

Biosafety Guidelines

Biosafety Level 1 Laboratory

Biosafety Level 1 is suitable for work involving well-characterized agents not known to consistently cause disease in immunocompetent adult humans, and present minimal potential hazard to laboratory personnel and the environment. Laboratory personnel must have specific training in the procedures conducted in the laboratory and must be supervised by a scientist with training in microbiology or a related science.

The following standard practices, safety equipment, and facility requirements apply to BSL-1.

A. Standard Microbiological Practices

1. **Controlled access**
The laboratory supervisor must enforce the access to the laboratory is controlled. Lab doors should be closed at all times and when no one is present in the lab, doors should be locked.
2. **Handwashing**
Persons must wash their hands with soap and water after working with potentially infectious materials. Hands should also be washed before leaving the laboratory and before touching common use surfaces. Be especially careful not to inadvertently touch the face or eyes with unwashed hands.
3. **Eating, drinking, handling contact lenses, and applying cosmetics**
Eating, drinking, handling contact lenses, applying cosmetics and storing food for human consumption is not permitted in laboratory areas. Food must be stored outside the laboratory area in cabinets or refrigerators designated and used for this purpose.
4. **Smoking**
Smoking is prohibited in all campus buildings including Sims. Smoking is permitted on campus grounds in designated smoking areas only.
5. **Pipetting**
Mechanical pipetting devices must be available and used. Mouth pipetting is prohibited.
6. **Safe handling of sharps**
Careful management of needles and other sharps are of primary importance.
 - Students should be trained in safe sharps handling procedures by their research mentor.
 - Use disposable sharps devices whenever possible.
 - Do not bend, break, or recap needles.
 - Used disposable needles and syringes must be carefully placed in conveniently located puncture-resistant containers used for sharps disposal.
 - Broken glassware must not be handled directly. Instead, it must be removed using a brush and dustpan, tongs, or forceps. Plastic ware should be substituted for glassware whenever possible.
7. **Minimize splashes and aerosols**
Perform all procedures in a manner which will minimize the creation of splashes and/or aerosols. To help minimize splashes and aerosols, centrifuge tubes must have caps and the rotor

must be covered with the lid. Additionally, mechanical pipettors, and/or conducting work inside of a biological safety cabinet will help minimize splashes and aerosols.

8. Decontaminate work surfaces

Work surfaces must be decontaminated after completion of work and after any spill or splash of potentially infectious material with appropriate disinfectant (70% ethanol or 10% bleach solution).

9. Door signage

A sign incorporating the universal biohazard symbol must be posted at the entrance to the laboratory when infectious agents are present. The sign may include the name of the agent(s) in use, and the name and phone number of the laboratory supervisor or other responsible personnel. Laboratory doors must have general contact information including the PI's name, office number and office phone.

10. Decontamination of waste

Decontaminate all cultures, stocks, and other potentially infectious materials before disposal using an effective method, such as autoclaving. Refer to Biohazard Waste Procedures below for additional information regarding proper decontamination of biohazardous waste. Depending on where the decontamination will be performed, the following methods should be used prior to transport.

- Materials to be decontaminated outside of the immediate laboratory must be placed in a durable, leak proof container and secured for transport.
- Materials to be removed from the facility for decontamination must be packed in accordance with applicable local, state, and federal regulations.

11. Pest management program

A pest management program is managed through Facilities Management. If you a problem in your lab, contact the Department's Instrumentation Manager who will contact Facilities Management.

12. Training

Students

- ❖ Students must receive general laboratory safety training as administered by the Chemistry Department. Records will be maintained by the Department's Chemical Hygiene Coordinator.
- ❖ Students will be farther trained by their research mentors. Research mentors are responsible for ensuring that students have been adequately trained and must maintain documentation of such training.
- ❖ All students are required to take a yearly safety quiz covering both general laboratory safety and biosafety topics.

Faculty and staff

- ❖ Faculty and stall must complete biosafety training provided by the CITI program. Instructions for completing CITI compliance training can be found at <https://www2.winthrop.edu/spar/IRB%20Trng%20Instr.htm>. The Director of SPAR

will maintain a record of all researchers having completed CITI Training and will send out renewal notices for refresher training within 90 days of expiration of the training certificate. CITI Training certificates will be valid for three years after the completion date of the training.

