

2020 edition

UNT College of Engineering Maker Space

Manual

**[SAFETY GUIDELINES]**

This document provides basic guidelines for utilizing the machinery and services available in and by the College of Engineering, UNT College of Engineering Maker Space

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#### PURPOSE

The purpose of this document is to set forth policy establishing safe work practices for students, staff and visitors working in the UNT College of Engineering Maker Space, it defines safety guidelines, training requirements and response procedures in case of emergency to minimize injuries and illness when in the lab.

#### SCOPE

This policy covers the UNT College of Engineering Maker Space maintained and operated by the University of North Texas, College of Engineering, Discovery Park, Denton, Texas.

#### APPLICABILITY

This policy covers users of the UNT College of Engineering Maker Space only, operated under the auspices of the College of Engineering.

#### INTRODUCTION

Electrical Maker Space labs are inherently filled with potential safety hazards. They are used by the faculty, staff, students, alumni and visitors. Equipment and tools are routinely used to complete various projects that, if not handled properly, may result in a serious injury or death. The purpose of this program is to provide a basic overview of the common hazards associated with the use of electrical equipment that are found in electrical labs or otherwise, to establish fundamental lab safety rules and to outline the use of safe work practices and use of proper personal protective equipment. Each user is required to attend general lab safety training. However, this training is not a substitute for an item-specific safety training that should be provided by the lab Supervisor. Employee awareness of potential hazards combined with following proper safety procedures can reduce accidents and injuries significantly. It is therefore, of vital importance that supervisors become familiar with those sections and standards in this policy that pertain to the operation(s) under their control. The success of this program depends upon the cooperation and support of everyone, students, staff, visitors and employees of the lab.

It should be understood that these are minimum standards that apply to all University academic labs present on all campus. More detailed lab specific rules may be developed by lab Supervisors and Departments that must also be followed.

#### PROCEDURE

*Emergency Contacts***:**

Public Safety, 940-565-3000

* Safety Risk Management, 940-565-2109
* Tyler Adam Martinez, 940-252-3976 In case of serious injury or if Public Safety cannot be reached, call 911.

Always notify your Supervisor as soon as possible. You may be required to complete an Accident Form.

**General Lab Safety Rules:**

The UNT EMF Machine Lab has developed these guidelines for those who currently, or might in the future, use power tools and heavy machinery in labs and laboratories. These guidelines DO NOT serve as a replacement for formal training in lab techniques or lab safety. Only trained personnel should use lab equipment after they have been trained by their supervisor. Failure to follow proper precautions can result in serious injury or death.

