS within 24 hours.

## **Clothing on Fire**

Douse with water immediately **OR** roll on floor and yell for help **OR** wrap with a coat or other non-flammable fabric. Wrap the victim laying down rather than standing to quickly extinguish the fire. The blanket should be removed once the fire is out to disperse the heat. Follow response for critical injury.

## **NOTE**

According to the Ontario Fire Code all laboratory doors are fire doors and must be kept closed at all times. Never block emergency exits, emergency equipment or electrical panels.



## **Card Swipe Access**

Your card will allow access to the lab during normal building hours. Security may ask you to leave when the building is closed. If you do not have an access card obtain one through the DocuCentre in JHE-216A.

Each swipe of your card is recorded and can be retrieved as evidence in the event of an incident. Do not lend your card to anyone. You would be responsible for their actions in the room.

## **Security Camera**

The labs are outfitted with digital security cameras which record onto hard drives. These recordings can be used as evidence when incidents occur.

## **NO FOOD OR DRINK**

Mice are a continuing problem in many campus buildings. Help keep your learning environment sanitary by eliminating food sources for rodents. Eat outside of labs and dispose of food waste properly.

A beverage spilled over line voltage equipment introduces the risk of electrocution. Damage caused by liquid spilled into precision measurement equipment will not be repaired quickly if at all. Everyone will lose out from a preventable accident.

Students found eating or drinking in the lab will have their access card deactivated.

## Lab Equipment

Several stations in the lab are equipped with an oscilloscope, function generator, multi-meter, spectrum analyzer and powered breadboard. The equipment is similar to that of other labs in the department.

There are Altera DE-2 development boards available in the lab as well as Microchip PICkit2 programmers. Other Altera boards (UP-2 and UP-3) are available to borrow. We do not lend out the DE-2 boards.

You are expected to have your own hand tools such as wire cutters and screw drivers. Please do not ask to borrow tools.

# Electronic Components

We can supply almost any component used in a previous course. Please see either Tyler Ackland (ITB-149) or Steve Spencer (ITB-147) for components. For example, we have:

**Resistors** (values from 1  $\Omega$  to 1 M $\Omega$ , 5% tolerance,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  watt)

**Capacitors** (values from 1 pF to 1  $\mu$ F ceramic, some electrolytic)

**Diodes** (1N914, LEDs, zener, etc.)

**Transistors** (MOSFET IRF520 and BJT 2N3904, 2N3906)

**Op-Amps** (LM741, LF411, etc.)

**Digital Logic** (74LS family including NAND, NOR, XOR, inverters, buffers, decoders, adders, flip-flops, counters, registers, etc.)

## Ordering Components

The IEEE Student Branch offers an order consolidating service to help groups save on shipping charges. Please contact them in ITB-141 for more information. (<http://www.ieeemcmaster.ca>)

The IEEE SB also offers basic printed circuit board milling. Solder mask is not available. This makes fine pitch surface mount soldering very difficult without bridging pins with solder. Holes on double sided PCBs will not be plated. Avoid using component holes as vias unless the component can be soldered on both sides of the board.