- ❖ Faculty mentors must also provide annual updates or additional training when procedural or policy changes occur. Personal health status may impact an individual's susceptibility to infection, ability to receive immunizations or prophylactic interventions. Therefore, all laboratory personnel and particularly women of childbearing age should be provided with information regarding immune competence and conditions that may predispose them to infection. Individuals having these conditions should be encouraged to self-identify to the institution's healthcare provider for appropriate counseling and guidance.

B. Safety Equipment (Primary Barriers and Personal Protective Equipment)

1. Personal protective equipment (PPE)
 - Protective laboratory coats are recommended to prevent contamination of personal clothing.
 - Splash goggles must be worn when there is the potential for splashes of microorganisms or hazardous materials. Personnel who wear contact lenses in laboratories must also wear eye protection.
 - Gloves must be worn to protect hands from exposure to hazardous materials. Glove selection should be based on an appropriate risk assessment. Alternatives to latex gloves should be available. Wash hands prior to leaving the laboratory. In addition, BSL-1 workers should:
 - ❖ Change gloves when contaminated, glove integrity is compromised, or when otherwise necessary.
 - ❖ Remove gloves and wash hands when work with hazardous materials has been completed and before leaving the laboratory.
 - ❖ Do not wash or reuse disposable gloves. Dispose of used gloves with other contaminated laboratory waste. Hand washing protocols must be rigorously followed.

C. Laboratory Facilities (Secondary Barriers)

1. Doors
Laboratories should have doors for access control and should be kept locked when no one is present in the laboratory.
2. Sink
Laboratories must have a sink for hand washing and supplied with soap and paper towels.
3. Laboratory Cleaning
The laboratory should be designed so that it can be easily cleaned. Carpets and rugs in laboratories are not appropriate.
4. Laboratory furniture

Laboratory furniture must be capable of supporting anticipated loads and uses. Spaces between benches, cabinets, and equipment should be accessible for cleaning. Bench tops must be impervious to water and resistant to heat, organic solvents, acids, alkalis, and other chemicals. Chairs used in laboratory work must be covered with a non-porous material that can be easily cleaned and decontaminated with appropriate disinfectant.

5. Laboratory windows

Laboratory windows that open to the exterior should be fitted with screens.

6. Laboratory waste

All biohazardous laboratory waste must be properly decontaminated before disposal. The following biohazard waste procedures must be followed when decontaminating biohazard waste:

Biohazard Waste Procedures

- ❖ All biohazard waste is doubled bagged in autoclave bags and taped with autoclave tape.
- ❖ The biohazard waste must then be autoclaved on the waste cycle. If the autoclave indicator tape changed colors, then the autoclaved waste bag is placed in a dark, plastic garbage bag, sealed with regular tape and disposed with the regular waste stream.
- ❖ If the autoclave indicator tape did not change colors, the waste must be run through another waste cycle. If the indicator tape did not change colors after the second waste cycle, the autoclave must be serviced by a trained technician.

Biosafety Level 2 Laboratory

Biosafety Level 2 is suitable for work involving agents that pose moderate hazards to personnel and the environment. It differs from BSL-1 in that: 1) laboratory personnel have specific training in handling pathogenic agents and are supervised by scientists competent in handling infectious agents and associated procedures; 2) access to the laboratory is restricted when work is being conducted; and 3) all procedures in which infectious aerosols or splashes may be created are conducted in biological safety cabinets or other physical containment equipment.

A. Standard Microbiological Practices

1. Controlled access

The laboratory supervisor must enforce the access to the laboratory is controlled. Lab doors should be closed at all times and when no one is present in the lab, doors should be locked.

2. Handwashing

Persons must wash their hands with soap and water after working with potentially infectious materials. Hands should also be washed before leaving the laboratory and before touching common use surfaces. Be especially careful not to inadvertently touch the face or eyes with unwashed hands.

3. Eating, drinking, handling contact lenses, and applying cosmetics

Eating, drinking, handling contact lenses, applying cosmetics and storing food for human consumption is not permitted in laboratory areas. Food must be stored outside the laboratory area in cabinets or refrigerators designated and used for this purpose.

4. Smoking

Smoking is prohibited in all campus buildings including Sims. Smoking is permitted on campus grounds in designated smoking areas only.

5. Pipetting

Mechanical pipetting devices must be available and used. Mouth pipetting is prohibited.

6. Safe handling of sharps

Careful management of needles and other sharps are of primary importance.

