**UW Bothell Electrical Engineering Labs Safety Rules**

**Introduction**

There are three main types of risk the student could be exposed to when working in Electrical Engineering (EE) Labs, which are **electric shock**, **mechanical injure** and **burn risk**. These are, however, avoidable risks and do usually happen when the students fail to follow the safety rules and instructions given by the lab instructor/manual. In order to make safety a priority in the laboratories, the rules presented below will be enforced by the lab instructors and lab staff.

**Lab Access and Conduct**

* Only students currently enrolled in UW Bothell laboratory classes or working on a research project with a faculty member are allowed to use the laboratory.
* Students are not allowed in the prep labs or research labs without explicit permission.
* Never work totally alone in the laboratory. Someone else, and preferably the EE Lab tech and/or instructor, should be present in the case of an emergency.
* No food or drink is allowed in the laboratory. Spilled beverages constitute a potential safety hazard due to the electrical short. Additionally drink spills that damage equipment.
* The laboratory tables are for conducting experiments only and should *not* be used as a storage area or place to sit.
* Follow the specific lab procedures outlined by the instructor and/or written in the lab manual. Additional experiments are not allowed. Instructor approval is required for make-up lab procedures.
* Absolutely NO crossing wires from desk to desk. This includes power cables, banana jacks, probes, etc.
* Use only the equipment provided. Do not use other equipment unless the EE Lab tech approves the use.
* Turn off the power before handling any wires.
* Never use damaged items, whether they are leads, components, equipment, or any other item.
* To decrease the chances of being shocked, wear dry shoes and do not stand on metal or wet concrete. Also, do not wear any metal or jewelry. Moreover, do not handle wires, components, or equipment with wet hands.
* In a laboratory in which ***soldering irons***\* are used, keep an attentive eye on a hot soldering iron. Also, place it in the proper holder when not in use. Never leave a hot soldering iron unattended.
* Make no connection to the power supply until the very last step. This practice will ensure that a student who is handling leads will not be ***electrical shocked***\*\*. Also, the circuit being built will not be harmed during construction.
* If a piece of equipment is not working properly, attach a note and report the problem to the EE Lab tech. The malfunction could possibly lead to a life-threatening situation.
* No daisy-chained cords or multi-plug outlets, which means that one extension cord, or multi-plug outlet may not be plugged into another. An example of a daisy chain is pictured, this is not permitted.

**Personal Protective Equipment (PPE) and Lab Attire**

* Wear protective eyewear when directed to do so by the laboratory instructor.
* Tie back long hair and secure dangling jewelry and loose clothing.
* Remove any conductive watch bands or chains, rings, wrist watches, etc.
* During the first lab period, locate the following safety items in the laboratory:
	+ - Fire Extinguisher
		- First aid kit
		- Telephone

**Accidents**

* Be alert to unsafe conditions and report them to the instructor for the correction.
* Report all accidents immediately (e.g. cuts, spills, breakage or equipment damage) to your instructor or a lab staff member.

**Soldering Safety**

* Wear goggles for eye protection. Solder can “spit” and trimming off leads or excess solder dross, be careful of the flyaway that could injury yourself as well as other people nearby.
* Do not touch the element or tip of the soldering ion. It is very hot (over 400 oC) and will burn.
* Do not inhale fumes from the soldering process. Work in a well-ventilated area and use a fume extractor.
* Always return the soldering iron to its stand when not in use. NEVER put it down on your workbench/table.
* Keep the cleaning sponge wet during use.
* Keep cleaning solvents in dispensing bottle to reduce inhalation hazards.
* Wash hands thoroughly after handling flux and solder containing lead. Use lead-free solder whenever possible.
* Clean up the area when finished. Discard lead and silver solder and dross in a 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.

**Electrical shock**\*\*

* **ACT FAST** – CALL UWB POLICE 425-352-5222
* **GET EMERGENCY CARE**
* Do not touch the person until the power has been shut off.
* Do not remove the person from the electric source until the power has been shut off.
* If you cannot shut off the power, use an insulator such as dry rope, cloth, or broom handle to drag the person away from a live wire.
* If there is not heartbeat and no breathing, do CPR only if you are trained.
* If there is a heartbeat but no breathing, immediately start rescue breathing.
* Check for burns and treat as third degree burns.
* If the person is breathing, put them in the recovery position.
* Get person to doctor if heart skipping beats, fever or coughing up sputum.

\*\***Electrical Shock**

A current of 100 to 200 mA causes ventricular fibrillation of the heart. This is an irregular twitching of the wall of the ventricle of the heart, and is fatal. There is no known remedy or resuscitation. Wet skin has a resistance of only 150 Ω and the hand-to-foot internal body resistance is from 400 Ω to 600 Ω. In the case of, for example, 120 V and a skin plus body resistance of 800 Ω, the result is a lethal current of 150 mA.

A current from 8 mA to 100 mA produces a painful shock, and perhaps also loss of muscular control so that the victim cannot free him or herself from the cause of the shock.

Severe burns occur for a current greater than 200 mA. Also, the muscular contractions are so severe that chest muscular reaction clamps the heart and stops it for the duration of the shock. This reaction prevents ventricular fibrillation. Artificial respiration should be administered immediately and in most cases the victim can be revived.