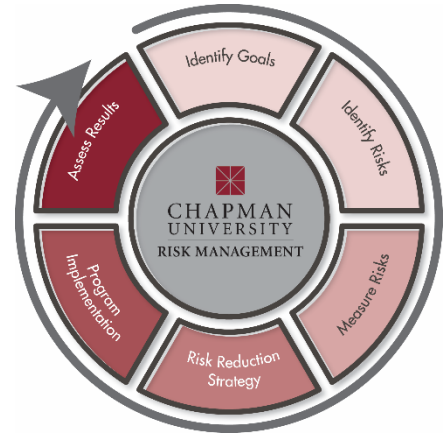




CHAPMAN UNIVERSITY
RISK MANAGEMENT

Environmental Health and Safety

Laboratory Safety Manual



Laboratory Safety, EH&S, Risk Management

Chapman University
One University Drive
Orange, CA. 92866
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Information for All Users
Faculty/Researchers/Staff/Students/Volunteers
Contact Information

Phone: (714) 997-6763

Student Health Center, Orange Campus

Location: 402 North Glassell St., Orange, CA. 92866

Hours: M-F, 8:30 am to 4:30 pm

Phone: (714) 744 - 7077

Fire Safety Officer - Victor Arteaga or Mark Davis

Email: arteaga@chapman.edu, mcdavis@chapman.edu

Phone: (714) 289-2071, (714) 744-7875

Manager of Environmental Health and Safety - Karen Swift

Email: swift@chapman.edu

Phone: (714) 628-2888

EH&S Specialist, Orange Campus - Pedro Villarreal

Email: pvillar@chapman.edu

Phone: (714) 532-7794

Lab Safety Administrator, Rinker Campus - Chuck Sohaskey

Email: sohaskey@chapman.edu

Phone: (714) 516-7199

Director of Risk Management - Allan Brooks

Email: abrooks@chapman.edu

Phone: (714) 532-7794

Schmid College

Director of Laboratory Safety - Justin O'Neill, Ph. D.

Email: joneill@chapman.edu

Phone: (714) 516-5625

Emergency Phone: (626) 840-0398

Laboratory Supervisor - Mohammed Haq

Office: SC 121

Email: haq@chapman.edu

Phone: (714) 532-6064

Vivarium – Rinker

Vivarium Manager - David Lopez

Phone: (714) 516-5422

Mobile: (520) 401-4504

Email: dlopez@chapman.edu

School of Pharmacy

Laboratory Support Staff - Ben Brahm or Tiffany White

Email: BenBrahm@chapman.edu or tiwhite@chapman.edu

Phone: (714) 516-5419 or (714) 516-5429

Crean College

Anatomy Lab Specialist - Melissa Scharfe

scharfe@chapman.edu

Phone: (714) 744-2197 or Mobile: (657) 274-6038

Risk Management Procedures Injuries and Accidents

If an accident occurs in an instructional or research lab that results in personal injury to a student, visitor, or employee, it is important that supervising faculty/researcher or staff person follow the below noted procedures. Although we strive to be prepared and act safely in the laboratory, accidents can still happen, and it is important that we act swiftly and appropriately.

- 1.** Have the injured individual cease all activities immediately and have other persons clear the area. If necessary, have others who might be working in the lab cease lab activities in order to allow first responders to focus on the injured party. Assess the injury, paying attention to how they are responding to the injury. If the injury requires serious medical attention or if there is any doubt regarding the severity of the injury or its potential to become worse, on the Orange Campus call Chapman University Public Safety immediately at (714)-997-6763 or on the Irvine Campus, call 911.
- 2.** If the injured individual is able to continue the lab after a minor injury (e.g. small cuts or punctures from clean glassware or sterile sharps, bruises, mildly irritated or dry skin from spills) and no immediate health risk would arise from them continuing, they may continue after appropriate first aid has been administered (bandage, skin rinsing, etc.). After lab, be sure to advise the individual to seek medical assistance. Advise the injured party that if there are any complications that arise from the injury to inform you as well as the Risk Management office.

At the Orange Campus if a student needs to stop lab due to the injury and it is prior to 4:00 pm, the injury is not severe, and the student is willing and able, have another student escort them to the Student Health Center. If they are unable to go to the health center due to the injury, or if it is after 4 pm, or it is the weekend, call Chapman University Public Safety immediately. Public Safety will respond promptly and appropriately assess the student.

