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INTRODUCTION

UC Berkeley has over 50 shops that provide academic and research support to the UC Berkeley community. This program is intended to cover any space where materials are fabricated, maintained, modified, repaired or tested, including:

- Academic shops in which student instruction and use are major components
- Professional shops in which research support, fabrication and facilities maintenance are major components

The UC Berkeley Shop Safety Program provides guidance and direction for establishing and maintaining a safe and healthy environment in these shops. This program applies to anyone who enters a shop owned by UC Berkeley or on UC Berkeley property, irrespective of their affiliation with the University.

This program is not intended to supersede established safety and health programs, but to work synergistically to provide the safest possible working and learning environment. Compliance with this program will protect users from injury or illness and reduce liability for shop managers.

ROLES AND RESPONSIBILITIES

Roles may vary depending on the structure of the organization or College, but will be similar to those outlined below. In some shops, roles may be combined and/or one person may serve multiple roles.

Administrative

Upper Management

Any academic or non-academic role at the Assistant/Associate Dean or Department Chair level and above is considered upper management for the purpose of this program. Upper management's responsibilities include:

- Ensuring environmental, health, and safety obligations are met for shops under their control
- Communicating to employees, students, visitors, and guests that health, safety, and a concern for the environment are top priorities on the Berkeley campus; and that everyone shares in the obligation to conduct shop operations in a safe, healthful, environmentally protective manner
- Supporting shop-led environment, health and safety initiatives

Primary Investigators (PIs), Faculty, and Instructors

PIs, faculty, and instructors using the shop for instruction or with a group of students are responsible for ensuring the group complies with the requirements of this program and shop-specific protocols.

Environment, Health & Safety

The responsibilities of the Office of Environment, Health & Safety (EH&S) include:

- Serving as a liaison between the shop and regulatory agencies, such as Cal/OSHA
- Assisting shops with legal or regulatory compliance
- Assisting in the identification of hazardous or potentially hazardous conditions through consultations and inspections
- Recommending corrective actions and risk mitigation strategies
- Assisting with safety-related training
- Conducting or assisting with investigations

Campus Shop Safety Committee

The Campus Shop Safety Committee (CSSC) is a group of representatives from all campus shops—academic and professional. The CSSC provides a forum for discussion of safety and health topics and identifies opportunities for improving shop safety. The CSSC meets three times a year: during the Spring, Summer, and Fall semesters.

CSSC Steering Team

CSSC Steering Team is comprised of at least six CSSC members. The CSSC Steering Team must have representation from EH&S, an academic shop, and a professional shop. The CSSC Steering Team responsible for:

- Chairing, organizing, and facilitating the triannual CSSC meetings
- Meeting regularly to discuss ongoing efforts and initiatives
- Maintaining shared CSSC resources, such as Google Drive

- Writing and distributing the CSSC meeting minutes

CSSC Representative

Shops must have CSSC representation. The CSSC representative is a crucial component of the communication loop between shops, the CSSC Steering Team, EH&S, and the campus community. One person may represent multiple shops within their department. The representative does not have to be the Department Safety Coordinator, Lab Safety Coordinator, or Shop Manager.

Representatives are responsible for attending the CSSC meetings, or sending a substitute representative if unable to attend. Representatives are also responsible for bringing shop safety concerns and successes to the committee, as well as relaying committee information back to their shop.

Operational

Shop Managers

Shop managers are responsible for ensuring their shop's overall condition and culture remains conducive to safe operations. Responsibilities include, but are not limited to:

- Authorizing users and revoking authorization when necessary
- Designating restricted areas
- Administering (planning, implementing, and evaluating) an appropriate safety training program
- Ensuring compliance with UC Berkeley's Hazard Communications Plan and maintaining the Orange Hazard Communication Flip Chart
- Enforcing the requirements of this program

User

A user is anyone performing work or instruction in a shop, or engaging in shop operations, regardless of academic or non-academic role. Users are responsible for complying with the requirements outlined in the **Safe Work Practices and Procedures** section of this program, as well as shop-specific safety protocols.

Non-affiliated users

Persons who are neither UC Berkeley students nor UC Berkeley employees are considered non-affiliated. If a non-affiliated person wishes to utilize a shop, they must receive permission from the Shop Manager. Not all departments allow non-affiliated users in their shop(s); and permission remains at the discretion of the Shop Manager.

