

 <p>Carnegie Mellon University Environmental Health & Safety FIRE LAB WORK</p>	<p>Environmental Health and Safety (EHS) Student Shop Safety Program</p>
<p>Date of Issuance:</p>	<p>Revision Date: 8/30/2022</p>
<p>Revision Number: 1</p>	<p>Prepared by: EHS, Student Leadership, Involvement and Civic Engagement (SLICE), Tech Spark and Student Organization Shop Safety Working Group</p>

1. Purpose

The purpose of this Student Shop Safety Program is to assist Carnegie Mellon University (CMU) students understand their roles and responsibilities when working in or managing a Student Organization Shops or maker space that has been approved by both Student Leadership, Involvement and Civic Engagement (SLICE) and EHS. This program is also designed to help in the development of formal, individualized shop safety plans which identify and communicate important safety information for each shop.

2. Scope

This program establishes the minimum requirements needed to create a safe shop space in order to prevent student incidents and injuries. This program is not intended to replace the Machine Shop Safety Policy which contains guidelines for undergraduate and graduate students working in university shops.

3. Definitions

- 3.1. **Assistant Shop Manager** – A member of an officially recognized student organization who has been elected or assigned to the assistant shop manager position, by their peers. This individual is one who is planning to maintain membership for more than one year. This individual functions as the backup to the Senior Shop Manager with the intent of replacing the Student Shop Manager once their year is complete.
- 3.2. **BioRaft** – The lab management system used by EHS to offer and track training, identify spaces and organization members, maintain the organization’s shop documentation, and track inspection results.
- 3.3. **Hand and Power Tools** – Tools that are held in the hand during operation which may include hammers, wrenches, screw drivers, power drills, soldering tools, etc.
- 3.4. **Machine or Shop Equipment** – Any electrically, pneumatically, or hydraulically powered pieces of equipment, including but not limited to: drill press, lathe, band saw, table saw, milling machine, grinder, shear, metal punch, jointer, swing arm saw, planer, slitter, roll-

form machine, cold header, multi-slide machines, drum sanders, belt sanders, veneer cutters, splices, alligator shears and any other fixed powered equipment.

3.4.1. Laser cutters and 3D printers are considered machine or shop equipment, but have additional safety requirements required before installation like space ventilation and dedicated fire extinguishers.

- 3.5. **Maker Space** – A flexible working space that contains a small inventory of hand and power tools, up to one machine or piece of shop equipment, and parts/supplies that can be moved into a desired work area (i.e. Greek garages, Booth cages, etc.).
- 3.6. **Senior Shop Manager** – A student who is a member of an officially recognized student organization who has been elected or assigned to the senior shop manager position by their peers. This individual is responsible for managing safety procedures in any student organization shops used by their student organization.
- 3.7. **Student Shop** – A space or room that contains hand and power tools, more than one large machining equipment (i.e. drill presses, belt sanders, and table saws), and some amount of chemicals which remain within the space during use.
- 3.8. **Student Organization Shop** – A student shop that is used by an officially recognized student organization. Student Organization Shops must be approved by both the SLICE and EHS prior to use by any student organization.
- 3.9. **Student Shop Safety Support Team (S4T)** – Representative from SLICE, EHS, Tech Spark that partner together to assist Student Organizations manage and run successful student shop/maker spaces.
- 3.10. **Partner** – A Carnegie Mellon student who has received training to include Student Shop Safety training, and Hand and Power Tool Safety training prior to functioning as a partner to a student organization member. The purpose of a partner is to prevent member of the student organization from working alone within the student shop and/or maker space.
- 3.11. **Work** – Any activity that involves the use and/or operation of a hand and power tool, machine and/or shop equipment is considered work activities. Using or working with chemicals (i.e. paints and composite, etc.) are also considered part of work activities.