For students on the Orange Campus, a medical evaluation can generally be provided by the Student Health Center. Outside of normal operation hours, an alternative source, on a fee-for service basis, generally requiring insurance is US Health Works at 1045 North Tustin Street, Orange, CA 92867, Phone: (714) 288-8303 or 800 N Tustin Ave. Suite A, Santa Ana, CA 92705, Phone: (714) 245-0800.

For any individuals injured on the Rinker Campus, non-emergency treatment is generally available at US Health Works located at 15751 Rockfield Blvd., Irvine, CA 92618, Phone: (949) 206-9100 or 22741 Lambert St., Suite 1608, Lake Forest, CA 92630, Phone: (949) 581-3011.

- 3.** In all cases regardless of severity, after lab has been completed, the person most familiar with the incident should fill out the [online incident reporting form](#) using the web address below. This form can also be accessed through the Chapman University Risk Management website Resources page. Also, fill out the incident log in the lab safety binder. Inform the appropriate college contact person shown on page 4 for major accidents. webfarm.chapman.edu/IncidentReporting/IncidentForm.aspx A follow up email from the College Safety Coordinator and/or Risk Management will be sent only if necessary.

- 4.** Follow-up with the student to see how they are doing after the incident/injury occurs and if/how they received care. Personally initiate follow-up with the student if you do not hear from them within 48 hours.

EH&S Guidelines on Laboratory Attire, also known as Personal Protective Equipment (PPE)

The use of appropriate clothing and Personal Protective Equipment (PPE) is essential to safety in a lab environment. The following guidelines are to be followed at all times by students, faculty and research personnel in Chapman University laboratory settings. The instructor or principal investigator is responsible for assuring that all persons in the lab are appropriately attired. Students in instructional and research labs may be asked by faculty, staff, or administrators to cease activity and leave the lab if they fail to adhere to these guidelines.

1. Instructional Laboratories

Complete lab attire requirements will be provided by the lab instructor for each course where lab work is performed. It is mandatory that students follow the lab instructor's directions and standards regarding lab attire at all times. At a minimum, students must wear closed toed shoes*, long pants*, and safety glasses or goggles* at all times when in labs. In many cases, additional safety attire such as gloves* and lab coats* will be required. Instructors may enforce this rule by penalty such as giving a grade of "zero" for a lab in which students that do not follow these guidelines.

2. Research Laboratories

In any case where "bench work" is being performed such as pouring and mixing non-hazardous chemicals or manipulating lab equipment, instruments, and tools, research students shall wear closed toed shoes, long pants, and safety glasses or goggles at minimum. In cases where more dangerous work is being done such as working with hazardous chemicals or materials, potentially dangerous biological agents, or dangerous equipment, lab coats and/or gloves and other appropriate protective equipment is required.

3. Computer, Computational, and other Work

For Individual labs or courses where only data analysis, other computational work, and no hazardous materials are present and no hazardous work is performed, the above safety attire requirements does not apply. The instructor shall use their own personal discretion to determine the appropriate attire.

4. Off Campus Work

Work that is done off campus such as sample collection, subject observation, or use of equipment at off-campus facilities is subject to the above guidelines. As with on-campus lab activities, it will be the responsibility of the instructor to determine appropriate attire and enforce these guidelines. It is the responsibility of the student to follow these guidelines. Due to the varied nature of off-campus work, contact the director of lab safety to determine necessary attire.

*** Shoes must completely cover the individual's feet. Leggings are not considered long pants. Eye protection and/or gloves will be dependent upon nature of work. The use of directly vented goggles is prohibited. Lab coats must fall at directly above the knee at minimum.**

Sample Footwear



EH&S General Lab Guidelines and Laboratory Safety Equipment

1. Food in the Laboratory

At no time is food or drink allowed in instructional or research laboratories. Food must be kept outside the laboratory or in an adjoining office when available. In the case of an emergency where an individual may need food or water, they should be removed from the lab if possible. However, if this is not possible, then unopened/sealed food should be used to help ensure they do not accidentally ingest materials that may have contaminated opened food.

2. Individuals with Special Needs and/or Medical Conditions

Individuals with special needs and/or medical conditions should be accommodated so long as it can be done safely. Most instructional and research labs are equipped with wheel chair accessible stations and these stations must be made available so that they may be utilized.

