

Biology Safety Manual and Laboratory Student Agreement
Science and Health Department
University of Cincinnati-Clermont College

(SH Safety Committee)
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PREFACE

This manual serves as a resource document in compliance with University of Cincinnati (UC) Environmental Health and Safety, accreditation boards, and various state and federal organizations (Environmental, Occupational Health, and Safety).

Laboratories must develop written manuals which include specialized safety procedures, respective to discipline (Allied Health, Biology, and Chemistry), for all facets of laboratory activities.

The UC Clermont College-Science and Health Department will distribute this to the appropriate personnel and incorporate these policies into annual safety training.

The development and revision of detailed, written procedures is essential to establishing consistency, training personnel, and facilitating the recognition and compliance to workplace safety.

Additionally, these protocols are integral to a defensible and demonstrable safety program under the review of OSHA (Occupational Safety and Health Administration) or other agencies.

An effective safety program ensures that functioning policies are established, enforced, and effectively taught and documented.

The development and implementation of UC Clermont College-Science and Health Safety Plan fosters a safer working environment and promotes a reduction of laboratory accidents and injuries.

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Instructor Compliance and Enforcement:

1. It is the responsibility of the instructor to ensure the safety of each person working or volunteering in the laboratory.
2. Instructors must know the laboratory safety guidelines and procedures approved for the Science and Health Department.
3. Instructors must abide by all safety policies and procedures particular to their discipline and laboratory specific agreements.
4. At the start of each semester, instructors must provide and review the safety policies associated with their particular laboratory.
 - a. Provide demonstration/ explanation about the location and use of safety equipment and proper use of laboratory items.
 - b. Review emergency procedures related to a fire emergency, tornado, act of violence, needle stick/ sharps injury, etc.
5. Instructors will ensure compliance with the approved safety policies with all students, volunteers or other people who enter their laboratory.
6. Instructors will document and report any lab-related incident to the laboratory personnel, program coordinator or the department chair.
7. The S&H Department Chair will be responsible for addressing any situation involving non-complaint students, staff, or faculty.
8. The S&H Department Chair will be responsible for enforcing consequences in cases of non-compliance in relation to the approved safety policies.

Laboratory Safety Manual in Biology Area
Science and Health Department- Safety Committee
University of Cincinnati Clermont College

This manual provides general guidelines and basic rules within the biology area to:

- a) encourage awareness of the risks in doing laboratory procedures
- b) promote safe and best practices in the laboratory
- c) protect the wellness and health of students, instructors, and laboratory personnel

All courses involving biological agents must follow guidelines in the University of Cincinnati Biological Laboratory Safety Manual, which contains the minimum precautions and procedures required in Biosafety Levels 1 and 2. Additional references include:

1. University of Cincinnati, Environmental Health and Safety <https://ehs.uc.edu/>
2. Journal of Microbiology and Biology Education, May 2013, p. 78-83.
3. Laboratory Biosafety Manual, 3rd edition; The World Health Organization, 2004.
4. Biohazards in Microbiological and Biomedical Laboratories, 4th edition, Centers for Disease Control and Prevention, 1999.

Agent Risk Group:

The biological and physical nature of human pathogens can be categorized into risk groups (RG) based on the transmissibility, invasiveness, virulence (i.e., ability to cause disease), and the lethality of the specific pathogen. Risk groupings of infectious agents (RG1 through RG4) generally correspond to biosafety levels (BL1 through BL4), which describe containment practices, safety equipment, and facility design features recommended for safe handling of these microorganisms. A parallel series of animal biosafety levels (ABSL1 through ABSL4) applies to handling of infected or potentially infected animals.

1. **Risk Group 1** agents are not associated with disease in healthy human adults (ex. *Bacillus subtilis*, *Escherichia coli* K12, *adeno-associated virus* (AAV)).
2. **Risk Group 2** agents are associated with human disease which is rarely serious; treatment is usually available (ex. *Staphylococcus aureus*, *Salmonella sp.*, *Herpes simplex viruses*, *Adenovirus*).
3. **Risk Group 3** agents are associated with serious or lethal human disease; treatment may be available; low community risk (ex. *Mycobacterium tuberculosis*, *Bacillus anthracis*, *HIV*).
4. **Risk group 4** agents are associated with serious or lethal human disease; treatment is not usually available, high community risk (ex. *Ebola virus*, *Marburg virus*, *Lassa virus*). Not currently permitted for use at the University of Cincinnati.