4. Roles and Responsibilities

4.1. Environmental Health and Safety (EHS):

- 4.1.1. Maintains the most updated version of the Student Shop Safety Program, and ensures it is accessible to all student organizations.
- 4.1.2. Conducts by-annual student organization shop safety inspections with the assistance of the S4T and the Senior Shop Manager/Assistant Shop Manager.

- 4.1.3. Provides assistance with disposal of hazardous waste, electronic waste and other items that cannot be thrown into public trash receptacles.
- 4.1.4. Provides general personal protective equipment for all student organizations who manage shop/maker spaces, upon request.
- 4.1.5. Assist student organization shops enter and update their organization's information within BioRaft to include members, hazard identification, document up-loading, training requirements, etc.
- 4.2. Student Leadership, Involvement and Civic Engagement (SLICE):
 - 4.2.1. Maintains the list of Senior Shop Managers and their Assistants to include preferred methods to contact the individual.
 - 4.2.2. Act as the primary communicator between the Student Shops and the other members of the S4T team.
 - 4.2.3. Distribute and maintain active copies of the Student Shop Annual Registrations and provide general guidance on the need to maintain up to date information in BioRaft.
 - 4.2.4. Coordinate annual Student Shop Safety meetings with the support of the other S4T team members.
- 4.3. Tech Spark Contact:
 - 4.3.1. Provide subject matter expert advice and guidance on shop equipment.
 - 4.3.2. Function as the first point of contact for questions regarding shop equipment repair and maintenance.
 - 4.3.3. Assist when possible with the disposal of metal scraps and unusable shop equipment.
 - 4.3.4. Participate in the annual Student Shop Safety meetings.
 - 4.3.5. Participate in bi-annual shop safety inspections.
- 4.4. Senior Shop Manager:
 - 4.4.1. Completes the Annual Shop Registration process ensuring the most up to date accurate information is reported.
 - 4.4.2. Maintains the organization's BioRaft account which can include updating: the list of members, list of shop/maker space hazards, training documents and addressing training delinquencies, etc.
 - 4.4.3. Ensures shop members know about and complete all applicable shop safety training required by EHS and within the student organization.
 - 4.4.4. Communicates all safety information to the shop safety members.
 - 4.4.5. Participates in bi-annual shop safety inspections and manages any identified deficiencies to make sure they are mitigated.
 - 4.4.6. Attends the annual Student Shop Safety meetings scheduled by the S4T team.

4.4.7. Reports all incidents with and without injury to the S4T as soon as possible and assists in the investigation process.

4.5. Assistant Shop Manager:

4.5.1. Functions as a back up to the Senior Shop Managers.

4.5.2. Assumes the role of Senior Shop Manager once their term as Manger has ended.

4.5.3. Assumes the role of the Senior Shop Manager if at any point the acting Manager is no longer able to perform their functions.

4.6. Shop Members:

4.6.1. Complete all applicable shop safety training required by EHS and the student organization.

4.6.2. Report all incidents with and without injury to the Senior or Assistant Shop Manager

4.6.3. Follow all established shop safety rules.

5. Annual Shop Registration

At the beginning of each Fall Semester, the incoming Senior Shop Safety Managers and the Assistant Managers will be contacted by a member of SLICE. Within this communication they will be asked to verify their roles and provide up to date contact information, which will initiate the registration process. They will also be asked to log into BioRaft to review and update their organization's information.

Once logged into BioRaft, the Senior or Assistant Shop Safety Manager will need to access their organization's information, review and update the following sections accordingly:

5.1. **View** - This tab contains general information regarding the organization such as location, research focus (overview of organization), hours of operation (on and off season), etc.

5.2. **Documents** - Each organization will need to upload, and update as needed, their organization's specific documentation, which shall include, but is not limited to, specific shop equipment procedures and/or training information.

5.3. **Members** - Add and update all of the origination's members.

5.4. **ChemTracker** - Review and update chemical inventory as needed

5.5. **Equipment** - Review and update the list of machine or shop equipment

5.6. **Training** - Review and verify selected list of training requirements are still appropriate. If discrepancies are identified, contact EHS for assistance updating the information.