Instructors should encourage students and others to disclose any medical conditions that may cause them to be of greater risk when exposed to substances found in the lab they are working, including if the individual is or may become pregnant. Disclosure and any accommodations that are made to appropriately address these conditions must be kept confidential. In some cases, clearance by the individual's physician to participate in lab activities is necessary.

3. General Chemical Storage

The four main storage groups that chemicals need to be separated into are flammables, corrosives, toxics, and reactive. Many labs have designated flammable, corrosive, or toxic cabinets. If available, these must be used. If these are not available, chemicals may be stored in appropriate laboratory cabinets so long as chemicals are segregated in to these main storage groups. Secondary containment should be used whenever possible. For more details see the Risk Management/EH&S website on Chemical Hygiene and Safety- <http://www.chapman.edu/faculty-staff/environmental/chemical-hygiene.aspx>

4. Emergency Phones

Most labs have a hard wired phone in it. Some of these phones on the Orange Campus will dial directly to Chapman University Public Safety when picked up, while others require that you dial 911 to reach Public Safety. At the Rinker Campus a call to 911 will reach the City of Irvine 911 call center.

5. Safety Showers and Eyewash Stations

Each lab also has a safety shower and eyewash station or shower/eyewash combo. Showers and combo units should be checked monthly and eyewash stations are checked weekly. It is the responsibility of personnel using the labs to assure that these safety checks are done on a regular schedule and properly recorded on the hang tags on the equipment. The area directly underneath a safety shower must be entirely clear and sinks where eyewash stations are present must be empty and clear of clutter to ensure that they can be used if needed.

6. Fires Extinguishers

Fire extinguishers are located in every lab or directly outside each lab. Fire extinguishers are serviced annually and inspections are documented on the hang tags. Personnel who use the lab on a regular basis, or other specifically assigned personnel should conduct a visual inspection of each unit to confirm that they're present and that the pressure gauge is in the green, operational zone. If a fire extinguisher is discharged and no alarm is pulled, please immediately contact the Fire Safety Officer so that it may be replaced. There should be nothing placed in front of fire extinguishers so that they may be easily accessed.

7. Compressed Gas Cylinder Racks and Harnesses.

Compressed gas cylinders must be contained in the provided standing or wall mounted harnesses or racks at all times. A restraint must be used across both the bottom and middle/top of all compressed gas cylinders. Only store the amount of gas cylinders in a harness or rack that that particular harness or rack is designed to hold.

8. First Aid Kits and Spill Kits

Basic first aid kits and spill kits are provided in each lab. Be sure to locate and make sure students know the location of these in the laboratories they are working. If these are absent or need to be restocked, inform the director laboratory safety.

9. Electrical Panels

Electrical panels cannot have anything in front of them obstructing access to them. In addition, make sure that electrical equipment is either on a table, desk, bench top, or other raised surface. Electrical equipment and cords located on the ground should be raised at least 2 to 3 inches off the ground using some solid non-conducting material.

10. Fume Hoods

Fume hoods are designed to evacuate dangerous fumes away from the laboratory worker. Fume hoods must be operating while in use (work, short term reagent holding). Fume hoods are certified by annually by an outside provider. To be certified, a fume hood must be operating within certain established parameters with respect to operating FPM flow. Fuming chemicals must always be handled in the fume hood. Do not tamper with fume hood measurement apparatus. Confirm that there is power to the unit and that it is operational. If you have reason to believe the equipment is not functioning properly, contact your lab manager and/or EH&S before proceeding with any work that requires the protection of the hood/cabinet. Do not tamper with the measurement apparatus that might be connected to the hood/cabinet.

11. Laminar Flow Hoods

Laminar flow hoods are designed to protect sensitive samples and filtered air is gently pushed out of the hood towards the laboratory worker. Laminar flow hoods must be operating while in use. Laminar flow hoods are certified by annually by an outside vendor. To be certified, a laminar flow hood must be operating within certain established parameters with respect to operating flow. Confirm that there is power to the unit and that it is operational. If you have reason to believe the equipment is not functioning properly, contact your lab manager and/or EH&S before proceeding with any work that requires the protection of the hood/cabinet. Do not tamper with the measurement apparatus that might be connected to the hood/cabinet.