1. **Never Use a Machine If You Are NOT Trained – Always Get Training Before Operating Any Machinery.** *You must attend general safety training and specific training on the machine you intend to use. If you are unfamiliar with a particular tool or instrument, do not use it until you are properly trained on its usage.*
2. **Never Work Alone – Always Use “Buddy System”.** *At least two adults must be in the lab when power tools are being used. You must get permission from your Supervisor for off-hours and weekend work if the lab permits off-hours work.*
3. **Never Use Machine When Impaired - Be Sober and Smart.** *The use of alcohol or drugs prior to the use of lab machinery is strictly forbidden and is ground for suspension or termination of lab access privileges. Be aware of other situations which may impair your ability to work safely, including illness, tiredness, stress, hurrying, or the use of medication that could make you drowsy.*
4. **Never Start Work If You Cannot Do The Job Safely - Just Don’t Do It.** *There are limits to what can be built in a given lab and in a given time, and how safely you can do it in hurry .If it cannot be done safely don’t start it.*
5. **Never Wear Open Toe Shoes - Use Closed-Toe Shoes in the Lab.** *Sandals, flip-flops or other open-toed shoes are prohibited at all times in machine labs. Tools, chips and fixtures are sharp, and often hot. Shoes will help protect your feet from injury. Flame retardant shoes are recommended when welding.*
6. **Never Work Without Proper Eye Protection - Always Wear Appropriate Safety Glasses or Goggles When Working or Cleaning Tools.** *The minimum standard for protective eyewear is safety glasses with side-shields; machine users must observe this standard at all times. Eyewear which offers additional protection against splashing or other hazards may be indicated based on a risk assessment of the process or procedure. Prescription glasses with plastic lenses must meet ANSI Standard Z87.1 for safety.*
7. **Never Work With Loose Hair, Jewelry, Clothing, etc. – Always Remove or Secure Anything That Might Get Caught in Moving Machinery.** *All lab users must secure or remove personal items that may become entangled in a machine. Long hair, necklaces, ties, dangling ID badges, jewelry, loose clothes, watches or rings, may get caught in tools and can drag you along resulting in serious injury or death. Check with supervisor for appropriate attire.*
8. **Never Bring Hands Close to Sharp Objects – Always Keep Your Hands At a Safe Distance From Sharp Tools.** *Make sure that nothing that you do will cause you to be cut by working too close to a sharp tool or moving machine part. Maintain a safe distance.*
9. **Never Create a Dusty and Smoky Environment *-* Dust, Chemicals and Smoke Can Be Dangerous to Your Health, so Work in Well-Ventilated Areas, Minimize Contamination and Use Appropriate Protective Equipment (PPE).** *Only use dust or fume-generating machines in their intended areas. Ensure the lab is well ventilated and appropriate PPE is used when working with such machines.*
10. **Never Be Shy To Seek Help –Always Ask If You’re Unsure About The Safe Operation of a Tool or Any Aspect of a Job – Have Lab Staff Check The Tool or Work With Which You Are Unfamiliar.** *Exercise common sense and clarify your tasks and responsibilities before starting work.*
11. **Never Leave Your Work Area Disorganized – Always Clean Up After Yourself.** *Before you leave your work site all tools must be returned to their storage location, machines must be cleaned and wiped down and the floor swept, as necessary. Leave appropriate time for cleanup at the end of your project.*
12. **Never Remove Safety Guards – They are Present for Reason.** *Safety guards must never be disabled or removed under any circumstances. You must ensure that safety guards are in place on moving parts before you start working. Follow all appropriate shut-down procedures before working on a machine if the repair requires removal or alteration of guarding.*
13. **Never Use Gloves While Using Rotating Equipment – Check With Supervisor, if Needed. Remove Them Before Starting Work.** *Gloves can become entangled in rotating machine parts resulting in serious injuries.*
14. **Never Leave Broken or Damaged Tools or Abnormal Equipment Unreported – Always Inform Your Supervisor to Remove Broken Items from Service for Repair.** *Broken parts or equipment can result in serious injuries and delays. Make sure you tag broken or damaged equipment and inform Lab Supervisor to arrange repair before next use*.
15. **Never Make Any Adjustments to a Machine When it is in Operation - Always Talk to Your Supervisor for Permission When Adjustment is Needed.** *Make sure you are competent and have permission from your supervisor to affect repairs. Ensure power is off, equipment is properly locked out and safety devices are in place.*

*Lab Hours*

Regular working hours for the Machine Lab during the week are Monday through Friday, 8 a.m. – 4 p.m., or by appointment. Access to labs may be limited during scheduled classes, holidays or other reasons. Contact lab Supervisor for timing and additional information.

During busy periods in the semester the lab may be opened by lab Supervisor or other staff in the evening and/or on weekends. Always check with lab Supervisor for a change in schedule.

*Visitors Use of Labs*

Any visitor user of a UNT College of Engineering Maker Space who is not a UNT employee must obtain a written permission from the lab Supervisor and adhere to all rules applicable to students, staff and faculty. Visitor users must follow guidelines delineated in the Responsibilities section for Other Users. No exceptions are made for visitors.

**Lab Cleaning Guidelines**

1. Report missing, broken or damaged tools to lab staff.
2. Turn off power to a machine before cleaning. This will avoid accidentally starting the machine and causing injuries.
3. Remove power cord to reduce the chance of injury.
4. Put away all tools and other items around the tool so that you don’t make them dirtier.
5. Clean up lose wiring, put away any laying around IC chips from the desks, and remove debris from the desks. Recycle where possible.
6. Sweep the floor in the area where you have been working and dispose of it properly.
7. Do not overuse the soldering stations, or 3D printing station.

