

Developing a Standardized Safety Approach to Instructional Laboratories in a Major Research Institution

Laboratory work is essential to all academic programs, starting with introductory-level undergraduate courses. It is vital that students develop a strong foundation in the basic principles and procedures of laboratory safety and to expand their knowledge throughout their academic career. It is important that both undergraduate and graduate students are able to recognize hazards, assess risks, minimize risks, and prepare for proper execution of potentially hazardous processes. Safety considerations should be woven into every part of the curriculum, from basic familiarity with common hazards for undergraduate students to the ability to predict and prepare for hazards of unknown materials at the graduate and professional level. Safety training should be treated as a critical component of preparing students to be successful as professionals. This document is a guideline to set the minimum standard for managing safety within instructional laboratory courses.

Responsibilities:

College Dean:

- Require all incoming graduate students in the fall to attend Graduate Student Safety Orientation provided by EH&S.
- Assure that the College upholds all health and safety requirements.

Department Chair or Program Chair/Vice-Chair:

- Assures that the department upholds all campus health and safety requirements.
- Assures that each course instructor has reviewed and documented all experimental SOPs. Clearly define who is responsible, if it is not the faculty instructor.
- Be familiar with the experiment procedures and risk levels for each course.
- When safety responsibilities are discussed (e.g. safety committee, department meetings, Teaching Assistant (TA) orientation, etc.), partner with EH&S to present safety responsibilities and the safety review process (including but not limited to SOPs, working with Student Disabilities Services on accommodations for students, reproductive health issues, emergency procedures/injuries, PPE enforcement, safety moments at the beginning of each class).

Faculty/Instructors/Academic Coordinators/Development Engineer:

- Assures that Teaching Assistants uphold the health and safety requirements and completes the [Primary Safety Responsibilities of TAs acknowledgement form](#) (Appendix A).
 - For courses with field component, assure that students uphold the health and safety requirements and completes the [Primary Field Safety Responsibilities of TAs](#) (Appendix D).
- When you are assigned a course, obtain a copy of the previous standard operating procedures (SOPs), review and update when there is change in procedures/experiment set up. Document using the [SOP Review/Revision Acknowledgement form](#).

- Utilize the [Experimental Risk Assessment tool](#) to review experiments and procedures to ensure appropriate safety measure are in place. Reviews should be conducted for existing experiments, new experiments, changes in procedures, or after an incident.
 - For senior design projects, review the “Senior Design Projects” section below.
- Contact EH&S at ehslaboratory@ucr.edu to initiate access to the course [Laboratory Hazard Assessment](#) for your instructional lab, which will determine the appropriate personal protective equipment (PPE) and other specific hazard (i.e. biological materials, radiation materials, etc.) approval for the lab. PPE identified must also be used for the students in the lab.
- Complete the [Instructional Lab Checklist for Faculty/Instructor/Academic Coordinator/Development Engineer](#) for each course on an annual basis or for every quarter you serve as the instructor.
- Clearly define expectations to TAs when students do not come to lab with the correct PPE.
- Clearly define and demonstrate [proper use and safe removal of gloves](#).
- Incorporate [Student Laboratory Safety Commitment](#) (See Appendix B) in the laboratory course requirements, ensure all students complete, and maintain records of completion.
 - For courses with field components, ensure students complete [Student Field Safety Commitment](#) (Appendix E).
- Provide and document safety training, including the completion of the [Instructional Laboratory Site Specific Training Checklist](#) with each TA. This should be completed for each room/site where the TA will be working in.

Teaching Assistants:

Teaching Assistants (TAs) typically have responsibilities for operating and overseeing undergraduate students and laboratories. Below is a list of expectations for Teaching Assistants:

- Attend Graduate Student Safety Orientation that is hosted by EH&S prior to serving as a TA*.
- Review and acknowledge the [Primary Safety Responsibilities of TAs](#) (See Appendix A).
 - For courses with field component, assure that students uphold the health and safety requirements and completes the [Primary Field Safety Responsibilities of TAs](#) (Appendix D).
- Understand the principles of safety – [RAMP](#) – and how these apply to each experiment.
- With the Faculty/Instructor/Academic Coordinator, complete the [Instructional Lab Site Specific Training Checklist](#) for each room where you will be assigned.
- Read the [Chemical Hygiene Plan](#) and sign the [acknowledgement form](#).
- Know where the Safety Data Sheets (SDS) for each chemical are located and become familiar with each section.
- Ensure all students have reviewed and signed the [Student Laboratory Safety Commitment](#) (See Appendix B).
 - For courses with field components, ensure students complete [Student Field Safety Commitment](#) (Appendix E).
- Demonstrate proper laboratory techniques for each experiment to the students.
- Maintain good housekeeping in assigned laboratories.
- Do not use cell phones during sessions unless instructed to do so.