12. Biosafety Cabinets

Biosafety cabinets are designed to protect the laboratory worker when working with potentially dangerous biological samples. Biosafety cabinets must be operating while in use. Biosafety cabinets are certified annually by an outside vendor. To be certified, a biosafety cabinet must be operating within certain established parameters with respect to operating airflow. Work designated to be carried out in biosafety cabinets must be done so at all times. Confirm that there is power to the unit and that it is operational. If you have reason to believe the equipment is not functioning properly, contact your lab manager and/or EH&S before proceeding with any work that requires the protection of the hood/cabinet. Do not tamper with the measurement apparatus that might be connected to the hood/cabinet.

EH&S Hazardous Waste Management

Hazardous Waste management includes chemical, biological, radiation as well as various forms of e-waste that must all be managed in accordance with University policies and procedures.

1. Collection

Make sure bottles are capped or funnel lid is closed when not in use. Secondary containment must be used and must be able to hold the maximum capacity of the primary waste container. The outside of waste containers should be clean as well. These guidelines apply to both liquid and solid waste. Broken glassware and used plastic tips must be disposed of in appropriate waste boxes. One inch of headspace must be left in all waste containers.



2. Labeling

It is extremely important that waste is labeled correctly and writing on labels is legible. Labels must be replaced if ruined by chemical spills. Labels can be found in safety binders, at the end of this manual and are electronically available via the Chapman [EH&S website](#). When filling out a waste label, do so completely and include all contact info, date, and mark appropriate hazards. Full chemical and element names must be used (no element symbols or chemical formulas)

3. Segregation

Segregate waste into the basic categories of flammable, corrosive, and toxic. In addition, separate out acids of pH 2 or less, bases of pH 12 or more, water reactive chemicals, peroxide forming chemicals, strong oxidizers, cyanides, and known carcinogens as well when able. Keep liquid and solid waste separate from one another when possible.

4. Biohazard Waste Disposal

Solid biohazard waste does not need to be decontaminated before pickup. It should be carefully packed in red biohazard bags and sealed tightly with tape. Bags should be placed in the large biohazard barrels in either Hashinger 223, or at Rinker in the Autoclave room 249. Do not leave in the hall under any conditions. These are picked up once a week, generally on Mondays.

Liquid waste is decontaminated (generally with 10-20% bleach for 30 min) and then poured down the sink.

Material that has been treated with phenol (including Trizol and Tri-Reagent) is considered no longer biohazardous but instead should be handled as organic chemical waste.

5. Disposal and Pick-Up

Do not leave waste containers in the hall or outside staff/faculty offices under any circumstances!!

Do not pour hazardous waste down the sink (including acetone) or place it in the trash. Waste cannot be collected in a container for more than six months from the waste collection start date for that container. Once waste has been accumulating for five months in a particular waste container, fill out the online form listed below and it will be picked up promptly. Email requests or phone requests without the accompanying online form will not be fulfilled.

<https://webfarm.chapman.edu/HazardousWasteDisposal>

Laboratory Safety Binders

A laboratory safety binder has been placed in every laboratory where research or instructional laboratories are located. These laboratory safety binders will contain the information listed below.

✓	Emergency Contact and Safety Information
✓	Chemical Hygiene Plan
✓	Safety Training Logs (see below and Appendix)
✓	Standard Operating Procedures

✓	Chemical Inventory and SDS (MSDS)
✓	Guidelines for Chemical Storage
✓	Injury Report Log
✓	Emergency Eye Wash Testing Guide and Instructions
✓	Hazardous Waste Guidelines and Waste Labels

If a research group primarily keeps and accesses chemical inventory, procedures, or SDS, electronically on a lab or office computer, that group may continue to do so. However, a hard copy of these files still need to be kept and updated in the provided safety binders as a back-up and manner by which the safety director, EH&S staff, as well as emergency responders can have around the clock access to this information.

Training Log Sheets

These must be kept in the appropriate section of the binder will be updated by the College safety designee at the beginning of each semester and summer to reflect students who completed training the previous semester. See training log at the back of this Manual.

Standard Operating Procedures (SOPs)

SOPs for general lab procedures (handling gas cylinders, using corrosives, etc.) that have been generated by EH&S and approved by the Science Safety Committee and will be placed in binders for students, faculty and research personnel.

Chemical Inventory

The printed chemical inventory for each lab contained in the binders will be updated annually.