Personal Protection Requirements:

1. To protect yourself from possible injury, wear safety goggles whenever working with chemicals, burners, or any substance that may damage eyes. DO NOT wear contact lenses in the laboratory; maybe worn in combination with eye protection (goggles).
2. Protective clothing (Lab coat or apron) is required whenever working with chemicals, heated substances, and biological agents (RG2 or BSL2).
3. Tie back long hair when working with chemicals, burners, or other lab equipment.
4. Remove or tie back any loose articles of clothing or jewelry including scarves & bulky shirts or jackets. Shirts should have tight-fitting long sleeves and pants/slacks with socks that cover your ankles. Short skirts are not appropriate – add tights underneath for full protection. Bare midriffs and low-cut necklines are not safe in the lab and will not be allowed.
5. Gloves are required whenever there is the potential for contact with biohazardous materials (RG2 or BSL2) and should never be reused. Do not attempt to wash disposable gloves. Change them when they are dirty, contaminated or ripped. Dispose of properly.

6. Shoes must have closed toes and closed backs. Do not wear sandals or open toed shoes in the laboratory.

General Rules and Standard Laboratory Practices:

1. Conduct yourself in a responsible manner at all times in the laboratory. Never leave your lab activity unattended.
2. All doors must be closed when lab begins.
3. Be sure you understand all procedures in any lab investigation and possible hazards associated with it.
4. Read ALL directions for an investigation several times, and follow directions EXACTLY as they are written. Ask questions if you are not sure how to proceed.
5. Never perform unauthorized experiments.
6. Never handle equipment unless you have specific permission.
7. If spills occur, notify your instructor immediately.
8. No eating, drinking, smoking, applying make-up, and no mouth pipetting.
9. Notify your instructor of any medical conditions you may have, such as pregnancy, allergies, asthma, or epilepsy. It is recommended that you discuss your condition with your family physician for guidance and monitoring. Be sure your instructor has your emergency contact information.
10. Keep your laboratory area clean. Store bags, packs & purses in appropriate places and off the lab tables. Do not handle electronic devices, phones or keys while working in the lab without the permission of your instructor or lab supervisor.
11. Be sure to clean your area thoroughly 5-10 minutes before the end of the class and keep the lab space clean for the next class period. Wipe down the counters, put away all equipment in clean, cool & dry condition. Wash your hands before leaving the lab area.
12. The location of exits, safety showers, eye wash, fire extinguishers and the nearest telephone (emergency) should be ascertained before beginning work.

First Aid:

1. Report all accidents, spills or broken glassware & equipment, no matter how minor, to your instructor immediately.
2. Know location of safety equipment & proper use.
3. Complete and submit appropriate incident report form for each incident that occurs during lab time. The form can be completed online on the EH&S website at <https://ehs.uc.edu/Accident/newform.asp> or the form can be downloaded for completion offline at <https://ehs.uc.edu/forms>.

Kitchen Space:

1. The kitchen area is to be used for preparing course materials and teaching purposes.
2. Keep all apparatus (such as measuring cups and spoons, blenders, knives, cutting boards, strainers, etc.) in the kitchen area and do not remove them from the kitchen area.
3. The kitchen apparatus, stove and ice makers are to be used as teaching tools and not to be used for preparation of food and drink for personal consumption.
4. The stove is used for media preparation and other lab procedures. It must be turn off after its use.
5. Autoclave is for sterilization of media and lab apparatus. No autoclaving of cultures (microorganisms).
6. Refrigerators in the kitchen area are not to be use for culture (microorganisms) storage. Storage of cultures requires use of the culture storage space in MCDONH room 248 or 252.
7. No preserved animals are allowed in the kitchen area. They must be placed in the plastic storage container either in the laboratory or in the storage room (MCDONH room 248 or 252).