RESPONSIBILITIES:

1. **Students**
   1. Must use “Buddy System” when working in the lab.
   2. Must complete general lab safety training with the lab supervisor, having a training certificate on file to arrange machine-specific training before using any machine.
   3. Must observe all lab safety rules in this policy when working in the machine lab.
   4. Must observe all lab-specific rules beyond the scope of this policy.
   5. Must report all injuries to a Lab Supervisor promptly, regardless of seriousness.
   6. Must promptly report unsafe conditions, actions or near-miss incidents to Lab Supervisor.
2. **Other Users**
   1. All users intend to use a machine lab must obtain a valid pass.
   2. Must complete general lab safety training and machine specific training provided by the Lab Supervisor before using any machine.
   3. Must observe all lab safety rules when working in the machine lab.
   4. Must use “Buddy System” when working in the lab.
   5. Must report all injuries to the Lab Supervisor promptly, regardless of seriousness.
   6. Must work with a Lab Supervisor for specific needs.
3. **Lab Supervisor**
   1. Must ensure that all users of lab are familiar with general and lab-specific safety rules.
   2. Must enforce all safety rules and make all users aware of the consequences of rule violations.
   3. Must ensure that all users of lab have attended general lab safety and machine-specific training before starting their work in the lab.
   4. Must provide tool/equipment specific training to each user of the equipment they will be using.
   5. Must investigate all accidents and near-miss incidents and ensure timely correction of unsafe conditions.
   6. Must give full support to all safety procedures, activities and programs.
   7. Must maintain all training records on the Training Record Form for inspection by EH&S.
   8. Must maintain access to MSDS for all chemicals used in the lab.
4. **Department**
   1. Must ensure that adequate supervision is provided for the lab staff.
   2. Must provide adequate resources for maintenance, repairs and safeguarding equipment.
   3. Must inform all lab users to follow University policy and safety rules.

TRAINING:

Anyone using a machine lab at UNT is required to attend two types of training:

* + 1. **General Lab Safety Training**

Training is provided by lab supervisor. After completing training, the user must complete the test, print a certificate of completion and provide a copy to the Lab Supervisor to arrange for machine- specific training.

* + 1. **Machine Specific Training**

Machine-specific hands-on training is provided by the Lab Supervisor before using a machine. This training will NOT be offered unless general safety training is completed.

The training should involve instructions and hands-on demonstration in the following:

* + - 1. Description and identification of the hazards associated with a particular machine;
      2. Proper safety precautions when working with a particular machine;
      3. Limitations of the tools/equipment and when and what NOT to use;
      4. Safeguards, protection they provide, and ensuring their presence before using a machine;
      5. What to do (e.g., contact supervisor, tag the machine) if a damaged guard, missing part, unusual noise, etc., is noticed.
      6. How to use emergency buttons and other measures, when needed.
      7. Maintenance and cleaning procedures

RECORD KEEPING:

* + - * 1. **General safety records** shall be maintained in general database.
        2. **Machine specific training records** shall be maintained by the Lab Supervisor using form in Appendix I.

##### R E F E R E N C E S

1. OSHA Standard 29 CFR 1910.22 General requirements
2. OSHA Standard 29 CFR 1910.35. Means of Egress
3. OSHA Standard 29 CFR 1910.133. Eye and Face Protection
4. OSHA Standard 29 CFR 1910.134. Respiratory Protection
5. OSHA Standard 29 CFR 1910.135. Hand Protection
6. OSHA Standard 29 CFR 1910.136. Foot Protection
7. OSHA Standard 29 CFR 1910.212. General Requirements for all Machines
8. OSHA Standard 29 CFR 1910.243. Guarding of Portable powered Tools.

**APPENDICES:**

Appendix I. Machine Specific Training Record Form Appendix II. Specific Machine Use Guidelines

1. Soldering Station Safety Guidelines
2. 3D printing Station Safety Guidelines
3. Multimeter Safety Guidelines
4. Oscilloscope Safety Guidelines

Appendix III. Hand Tools Safety Guidelines

###### APPENDIX I

**University of North Texas**

**MACHINE SPECIFIC TRAINING RECORD FORM**

**The student listed below has satisfactorily been trained on the safe use and operation of the specified lab equipment.**

**EMPLOYEE NAME *(Please print)* UNIT**

|  |  |  |  |
| --- | --- | --- | --- |
| **DATE** | **Lab Equipment Trained On (*Make separate entry for each specific equipment*)** | **Student Signature** | **Lab Supervisor Signature** |
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APPENDIX II

**SPECIFIC MACHINE USE GUIDELINES**

Following are just general safety guidelines for various machines and tools normally present in machine labs. These are not specific rules. Each Lab Supervisor will set special rules applicable to that lab that must be followed. If there is any question you must consult your Lab Supervisor.