MANAGING SHOP HAZARDS

The foundation of a successful injury and loss prevention program is a hazard management process. This section focuses on two tools used to recognize, control, and/or mitigate hazards in a shop environment.

Integrated Safety and Environmental Management

Integrated Safety and Environmental Management (ISEM) is a tool adopted by University of California Office of the President (UCOP). The main component of ISEM is a 5-step process that provides a formal, organized system for planning, performing, assessing, and improving activities (Figure 1).

The five steps, or "functions", provide the necessary framework for any activity that could potentially affect faculty, staff, students, visitors, the public, or the environment. The functions are applied as a continuous cycle with the degree of rigor appropriate to address the type of activity and the hazard or environmental aspect involved.

1. Defining the Scope of Activities
Defining the scope is accomplished by considering activities, processes, tasks, resources, etc.

2. Analyzing the Hazards
Hazards and environmental aspects associated with the activities are identified, analyzed, and categorized.

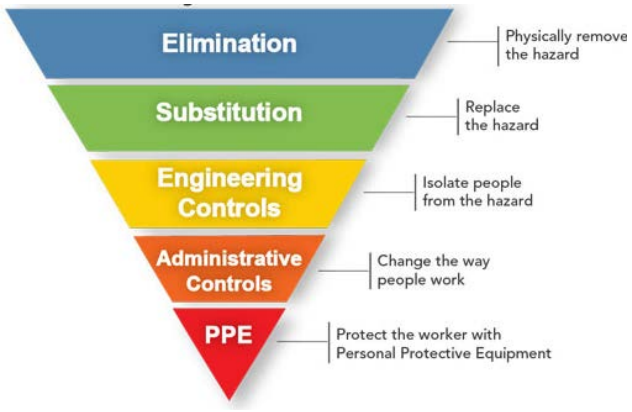
3. Developing and Implementing Hazard and Operational Controls
Applicable standards and requirements are identified and agreed upon, controls to prevent and/or mitigate hazards and aspects are identified, the safety and environmental parameters are established, and controls are implemented.

4. Performing Activities within Established Controls
Readiness is confirmed and activities are performed safely and in compliance with applicable regulations and policies.

5. Providing Feedback and Assuring Continuous Improvement
The appropriate parties obtain feedback on the adequacy of controls, identify opportunities for improving the definition and planning of activities, conduct departmental and independent oversight and, if necessary, participate in regulatory enforcement actions.

Hierarchy of Controls

A *hierarchy of controls* is used as a means of creating a safer system. It is referred to as a hierarchy because the control methods at the top of the graphic are more effective and protective than those at the bottom. One representation of this hierarchy is depicted in Figure 2.



Elimination and Substitution
Elimination and substitution are the most effective at mitigating hazards. An example of substitution would be replacing a hazardous chemical used during a cleaning process with a less hazardous one.

Engineering Controls
Engineering controls are used to control – not eliminate - a hazard. Well-designed engineering controls will be independent of worker interactions and provide a high level of protection. Interlocks, machine guards, ventilation systems, and guardrails are examples of engineering controls

Administrative Controls
Administrative controls are behavior-oriented. Training, written procedures, inspections, lights, sirens, and warning signs are administrative controls.

Personal Protective Equipment (PPE)
PPE is the last line of defense and is used to supplement other hazard control measures in the hierarchy. Examples of PPE are gloves, safety glasses, protective footwear, and dust masks.

PROGRAM REQUIREMENTS

Restricted Areas

Establishing restricted areas of a shop controls access to hazardous materials or operations. Restricted areas must be identified and have their boundaries demarcated with a special warning (e.g., a sign and yellow lines painted on the floor).

Only authorized users may enter restricted areas. Unauthorized personnel must be escorted.

Authorization

Authorization gives a user permission to use a shop and it may list specific restricted areas, equipment, tools, and/or activities that qualify or limit the authorization. Authorization levels may vary between users. The Shop Manager determines the level of authorization for each user.

Authorization must be documented and shop managers are encouraged to develop and use an authorization form customized to their needs. The basic form provided in Attachment A: Shop User Authorization, may be used to meet this requirement at a minimum. Additionally, non-affiliated users must complete and sign Attachment B: Waiver of Liability, Assumption of Risk, and Indemnity Agreement.