SDS (MSDS)

The Safety Data Sheet (SDS), formerly known as Materials Safety Data Sheet (MSDS) for each chemical used in each lab must also be present in the safety binders or an additional binder when needed. As with the chemical inventory, SDS sheets will be updated on an ongoing basis throughout the year, and reviewed again at the time of each annual inventory and lab inspection. If a chemical is no longer being used in a lab, the SDS for that chemical may be removed from the binder. **However, any SDS for chemicals no longer being used in a particular lab must be given to the College's designated safety person, and retained indefinitely under OSHA standards.** The SDS sections of these binders are to serve as a back-up resource. The primary method of securing the current SDS for all chemicals use shall be the CHIMERA system which is used to assure access to the most current information sheet.

Information for Personnel Conducting Research Responsibilities of Advisers and of Students for Safety in the Laboratory

Faculty, researchers, and students have responsibility when it comes to safety in the laboratory. In general, it is the University, through our faculty and researchers who maintain responsibility to make sure that a safe environment exists for all individuals who work in the lab. Faculty and researchers serve in an advisory capacity to students and others who work in labs as research assistants or in other support roles. Often this will be a collaborative effort with both lab safety personnel within a college and Chapman Environmental Health and

Safety. Researchers, whether they are students or otherwise, must comply with safety rules and regulations they are provided and need to be active reporters of safety issues in the lab.

Faculty/Researcher/PI Adviser Responsibilities

- Ensure that students are properly educated and trained in safety practices.
- Keep and maintain documentation of such training.
- Provide information regarding hazards and safety concerns in the laboratory.
- Provide or ensure training regarding dangerous laboratory procedures and handling of dangerous reagents.
- Continually encourage safe lab practices.
- Ensure that engineering measures and safety equipment are properly working and maintained.

Student/Researcher Responsibilities

- Attend or go through training regarding safe laboratory practices.
- Read and process information regarding hazards and dangers in the lab.
- Follow safety procedures and regulations regarding dangerous laboratory procedures
- Wear appropriate and observe requirements for Personal protection equipment (PPE)
- Report deficiencies in engineering safety measures and equipment to adviser.

Guidelines for Undergraduate Research Students

Oversight of all research is the responsibility of the Principal Investigator (PI) or responsible faculty member. The first step is conducting a Hazard Assessment. Oversight requirements are based on 3 levels of hazard assessment:

Initially, the hazard level assessment of procedures will be determined by the PI. However, if it is felt that the assessed hazard level is inappropriate, it will be adjusted by the director of laboratory safety for the college or the Manager, Environmental Health and Safety.

Level 1: Low hazard

- student may work alone and outside of regular working hours
- faculty member may be off campus but must be reachable by cell-phone
- if faculty member is away (e.g. at a conference), another faculty member must be designated as a substitute mentor

egg. computer work like plotting, data analysis, literature searches, paper writing; washing glassware; lab housekeeping; using most analytical instruments (egg. spectrophotometers, pH meters, HPLCs etc.); feeding and care of animals; procedures using reagents that have low hazards

Level 2: Moderate hazard

- student must complete documented safety training on procedure
- student may work alone during regular working hours if other safety trained personnel are available within the building
- student may work outside of regular working hours with a lab partner appropriately trained in lab safety
- faculty member (or their designated substitute) must be on campus and reachable by cell-phone
egg. procedures and instruments using reagents identified as moderately hazardous or toxic

Level 3: High hazard

- student must complete documented safety training on procedure
- student must work within regular working hours (no weekends or late nights)
- student must work with another student, staff or faculty properly trained in safety present
- professor must be in office, lab or another known location in the building (egg. classroom or conference room) where they can be physically reached quickly

egg. working with highly concentrated acids and bases (>10M); highly hazardous cryogen and gas work; high level biohazards; high level radiation; procedures with high fire or explosion risk

High School Interns

The same guidelines outlined above apply to high school interns except:

1. all lab procedures other than computer work fall into Level 3 for supervisory purposes
2. student may only work when an undergraduate mentor, graduate student, staff or faculty member who is properly trained in safety is in the lab (not just another high school intern)
3. additional required liability paperwork/forms must be completed first; this may include contracts or affiliation agreements, memorandums of agreement, waiver of liability/assumption of risk agreement, emergency medical information, parental authorizations, including medical services releases, and other documentation as required by Risk Management and Legal Affairs. Any program that involves work with minors must be registered with the University. For more information visit the [Risk Management Resources Page](#) and look under the heading "Programs with Minor Participants."