6. Shop Inspections

The S4T will schedule two shop safety inspections, within the calendar year, with the assistance of the Senior Shop Manager. Senior Shop Managers are expected to attend these

inspections. If they are unable to attend, they must either send the Assistant Shop Manager or a comparable designee.

Shop inspections will be performed in accordance with the BioRaft inspection criteria. Shop managers can prepare for these inspections by using the self-inspection checklist found within their BioRaft account. In general, the inspections will focus on the following areas:

- 6.1. Chemical Use and Storage
- 6.2. Compressed Gasses
- 6.3. Emergency Equipment
- 6.4. Electrical
- 6.5. Hazardous Waste
- 6.6. Housekeeping
- 6.7. Personal Protective Equipment
- 6.8. Tools and Equipment
- 6.9. Training
- 6.10. Ventilation

7. Personal Protective Equipment

Personal protective equipment (PPE) is an important part of each student organization's safety. Through shop inspections, hazard identification, equipment specific procedure development, and support from S4T the hazards associated with the work performed in the student shop should be identified. When these hazards cannot be eliminated, then the use of PPE can be used to protect the student performing the work.

All student organizations should have access to the appropriate level of PPE. If an organization cannot afford the cost of PPE they can request PPE through the EHS department. The student activities PPE request form can be found on the EHS, Student Safety web page or through the following link: <http://ehs-apps.andrew.cmu.edu/secure/ALERT-Online/students/ppe-request.aspx>

EHS does not store PPE on a routine basis. Efforts should be made by the Senior or Assistant Shop Manager to identify PPE needs early allotting time for the ordering and delivery process.

7.1. Standard Types of PPE:

The following types of PPE should be available in any student shops regardless of the activities performed:

- 7.1.1. **Safety Glasses** – Worn when there is a potential for an object, dust or particle to enter the eye.

- 7.1.2. **Safety Goggles** – Used when there is a risk of chemical splashes or liquid products entering the eye.
- 7.1.3. **Face Shield** – Worn when work activities have a risk of generating flying debris that could hit the face or neck.
- 7.1.4. **Material Handling Gloves** – Leather gloves, coated gloves, and/or puncture/cut resistant gloves that should be worn when moving material that can cause cuts, punctures, or lacerations to the hands. Gloves should never be worn when working near rotating parts.
- 7.1.5. **Disposable Nitrile Gloves** – Used to protect hands from liquids, paints, oils, etc. that may cause skin irritation.

7.2. Specialized PPE:

The following types of PPE are optional for the majority of student shop groups. There are a few organizations however, which have specific documented hazards which require the items listed below. EHS should be contacted to help determine when and if these specialized items are needed.

- 7.2.1. **Tyvek Protective Sleeves** – Worn when work activities may have the potential to damage personal clothing or could cause a persons' skin to become irritated if left uncovered.
- 7.2.2. **Disposable Ear plugs** – Provided when work activities, tools or equipment generates noise levels that maybe irritating to those in the areas. Note: if noise levels require space occupants to yell so they can be heard, EHS must be notified so noise monitoring can occur.
- 7.2.3. **Respiratory Protection** – Used on a volunteer basis and/or for comfort purposes to prevent the inhalation of particulates and dusts.

7.3. Other Shop Items:

Although not considered PPE, the following items aid in the organization's ability to address minor incidents and should be available within each student shop or maker space.

- 7.3.1. **First Aid Kits** – Kits containing items like band aids, antibiotic ointment, ice pack, and small gauze pads are the ideal for shop spaced. An injury requiring more than a standard sized band aid should be handled by Health Services, Student EMS or University Police.
- 7.3.2. **Spill Kits** – EHS provides spill kits and refill products for each organization. The spill kits contain 10 spill pads and 1 lb bag of kitty litter to assist in the clean-up of any small spill of paint, oil or other type of non-hazardous liquid. If a large or a hazardous spill occurs, University Police and EHS should be contacted.