Heating and Fire Safety:

1. Never use a heat source without wearing safety goggles.
2. Never heat a chemical you are not instructed to heat.
3. Maintain a clean, uncluttered work area.
4. Never reach across a flame. Do not leave a lighted burner or other heat source unattended. Turn it off before walking away, or ensure your partner is tending the experiment.
5. Use a hot plate instead of an open flame when flammable material is present.
6. Do not point a test tube or bottle that is being heated at yourself or others. Do not heat directly on the bottom in a fixed place. Move the test tube thru the heat source to avoid hot spots.
7. Never heat a liquid in a closed container.
8. Never pick up a heated container bare handed.
9. Do not dispose egg yolks, pieces of chromatography paper, or other solids into the sink. Follow chemical disposal directions for chemical solids.
10. Never look directly into a laser beam. Doing so can cause permanent eye damage. Always wear UV filtering safety glasses when looking at DNA gels on the UV light.
11. Turn off all burners before leaving the laboratory. Check that the gas line leading to the burner is off as well.

Using Microorganisms and Stock Cultures:

1. Wash hands upon entering and before exiting the laboratory. Hand washing is performed by washing with soap and water, and dry with paper towels.
2. Always observe proper aseptic technique as directed by your instructor.
3. Do not touch the face or bite nails during laboratory work.
4. Disinfect working areas before and after the laboratory session with disinfectant (70% alcohol) known to kill the organisms handled.
5. Instructor will inform students of safety precautions relevant to each exercise before beginning the exercise.
6. Instructor must emphasize to students the importance of reporting accidental spills and exposures.

Using Chemicals Safely:

1. Chemicals must be mixed only following the experimental procedure and only when the instructor is present.
2. Never touch, taste, or smell a chemical unless instructed to do so by your instructor. Keep your hands away from your face when working with chemicals.
3. If instructed to note the fumes in an investigation, waft the fumes away from the container towards your nose. Do not inhale fumes directly from the container.
4. If fumes are potentially dangerous, conduct procedure in a well ventilated fume hood.
5. Notify your instructor IMMEDIATELY if chemicals are spilled.
6. Dispose of all chemicals as directed by your instructor.
7. Always use the pipets provided with reagent bottles to avoid contamination of reagents.
8. Use extra caution when working with acids or bases. Pour over a sink or container, not over the lab table.
9. When diluting acids, ALWAYS pour acid into water to dissipate the heat produced. NEVER pour water into a concentrated acid.
10. Become familiar with safety precautions for each chemical to be used in an experiment. Know where eye-wash stations and fire safety equipment are located, as well as proper use.

Using Glassware:

1. Never force glass tubing into a rubber stopper. Use a lubricant such as glycerin to make the glass slide in easier.

2. Use a wire screen to protect glassware from any flame.
3. Test glassware to be sure it is not hot before picking it up.
4. Never use broken or chipped glassware. If glassware breaks, notify your instructor and dispose of the glassware in the proper broken glass container.
5. Never eat or drink from laboratory glassware. Do not eat or drink in the laboratory.
6. Clean glassware thoroughly before putting it away and wet glassware should be put into the strainers to dry.

Using Sharp Instruments:

1. Never cut material toward you; cut away from you.
2. Notify your instructor immediately if you cut yourself or receive a cut.

Use Common Sense:

1. Use common sense. This is not a complete list of all safety instructions but is intended as a guide. Never jeopardize yourself, anyone around you or the lab facilities with your actions or inactions. If in doubt, ask your instructor.

Evacuation and Emergency Situations*:

1. Familiarize yourself with the evacuation routes and the nearest exits.
2. When the building alarm sounds all must evacuate via the nearest designated emergency exit and proceed to the designated assembly areas located at:
Peters-Jones: Campus Commons (Front)
Synder: Campus Commons (Front) or Hillside Picnic Area (Back)
Education Services (MCDONH): Campus Commons (Front)
Student Services: Campus Commons (Front) or East Parking Lot (Tree Line)
Student Activity Center: South Parking Lot (Tree Line)
West Woods Academic Center: Campus Commons (Front)
3. Follow directions given to you by your instructor, supervisor, manager, and/ or emergency officer.
4. During emergency power shut down, the power sources should be shut off (heaters, agitation equipment, motor, vacuum pumps, UV lamps, and any electrical equipment). Do not work with chemicals or equipment under emergency lighting.
5. In case of a fire, immediately evacuate the building through the nearest exit route. Do not use elevators. Assist disabled persons in exiting the building.