The American Chemical Society (ACS) Guidelines

The University recommends all personnel follow those guidelines recommended by the American Chemical Society Committee on Professional Training which certifies undergraduate degrees in chemistry. These [guidelines](#) state that laboratory safety requires the development of skills and responsibility and must be an integral part of the curriculum.

The safety approach recommended by ACS is exemplified by **RAMP**:

Recognize Hazards, Assess Hazard Risks, Minimize Hazard Risks, Prepare for Emergencies

1. Faculty are responsible for:
 - a. reviewing safety issues with students in teaching and research laboratories
 - b. ensuring training is completed and documented for each student working in the lab prior to research commencing
 - c. setting an example of safe practice and supporting a strong lab safety culture
 - d. encouraging a clean, uncluttered work space to facilitate safe practices
 - e. addressing issues raised during lab safety inspections in a timely manner
2. Students must complete documented safety training in general lab safety and radiation (if applicable) before starting work in a lab. This must include the basics of:

- a. no food or drink in the lab
 - b. protective eye wear and lab coats
 - c. hazardous waste handling, labeling and pick up procedures
 - d. appropriate storage of chemicals
 - e. appropriately documenting and reporting accidents to the proper personnel
3. Students must be made aware of:
- a. the location of all emergency and safety equipment (eg. eye wash, showers, extinguishers, hoods)
 - b. the emergency response instructions hanging in each lab with fire escape routes
 - c. that they must call 911 on a lab or office phone to reach the Public Safety campus office (or Irvine Police/Fire) in the event of an emergency – When calling Public Safety from the Orange Campus, Public Safety will determine appropriate response and call outside emergency services if needed
4. Students must have ready access to and be aware of the location in the lab of:
- a. Chapman’s Chemical Hygiene Plan (CHP)
 - b. Safety Data Sheets (SDS) for chemicals used in the lab
 - c. Standard Operating Procedures (SOPs) for general procedures (eg. handling gas cylinders – these are part of the CHP) and lab-specific procedures (eg. synthesizing a chemical or working with a scintillation cocktail).
5. Additional training requirements and level of supervision/oversight is based on risk assessment as identified in the lab SOPs with more hazardous procedures requiring students to:
- a. complete initial additional documented safety training in the specific procedures
 - b. work under closer faculty supervision
 - c. and work with a lab partner and/or during regular working hours only

For additional details, please refer to the ACS guidelines in Appendix 1.

Safety Training Requirements for Research Students

These guidelines will have to be followed by **ALL** students and researchers working in a laboratory setting. Students who work solely from a computer or only perform subject observation will not be required to complete safety training. If you question as to whether or not you have students who meet these requirements, please contact the director of laboratory safety.

A record of each student's training must be kept in a safety training log located in each lab's safety binder. Logs will be updated at the beginning of each semester by the Director of Laboratory Safety but faculty will be responsible for checking this log to make sure that all students have complied with these requirements.

1. Basic Safety Training: To Be Completed Prior to Working in a Research Lab

All students must complete and pass the safety quiz administered as part of the General Chemistry sequence (Chem 140 – 150) in order to work in a research lab. Any student not taking CHEM 140 and 150 at Chapman will need to contact the lab safety director to access the educational materials and quiz prior to working in a research lab. Once a student completes and passes this quiz, they will not be required to take it again.

2. Research Safety Training Seminar: To Be Completed the First Semester of Work in a Research Lab

All research students will be required to attend a 120-150 minute research safety seminar to learn the proper manner to report accidents, procedures for waste management, working with hazardous chemicals and biological agents, and fire extinguisher operation. Once a student completes this seminar, they will not be required to take it again. Students who do not complete the seminar during the first semester of research will not be allowed to continue work in a research lab until the seminar is completed successfully. Seminars will be given multiple times during each semester to accommodate student schedules.

All research students or other research support personnel, including volunteers, will be required to complete online safety training modules that can be accessed through blackboard. There are many different training modules and in most cases, students will be required to complete multiple modules in order to meet the specific safety training requirements for their research. Students or advisers/researchers will need to contact lab safety personnel within their college to sign them up for these modules. Students or researchers will then be able to access the modules and take the associated quizzes. Once a student or researcher completes these modules, they will need to notify their colleges lab safety personnel so that they may be cleared to work in the lab.