> Authorization to work in one shop does not allow a user to work in another shop. Shop Managers who oversee multiple shops may authorize users to work in more than one shop under their direction, but this must be clearly stated on the authorization form.
>
> **Reauthorization**
> Reauthorization may be necessary after a break in service (e.g., sabbatical, break in employment, reentry after graduation) to reacquaint a user to a shop. Reauthorization is at the discretion of the Shop Manager, based on user competency and operational changes since last authorization. Reauthorization must be documented.

Safe Work Practices and Procedures

Shops must employ practices for working safely. The practices must be outlined in documentation that users acknowledge and sign. At a minimum, documentation must address:

- Personal conduct
- Solo work
- Dress code
- Use of electronic devices, such as cell phones, tablets, and iPods
- Food and beverages

Hazard Communication

Shop users have the "right to know" about all chemicals and hazardous materials in the shop. Hazard communication is accomplished by:

- Ensuring all chemicals and hazardous materials are properly labeled
- Providing a Safety Data Sheet (SDS) or electronic access to the SDS for each chemical
- Training to ensure recognition and understanding of the associated hazards

Orange Flip Chart

Part of UC Berkeley's Hazard Communication Plan is the Orange Flip Chart or equivalent. The Orange Flip Chart outlines emergency procedures, important contacts, campus safety resources, and information on chemical hazards. Shop users are encouraged to review the information in the Orange Flip Chart. Shop employees are required to review and sign Orange Flip Chart.

Documented Hazard Analysis

Shops are required to complete a documented hazard analysis for hazardous operations and processes. Hazard analyses reduce the risk of injury or illness through hazard identification and mitigation. The most common methods used at UC Berkeley are:

Standard Operating Procedure (SOP) – An SOP contains detailed, written instructions on how to safely perform work. An SOP outlines the purpose, scope, responsibilities, and procedural steps. SOPs work best when applied to a specific, unchanged process or procedure.

Job Hazard Analysis (JHA), Job Safety Analysis (JSA) – While JHA and JSA are different processes, there similarities are such that the terms are used interchangeably. Both analyses break a job down into a series of tasks or steps focusing on the relationship between the worker, the task, the tools, and the work environment. Each task or step is assessed for potential hazards and controls are applied to eliminate or reduce the risk to an acceptable level.

PPE Assessment

Shops must have a documented assessment that specifies if hazards are present, or are likely to be present, which necessitate the use of PPE. Examples of documentation include: JSA, JHA, SOP, or **Attachment C**: *PPE Assessment.*

Inspections and Assessments

Continuous Assessment

Shop users must continually assess their shop for hazardous conditions and either correct them immediately, or report them for corrective action.

Pre-Use or Pre-Operation Inspections

Pre-use inspections are required for all tools, machines, and equipment. Pre-use inspections ensure equipment meets minimum acceptable safety requirements. The inspections are conducted by the user and involve a cursory look at the physical condition of the equipment, as well as a check of any safeguards.

Pre-operation inspections are conducted for high-hazard operations and on new or modified equipment and processes. Pre-operation inspections must be documented.
A pre-operation inspection involves:

- Ensuring all known hazards are safeguarded
- Reviewing safe work practices and procedures, including the emergency action plan for emergency shutdown, and non-routine start-ups.

Specialized Inspections
Regulations may require qualified persons to periodically inspect specialized equipment (e.g., pressure vessels, fire extinguishers, emergency eyewash stations) at regular intervals. Specialized inspections must be documented.

Periodic Inspections
Shops must be officially inspected two times per year: once as a self-inspection conducted by the shop manager or designee, and once by an EH&S representative in a calendar year.

In the first quarter of the year, shops are responsible for conducting a Shop Safety Self-Inspection. The self-inspection focuses on program and regulatory compliance. The self-inspection is guided and documented online via the UC System wide Safety Inspection Tool (SIT). An EH&S Specialist will review all self-inspections and follow up with shop managers to acknowledge completion and, if necessary, provide assistance in correcting any deficiencies.

In the third quarter of the year, an EH&S Specialist conducts a formal, in-person Shop Safety Inspection. The inspection focuses on safety culture and practices. The EH&S inspector will document and share the inspection results via SIT.

TRAINING

Users must be trained in the provisions of this program prior to working in a shop. Additionally users must receive shop orientation, as well as tool and equipment-specific training.