### Soldering Station Safety Guidelines

* 1. You must attend general and machine specific safety trainings and wear proper PPE before using machine.
  2. Run drill at correct RPM for diameter of drill bit and material. Ask a Lab Supervisor for the correct RPM.
  3. Always hold work to the drill table in a vise or clamp.
  4. Use a correctly ground drill bit for the material being drilled. The Lab Supervisor can help select the correct bit.
  5. Use the proper cutting fluid for the material being drilled. Ask a Lab Supervisor about the appropriate fluid for the material you are machining.
  6. Ease up on drilling pressure as the drill starts to break through the bottom of the material.
  7. Never use a dull or cracked drill; inspect the drill before using. If in doubt, check with a Lab Supervisor or replace the bit.

### 3D Printing Station Safety Guidelines

1. You must attend general and machine specific safety trainings and wear proper PPE before using a machine.
2. Make sure that the chuck, drive plate, or, faceplate is securely tightened onto the lathe spindle.
3. When removing the chuck, drive plate, or faceplate do not use machine power.
4. When installing the chuck, drive plate, or faceplate do not use machine power.
5. Move the tool bit a safe distance from the collet or chuck when inserting or removing work.
6. Do not run the machine faster than the proper cutting speed – consult a speed and feed table to determine the best speed.
7. When setting up the tool holder place, it to the left side of the compound slides to prevent the compound slide from running into the chuck or spindle attachments.
8. Always clamp the tool bit as short as possible in the tool holder to prevent it from breaking or chattering.
9. Always make sure that the tool bit is sharp and has the proper clearance. Ask for assistance making adjustments.
10. Never use a file without a handle. If any filing is done on work revolving in the lathe, file left handed to prevent slipping into the chuck.
11. If work is turned between centers, make sure that proper adjustment is made between centers and

APPENDIX III

### Multimeter Safety Guidelines

Hand tools are non-powered tools. They include axes, wrenches, hammers, chisels, screw drivers, and other hand-operated mechanisms. Hand tool injuries are more common because people take everyday hand tools for granted; they forget to follow simple precautions for safety. The most common hand tool accidents are caused by the following:

1. Failure to use the right tool
2. Failure to use a tool correctly
3. Failure to keep edged tools sharp
4. Failure to replace or repair a defective tool.
5. Failure to store tools safely

### Oscilloscope Safety Guidelines

Hand tools are non-powered tools. They include axes, wrenches, hammers, chisels, screw drivers, and other hand-operated mechanisms. Hand tool injuries are more common because people take everyday hand tools for granted; they forget to follow simple precautions for safety. The most common hand tool accidents are caused by the following:

1. Failure to use the right tool
2. Failure to use a tool correctly
3. Failure to keep edged tools sharp
4. Failure to replace or repair a defective tool.
5. Failure to store tools safely

*How to Use Tool Safely:*

You must attend general and machine specific safety trainings and wear proper PPE before using such tools. Follow these guidelines for general hand tool safety:

1. Use the right tool to complete a job safely and efficiently.
2. Wear safety glasses whenever you hammer or cut, especially when working with surfaces that chip or splinter.
3. Do not use a screwdriver as a chisel. The tool can slip and cause a deep puncture wound.
4. Do not use a chisel as a screwdriver. The tip of the chisel may break and cause an injury.
5. Do not use a knife as a screwdriver. The blade can snap and injure an eye.
6. Never carry a screwdriver or chisel or sharps in your pocket. If you fall, the tool could cause a serious injury. Instead, use a tool belt holder.
7. Replace loose, splintered, or cracked handles. Loose hammer, axe, or maul heads can fly off defective handles.
8. Use the proper wrench to tighten or loosen nuts. Pliers can chew the corners off a nut.
9. When using a chisel, always chip or cut away from yourself. Use a soft-headed hammer or mallet to strike a wooden chisel handle. A metal hammer or mallet may cause the handle to split.
10. Do not use a wrench if the jaws are sprung.
11. Use impact tools, such as chisels, wedges, or drift pins, if their heads are mushroom- shaped. The

##### How to Store Tools:

Improper tool storage is responsible for many lab accidents. Follow these guidelines to ensure proper tool storage:

1. Have a specific place for each tool.
2. Do not place unguarded cutting tools in a drawer. Many hand injuries are caused by rummaging through drawers that contain a jumbled assortment of sharp-edged tools.
3. Store knives or chisels in their scabbards.
4. Hang saws with the blades away from someone's reach.
5. Provide sturdy hooks to hang tools on.
6. Rack heavy tools, such as axes and sledges, with the heavy end down.