For courses that do not have TAs assigned, Faculty/Instructor/Academic Coordinators/Development Engineers are responsible to ensure all the above expectations are met.

Environmental Health and Safety (EH&S):

EH&S provides consultation and guidance for all instructional labs.

- Organize the Graduate Student Safety Orientation course and make improvements to the content as appropriate.
- Share attendance records of GSSO to the appropriate College administrators to ensure students receive credit for attending.
- Evaluate all instructional lab on an annual basis and share evaluation reports to the Department/Program Chairs and Dean.
- Participate in any department or college level safety meetings.
- Share lessons learned from near misses and other incidents broadly to the College.

Senior Design Projects:

Faculty/Advisors/Instructors/Development Engineer:

- Assures that students uphold the health and safety requirements and completes the [Primary Safety Responsibilities of TAs](#) (Appendix A).
- Ensure students complete Appendix C – [Student Design Hazard Assessment](#) to identify potential hazards and risks of all tasks associated with the project.
- Standard Operating Procedures (SOPs)
 - Review the standard operating procedures (SOPs) developed by students and provide feedback.
 - Ensure all students review and document using the [SOP Review/Revision Acknowledgement form](#).
 - Ensure student document when there is a change in procedures/experiment set up.
- Contact EH&S at ehslaboratory@ucr.edu to initiate access to the course [Laboratory Hazard Assessment](#) for your instructional lab, which will determine the appropriate personal protective equipment (PPE) and other specific hazard (i.e. biological materials, radiation materials, etc.) approval for the lab. PPE identified must also be used for the students in the lab.
- Complete the [Instructional Lab Checklist for Faculty/Instructor/Academic Coordinator/Development Engineer](#) for each course on an annual basis or for every quarter you serve as the instructor.
- Clearly define expectations when students do not come to lab with the correct PPE.
- Clearly define and demonstrate proper use and safe removal of gloves.
- Incorporate [Student Laboratory Safety Commitment](#) (See Appendix B) in the laboratory course requirements, ensure all students complete, and maintain records of completion.
- Provide and document safety training, including the completion of the [Instructional Laboratory Site Specific Training Checklist](#) with each TA. This should be completed for each room/site where the TA will be working in.

Students:

- Complete Appendix B – [Student Lab Safety Commitment](#)
- Complete Appendix C – [Student Design Hazard Assessment](#) (if applicable)
- Collaborate with your faculty/advisor/development engineer to conduct hazard analysis of key processes and sub-processes associated with the design.
- Identify appropriate corrective actions to reduce risks by eliminating and controlling hazards, using the accepted hazard control hierarchy of elimination and substitution, engineering controls.

Safety Resources:

Safety is always an important concern in instructional laboratories.

- University wide resources:
 - [Laboratory Safety Manual](#)
 - [Chemical Hygiene Plan](#)
 - [Lab Site Specific Checklist](#)
 - [12 Months of Research Safety topics](#)
 - [Spotlight on Safety](#)
- ACS Teaching Lab: <https://institute.acs.org/lab-safety/education-and-training/safety-videos/college-lab-safety-videos.html>

Handling biological materials:

- Review [ASM Biosafety Guidelines for Teaching Labs](#).
- Use microincinerators or disposable loops rather than Bunsen burners.

Consult the departmental lab coordinator with questions about departmental safety policies.

Appendices:

Appendix A – [Primary Safety Responsibilities of TAs](#)

Appendix B – [Student Laboratory Safety Commitment](#)

Appendix C – [Student Design Hazard Assessment Form](#)

Appendix D – [Primary Field Safety Responsibilities of TAs](#)

Appendix E – [Student Field Safety Commitment](#)