8. Safety Training

8.1. Safety training for performing work activities within any student shop or maker space is determined by the hazards identified within the space and those created during the work processes. Both the recognized hazards and the affiliated safety training will be documented in BioRaft by the Senior Shop Manager in partnership with EHS. This information will be verified and updated as needed during the shop inspection process.

8.1.1. In addition, each student shop organization will need to create equipment specific training requirements. A template has been created and is included in Appendix A to ensure the developed training requirements contain the appropriate topics and safety information. A completed example is included in Appendix B to assist in the development process. The topics required to be included in the documentation are:

- Pre-use inspection
- Operation safety
- Proper operation
- Personal protective equipment
- Maintenance
- Post use procedure

8.2. The following sections list the training classes, an indication if the class is offered online or in a classroom setting, along with a brief description. Before a member of the student organization is permitted to perform within the student shop or maker space, they must complete all required safety training.

8.3. The following BioRaft training classes are required for ALL members of the student organization who wish to work in the student shop or maker space:

- 8.3.1. **Fire Extinguisher** (classroom) – This classroom course reviews the actions that should be taken during a fire emergency, the types of fire extinguishers found on campus and the fires they extinguish. Attendees will then take part in the practical use of a fire extinguisher with the use of a fire simulator.
- 8.3.2. **Hand and Power Tool Training** (online) – This course examines the dangers in tool use, with emphasis on the most common tools, and the ways to avoid injuries while using them.
- 8.3.3. **Hazard Communication** (online) – Discusses Right-to-Know Law, physical and health hazards, safety data sheets, labels and labeling requirements, written programs, how to protect yourself and others, and chemical inventories.
- 8.3.4. **Personal Protective Equipment** (online) – This course describes the various types of personal protective equipment (PPE) that may be needed to protect oneself

from injury or illness. Training includes selecting the right PPE, how to put it on/take it off and how to maintain it in good condition.

8.3.5. **Student Shop Safety Training** (online) – This class discusses general shop safety rules and practices, with a focus on injury prevention.

8.4. The following BioRaft training classes are only required when the associating hazard exists within the student shop or maker space.

8.4.1. **3D Printer** (online) - This course provides information on safe handling of 3D printing materials, safe execution of the 3D printing process and safe disposal of 3D printing wastes and is required by all personnel working with 3D Printers.

8.4.2. **Ladder and Scaffold Safety** (online) - This training is recommended for anyone using a ladder or scaffold.

8.4.3. **Laser cutter** (online) - Topics presented include, laser cutter basics hazards of laser cutting, measures to reduce or eliminate laser cutter hazards and emergency response procedures.

8.4.4. **Lithium Ion Battery Safety** (classroom) - The purpose of this course is to educate users of Lithium Ion Batteries (LIB) on the safe use, proper charging, safe discharge & disposal, personal protective equipment, engineering controls and proper safety considerations for the work space. In addition, this training will cover the proper emergency preparedness and response for runaway events. Any individual who uses, builds, maintains LIB's or equipment containing LIB's is required to attend this course.

8.4.5. **Soldering Safety** (online) - This training is for anyone who uses soldering processes with applications in metalworking and electronics, including the connection of electronic components and wiring to circuit boards.

8.5. The following BioRaft training will be assigned based on the student's role based on their responsibilities within their organization:

8.5.1. **BioRaft/Chem Tracker Training** (classroom) – BioRAFT User Training will present an overview of the system, its functions, purpose, and how to effectively use each of the modules. The major component of this training will focus on ChemTracker use.

9. Working Alone

Working alone inside a shop and/or maker space is strictly prohibited, no exceptions.

10. Revisions

Date	Documented Changes	Initials
8/30/2022	Updated Format – font and bullet point alignment	MAS