*See Clermont College Emergency Policies and Procedure

Documentation of Practices:

1. Requires students to sign Laboratory Student Agreements at the start of each semesters.
2. Prepare and keep laboratory attendance sheet.
3. Make Material Safety Data Sheets (MSDS) available at all times. After June 1, 2016, these will be Safety Data Sheets (SDS).

Biology Laboratory Student Agreement

All students registered for a Biology lab section are responsible for reading, reviewing and signing the safety policies each semester. The rules are designed to give you and fellow students a safe and educational lab experience. Most accidents or injuries can be prevented by using common sense and following the policies listed below. Violation of the agreement could result in removal from the lab.

Laboratory Policies:

1. Never enter the laboratory without the presence of the laboratory instructor, laboratory staff, or other laboratory personnel who have attended safety training.
2. Proper apparel must be worn by all students in the laboratory. No open-toed shoes, shorts, short skirts or halters will be tolerated. If students come to lab wearing inappropriate apparel, they will be asked to cover exposed area or leave.
3. Splash resistant, indirect vent goggles must be brought to ALL laboratories and worn when instructed. They must be purchased and worn by the second lab meeting. Safety glasses are not acceptable and must meet ANSI standard Z871.1-198. Please inform your instructor and lab partner if you wear contact lenses.
4. Food, drinks, candy, and gum must not enter the laboratory. Food and drink is to be left outside the lab. This includes capped bottled water and soft drinks.
5. Students must be in control of all faculties to participate in the laboratory. If a student is deemed by the instructor, to be impaired in some way the student will not be allowed to complete the lab and will be asked to leave.
6. Please report any accidents/injuries/spills immediately to your instructor. The instructor will determine the best way to address the problem.
7. Students must familiarize themselves with the safety equipment in the laboratory. Fire extinguishers, eyewash, safety shower, spill kits, and fire exits.
8. Broken glassware should be swept up with a broom and dust pan and placed in the "Glass Breakage Box". Never place broken glass in the regular garbage can.
9. Chemicals must be mixed only following the experimental procedure and not arbitrarily.
10. Do not remove chemicals from the laboratory.
11. Never leave lab experiments unattended.
12. Cell phones should not be used in the laboratory without the permission of your instructor or lab supervisor.
13. Avoid contamination of reagents. Always use the pipets provided with reagent bottles.
14. When using strong acids, bases, or organic solvents gloves must be worn. If asked to note an odor, gently waft the vapors to observe the smell.
15. When using biological agents/microorganisms in the lab, perform proper handwashing (soap and water) before and after each laboratory exercise, observe aseptic techniques, and disinfect bench before and after the laboratory session with 70% alcohol solution.
16. Gloves are required whenever there is potential for contact with biohazardous materials and should never be reused.
17. Deliberate misuse of instruments or disturbing behavior may result in disciplinary action.
18. Students may not enter the chemical stockroom unless accompanied by an instructor or lab staff.
19. Chemicals must be disposed of in the appropriate waste container and must never be put down the drain without the approval of the instructor. The instructor will direct students concerning proper waste disposal.

20. All heating sources must be turned off and unplugged at the end of each lab period. (i. e. hotplates, Bunsen burners, and sand baths).
21. Student's hands, the lab bench and any equipment should be washed or wiped down at the end of each lab period. This includes hot plates, balances, and any other equipment used. The lab space must be clean and ready for the next class period.
22. Follow any other safety rules given in the lab protocols or issued by your laboratory instructor.
23. When building alarm sounds all must evacuate via the nearest designated emergency exit and proceed to the designated assembly area.
24. In case of a fire, immediately evacuate the building through the nearest exit route. Do not use elevators. Assist disabled persons in exiting the building.

Student Agreement:

I have read and agree to follow the Biology Lab Student Agreement. I am aware that the instructor and /or laboratory staff has the right to report on or remove me from the laboratory if I fail to adhere to these policies. Furthermore, I understand that my instructor may deduct points for failure to obey these laboratory policies

Print Name: _____

Signature: _____ Date: _____

_____ I wear contact lenses.