Shop Orientation

All users, irrespective of their affiliation with UC Berkeley (i.e., faculty, staff, student), must complete shop orientation. Training must be specific to the shop's operations. At a minimum, training must cover:

- Safe work practices and procedures
- Required PPE, including how to use it, its limitations, proper care, and disposal
- Emergency essentials (location of Safety Data Sheets, emergency showers and eyewash stations, fire protection equipment, first aid kits, landlines, etc.)

Tool and Equipment-Specific Training

Users must receive training on all tools, machines, and equipment prior to use. At a minimum, training must cover basic operations and safe use procedures. Hands-on training is highly encouraged.

Documentation of Training

Shop orientation and tool and equipment-specific training must be documented. For legal purposes, documentation must include the subject covered, date of training, trainer's name, and the trainee's name and signature.

Retraining

Retraining must occur whenever:

- A user demonstrates deficiencies or inadequacies in their knowledge or actions
- An inspection reveals retraining would improve the safety of shop operations
- A break in service
- There is a change to this program that affects shop operations
- Per user request

RECORDKEEPING

Shops are responsible for maintaining their own safety-related records. Records include:

- Sign-in sheets and content and/or outline from safety training or tailgate talks
- Sign-in sheets and minutes from shop safety meetings
- Safety inspections, assessments, or evaluations
- Permits (i.e., hot work, confined space entry)
- Calibration, repair, and maintenance records related to the safe operation of tools, machines, and equipment

Retention

Retain training records for three (3) years after the user has left UC Berkeley (graduated, retired, no longer employed, etc.).

Retain calibration, repair, and maintenance records related to the safe operation of tools, machines, and equipment until the end of its service life.

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Revision History:	1.0, 01/11/2011 – Original program 2.0, 09/21/2015 – Bookmarked PDF 2.1, 06/28/2016 – Updated program

Attachment A: *Shop User Authorization*

_____, _____ is authorized to enter the
(Name) *(ID Number)*
restricted areas of the following shop(s):_____

Users are responsible for complying with the requirements outlined in the Shop Safety Program, as well as any shop-specific safety protocols.

Users must receive shop orientation, as well as tool and equipment-specific training (JSA, JHA, SOP, etc.). Training must be documented.

Authorization levels may vary between users. The Shop Manager determines the level of authorization for each user.

User Signature: _____

Shop Manager Name _____
Signature_____
Date_____

Attachment B: *Waiver of Liability, Assumption of Risk, and Indemnity Agreement*

Participant's name: _____Name_____
Please Print

UNIVERSITY OF CALIFORNIA, CAMPUS

Name of Class or Activity

Waiver of Liability, Assumption of Risk, and Indemnity Agreement

Waiver: In consideration of being permitted to participate in any way in
Description of Class or Activity including date(s)

hereinafter called "The Activity", I, for myself, my heirs, personal representatives or assigns, **do hereby release, waive, discharge, and covenant not to sue** The Regents of the University of California, its officers, employees, and agents from liability **from any and all claims including the negligence of The Regents of the University of California, its officers, employees and agents,** resulting in personal injury, accidents or illnesses (including death), and property loss arising from, but not limited to, participation in The Activity.

_____ _____
Signature of Parent/Guardian of Minor Date Signature of Participant Date

Assumption of Risks: Participation in The Activity carries with it certain inherent risks that cannot be eliminated regardless of the care taken to avoid injuries. The specific risks vary from one activity to another, but the risks range from 1) minor injuries such as scratches, bruises, and sprains 2) major injuries such as eye injury or loss of sight, joint or back injuries, heart attacks, and concussions to 3) catastrophic injuries including paralysis and death.

I have read the previous paragraphs and I know, understand, and appreciate these and other risks that are inherent in The Activity. I hereby **assert that my participation is voluntary and that I knowingly assume all such risks.**

Indemnification and Hold Harmless: I also agree to INDEMNIFY AND HOLD The Regents of the University of California HARMLESS from any and all claims, actions, suits, procedures, costs, expenses, damages and liabilities, including attorney's fees brought as a result of my involvement in The Activity and to reimburse them for any such expenses incurred.

Severability: The undersigned further expressly agrees that the foregoing waiver and assumption of risks agreement is intended to be as broad and inclusive as is permitted by the law of the State of California and that if any portion thereof is held invalid, it is agreed that the balance shall, notwithstanding, continue in full legal force and effect.