3. Advanced Lab Specific Safety Training

Some labs need to include an extra level of safety training where students perform more dangerous tasks such as working with radioactive materials, handling possibly virulent pathogens, caring for and testing with animals, or using extremely toxic chemicals. The necessary training for these situations will have to be completed by a student prior to performing any of these activities. In most cases, the safety training can be conducted by the faculty member in a one on one or small group setting.

Information Regarding Biosafety and Working with Animals

Biosafety

For more specific rules, regulations and procedures regarding research using biological materials, please refer to the Chapman University Biosafety Manual, which can be found at.

http://www.chapman.edu/faculty-staff/environmental/_files/biosafety-manual.pdf

Inquiries regarding biosafety, the biosafety manual, and biological use authorization forms can be forwarded to Chuck Sohaskey at sohaskey@chapman.edu

Working with Animals

When working with animals it is necessary to ensure that all federal and state regulations are being followed regarding the care and use of animals and the safety of those handling the animals. In many cases this will require the use of approved vivaria or other animal facilities and may require approval by the Chapman University IACUC.

Inquiries regarding the use of the vivaria and potential need for IACUC clearance can be forwarded to David Lopez at dlopez@chapman.edu

Transfer, Graduate, and Non-Chapman Students
**Instructions for participating in research at Chapman University on completing
Learning Science Safely and hazardous waste education.**

Learning Science Safely

1. Contact the Director of Laboratory Safety for Schmid College of Science and Technology via email (joneill@chapman.edu), and provide your Chapman email or Chapman username if corresponding through a personal email address. School of Pharmacy and Crean College persons may contact Chuck Sohaskey via email at sohaskey@chapman.edu
2. For Schmid College, upon confirmation that you have been added to the *Schmid College Research Laboratory Safety* blackboard group, log on to the blackboard at <http://blackboard.chapman.edu>.
3. Enter the *Schmid College Research Laboratory Safety* organization and go to external links (upper left menu). Once on the risk management website, click the [Environmental Health & Safety tab](#). Watch the *Learning Science Safely* video that can be accessed via the Training Video's link.
4. Return to the blackboard *Schmid College Research Laboratory Safety* site and watch the ACS lab safety video (upper left menu).
5. Go to safety quiz (upper left menu) and read the student lab responsibilities document. Then print, read, fill out (write research for the course and put your research advisor for the instructor), and sign the bottom of the Safety Rules and Procedures sheet. Return this sheet to the Director of Laboratory Safety via mailbox, email scan, or dropping it off at the office.
6. Take the safety quiz. Be sure to hit submit when you are finished. Notify the Director of Laboratory Safety via email when you have completed the quiz.

Hazardous Waste Education (Graduate Students)

1. Go to the Chapman risk management site at www.chapman.edu/faculty-staff/risk-management/index.aspx.
2. Once on the site go to the [Environmental Health & Safety](#) web page and then to the link for **EH&S Campus-wide Forms and Tools** and open the **Hazardous Waste Training** PDF.
3. Print out the first two pages (quiz) and then read pages 3-15. Take the quiz and submit it to the Director of Laboratory Safety via mailbox, email scan, or dropping it off at the office.

Lab Safety Binder – Record of Safety Training

The below recorded individuals participated in Laboratory Safety Training consistent with the safety hazards of the laboratory facilities that are represented in the Lab Safety Binder in which this roster is documented. By initializing each line, the responsible PI or other supervisor hereby certifies that the named individual has completed the required training for laboratory-specific hazards.

	Name	ID (Student or Employee)	Approved/initialed by PI or Other Responsible Supervisor
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	Name	ID (Student or Employee)	Approved/initialed by PI or Other Responsible Supervisor
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Appendix 1

ACS Committee on Professional Training Laboratory Safety

Laboratory safety involves the development of both skills and responsibility and must be an integral part of every chemistry curriculum. This means that safety awareness must be integrated into each course with increasingly broader scope at more advanced levels. The creation of a culture of laboratory safety requires a broad commitment from all levels of the educational institution. At the department level, faculty need to assume responsibility for continuing review of safety issues with students in teaching and research laboratories, especially the persons responsible for undergraduate instruction, often graduate students or instructors. Faculty must lead by example in a coordinated departmental safety effort. At the administrative level, this will involve implementation of a Chemical Hygiene Plan that is in agreement with any campus chemical hygiene/safety efforts and must address the safe handling, storage, and disposal of chemicals. Eye wash and showers must be in operating condition, and fume hoods with proper sashes are essential. Anyone working or visiting in the lab must be wearing goggles, and consumption of food or drinks must not be permitted. A clean, uncluttered laboratory is more likely to encourage careful work.

Development of safety skills may be divided into four emphasis areas.

- Recognize Hazards
- Assess the Risks of Hazards
- Minimize the Risks of Hazards
- Prepare for Emergencies

Recognize Hazards

A hazard is a potential source of danger or harm and can result from working with chemicals, equipment, and instrumentation. Introduction to this topic can start with an understanding of the terms describing chemical hazards, such as “toxic”, “flammable”, or “corrosive”, and how to obtain information from chemical labels, Material Safety Data Sheets (MSDS), and other reference sources. Chemical hazards encountered in early undergraduate laboratories should be explained in more detail – for example, acids, bases, flammables, and toxic compounds. At more advanced levels, more details of chemical and physical hazards should be explained so that students are able to identify hazards themselves in experiments – for example, types of toxic compounds, compressed gases, cryogenics, pressurized systems, peroxides, reactives, unstable compounds, pyrophorics, explosives, and water-reactives. Other topics might include toxicology, nanomaterials, biohazards, and radiological hazards, which become relevant as chemistry becomes more “biological”.

Assess the Risks of Hazards

Once a hazard(s) is recognized, laboratory safety necessarily requires an assessment or evaluation of risk from potential exposure to the hazard. Identifying potential routes of exposure is followed by judging the relative risk posed by the hazards of the experiment. The hazardous physical, chemical, and toxic properties of solvents, reactants, catalysts, products, and wastes should be considered as well as circumstances of the experiment – for example, how much is being used, is the right equipment available, can the hazard be controlled or minimized? Are the reactions exothermic or water- or air-sensitive? Are there risks associated, for example, with the use of lasers or equipment utilizing high voltages (electrophoresis)?

Minimize the Risks of Hazards

Based on a risk assessment, experiments should be designed to minimize potential risks. These steps may involve carrying out experiments in a fume hood with a protective shield and wearing protective gloves and goggles. The handling and storage of wastes is a critical component. It is often useful to consider case histories of incidents that have resulted in injury or damage. What could have been done to prevent or minimize such incidents? Discussion can be implemented by giving students a picture of a risky or hazardous environment and then asking them, "What is wrong with this picture?"

Prepare for Emergencies

Since it is essential to react promptly and deliberately to emergencies, students should learn what to do in various emergencies and be prepared to act accordingly – for example, fires, injuries, and spills. Safety devices such as showers, eye washes, fire extinguishers, and spill kits, must be clearly labeled and their use and location known to all those working in a laboratory. Emergency phone numbers, alarms, and escape routes should be clear to everyone.

The Culture of Laboratory Safety

Faculty and staff must be leaders in safety: teaching safety to students, continuously promoting safety, demonstrating the importance of safety through their actions, and accepting responsibility for safety. The Safety Ethic is, above all, a value, stated as: I value safety, work safely, prevent at risk-behavior, promote safety, and accept responsibility for safety. [3] It emphasizes personal responsibility of each person involved. In order for this culture to thrive, everyone must be promoting it. It is, of course, necessary to be familiar with Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), Department of Transportation (DOT), and Department of Energy (DOE) regulations, but responsibility goes beyond simply complying with federal, state and local regulations – it is about caring for the safety of fellow students, faculty, and staff. There are several chemical and laboratory safety resources that can be very useful in building a strong culture of safety.

Curricular Approaches

Laboratory safety education and training is an ongoing process and therefore must be integrated into every laboratory course. In research laboratories, the responsibility for necessary instruction will lie with the research director. Because of time and resource constraints, presentation and discussion may be limited in lab lectures prior to the start of a laboratory or pre-lab assignments.

Three possible approaches are suggested:

1. A seminar course devoted entirely to laboratory safety;
2. Laboratory safety as part of a seminar devoted to chemistry as a profession; and,
3. Online materials where students would be required to do reading and then pass exams, the grades being recorded.

It is very important to emphasize that safety is about learning how to carry out laboratory work safely and not only about rules and regulations, so students are required to think about responsibility for safety in the conduct of their work. It is very important to emphasize that safety is about more than rules and regulations and safety policies. Working safely is a basic responsibility of every employee and every student. Reduce unnecessary risks, insure that regulations are followed by others, and always bring safety concerns to the attention of a supervisor or a departmental safety committee. A departmental safety committee should be established if it does not exist.