Acknowledgment of Understanding: I have read this waiver of liability, assumption of risk, and indemnity agreement, fully understand its terms, and **understand that I am giving up substantial rights, including my right to sue**. I acknowledge that I am signing the agreement freely and voluntarily, and **intend by my signature to be a complete and unconditional release of all liability** to the greatest extent allowed by law.

_____ _____
Signature of Parent/Guardian of Minor Date Signature of Participant Date
Participant's Age (if minor) _____

Attachment C: *PPE Assessment*

Shop:

Assessment completed by: **Date:**

Directions: Conduct a walk-through of the shop and assess the potential hazards of day-to-day operations. Document the hazard (e.g., irritation), source (e.g., dust from sander), and required PPE (e.g., goggles) on the chart below. This assessment is intended for normal, daily operations and does not take the place of a task-specific assessment (JHA, JSA).

	Hazard	Source	PPE
Head Protection			
Eye and Face Protection			
Foot and Leg Protection			
Hand and Arm Protection			
Body Protection			
Respiratory Protection			
Hearing Protection			

PPE Assessment

Shop:

Assessment completed by: **Date:**

	Hazard	Source	PPE
Eye & Face Protection	☐ Impact, penetration ☐ Irritation ☐ Absorption ☐ Ingestion ☐ Optical radiation ☐ Temperature extremes ☐ Chemical spills/splashes ☐ Flame or sparks ☐ Other_____		☐ Safety glasses ☐ w/ side shields ☐ Safety goggles ☐ Face shield ☐ Optical
	All safety glasses or goggles must comply with ANSI Z87.1; Users whose vision requires the use of prescription (Rx) lenses must wear safety glasses/goggles fitted with Rx lenses or wear protective eyewear over regular Rx eyewear; Dusty and/or chemical environments may represent an additional hazard to contact lens wearers; Use caution with metal frame eyewear in electrical hazard areas; Side shields must be worn when there is a hazard from flying material; Face shields should only be worn over primary eye protection.		
Foot & Leg Protection	☐ Impact, penetration, puncture, compression, roll-over ☐ Cuts, abrasions, blisters ☐ Electrical ☐ Temperature extremes ☐ Slips, trips, or falls ☐ Chemical spills/splashes ☐ Flame or sparks ☐ Other_____		☐ Closed-toe shoes ☐ Safety shoes or boots ☐ Non-slip ☐ Safety toe ☐ Metatarsal ☐ Puncture-resistant sole ☐ Water-resistant ☐ Electrically conductive or insulating ☐ Shin guards ☐ Chaps
	Safety shoes or boots must comply with ANSI Z41-1999, ASTM F2412-05, or ASTM F2413-5.		
Hand & Arm Protection	☐ Impact, penetration, puncture ☐ Cuts, abrasions, blisters ☐ Irritation		

	□ Absorption □ Electrical □ Temperature extremes		
	For multiple chemicals, select gloves on the basis of the chemical component with the shortest breakthrough time.		

PPE Assessment

	Hazard	Source	PPE
Head Protection	□ Impact, penetration, struck against or by □ Electrical		Hardhat Bump cap
Body Protection	□ Cuts, abrasions □ Irritation □ Electrical □ Temperature extremes □ Radiation		
Respiratory Protection	□ Asphyxiation □ Inhalation □ Irritation □ Odor		Dust mask Disposable respirator (N-95)
	Users exposed to inhalation or asphyxiation hazards must be enrolled in the Respiratory Protection Program; Never wear a half- or full-face respirator without authorization from EH&S; Users who wish to wear a disposable respirator (N-95) for their comfort must comply with the requirements of the Respiratory Protection Program.		
Hearing Protection	□ Hearing loss		Earplugs Earmuffs
	UCB employees must be enrolled in the Hearing Conservation Program if noise exceeds 85dBA.		
Other	(e.g., personal flotation devices)		

This form can be used as a reference to help select the proper PPE based on common hazards found in a shop environment. The hazards listed are not all inclusive.

Hazards:

- Absorption
- Asphyxiation
- Biological
- Chemical spills/splashes
- Compression, roll-over
- Cuts, abrasions, blisters
- Drowning, engulfment, entrapment
- Electrical
- Flame or sparks
- Hearing loss
- Impact, struck by or against
- Ingestion
- Inhalation
- Irritation
- Odor
- Optical radiation
- Penetration, puncture
- Repetitive motion
- Slips, trips, or falls
- Temperature extremes