- ❖ Students should be trained in safe sharps handling procedures by their research mentor.
- ❖ Use disposable sharps devices whenever possible.
- ❖ Do not bend, break, or recap needles.
- ❖ Used disposable needles and syringes must be carefully placed in conveniently located puncture-resistant containers used for sharps disposal.
- ❖ Broken glassware must not be handled directly. Instead, it must be removed using a brush and dustpan, tongs, or forceps. Plastic ware should be substituted for glassware whenever possible.

7. Minimize splashes and aerosols

Perform all procedures in a manner which will minimize the creation of splashes and/or aerosols. To help minimize splashes and aerosols, centrifuge tubes must have caps and the rotor must be covered with the lid. Additionally, mechanical pipettors, and/or conducting work inside of a biological safety cabinet will help minimize splashes and aerosols.

8. Decontaminate work surfaces

Work surfaces must be decontaminated after completion of work and after any spill or splash of potentially infectious material with appropriate disinfectant (70% ethanol or 10% bleach solution).

9. Decontamination of waste

Decontaminate all cultures, stocks, and other potentially infectious materials before disposal using an effective method, such as autoclaving. Refer to **Biohazard Waste Procedures** below for additional information regarding proper decontamination of biohazardous waste. Depending on where the decontamination will be performed, the following methods should be used prior to transport.

- Materials to be decontaminated outside of the immediate laboratory must be placed in a durable, leak proof container and secured for transport.
- Materials to be removed from the facility for decontamination must be packed in accordance with applicable local, state, and federal regulations.

10. Door signage

A sign incorporating the universal biohazard symbol must be posted at the entrance to the laboratory when infectious agents are present. Posted information must include: the laboratory's biosafety level, the Laboratory Biosafety Level Criteria: BSL-2 35, faculty's name, telephone number and required procedures for entering and exiting the laboratory. Laboratory doors must have general contact information including the PI's name, office number and office phone.

11. Pest management program

A pest management program is managed through Facilities Management. If you a problem in your lab, contact the Department's Instrumentation Manager who will contact Facilities Management.

12. Training
Students

- ❖ Students must receive general laboratory safety training as administered by the Chemistry Department. Records will be maintained by the Department's Chemical Hygiene Coordinator.
- ❖ Students will be farther trained by their research mentors. Research mentors are responsible for ensuring that students have been adequately trained and must maintain documentation of such training.
- ❖ All students are required to take a yearly safety quiz covering both general laboratory safety and biosafety topics.

Faculty and staff

- ❖ Faculty and stall must complete biosafety training provided by the CITI program. Instructions for completing CITI compliance training can be found at <https://www2.winthrop.edu/spar/IRB%20Trng%20Instr.htm>. The Director of SPAR will maintain a record of all researchers having completed CITI Training and will send out renewal notices for refresher training within 90 days of expiration of the training certificate. CITI Training certificates will be valid for three years after the completion date of the training.
- ❖ Faculty mentors must also provide annual updates or additional training when procedural or policy changes occur. Personal health status may impact an individual's susceptibility to infection, ability to receive immunizations or prophylactic interventions. Therefore, all laboratory personnel and particularly women of childbearing age should be provided with information regarding immune competence and conditions that may predispose them to infection. Individuals having these conditions should be encouraged to self-identify to the institution's healthcare provider for appropriate counseling and guidance.

B. Special Practices

13. Laboratory entrance

Anyone entering the laboratory must be made aware of the potential hazards and meet specific entry/exit requirements (PPE requirements, immunization requirements, etc.).

14. Medical surveillance

Laboratory personnel must be provided medical surveillance, as appropriate, and offered available immunizations for agents handled or potentially present in the laboratory.

15. Laboratory specific biosafety manual
A laboratory-specific biosafety manual must be prepared by the PI and include information that is specific to the laboratory. The biosafety manual must be available and accessible.
16. Training
The laboratory supervisor must ensure that laboratory personnel demonstrate proficiency in standard and special microbiological practices before working with BSL-2 agents.
17. Containers for potentially infectious materials
Potentially infectious materials must be placed in a durable, leak proof container with a lid during collection, handling, processing, storage, or transport within a facility. Containers must be properly labeled with its contents and a biohazard symbol.
18. Decontamination of laboratory equipment
Laboratory equipment should be routinely decontaminated, as well as, after spills, splashes, or other potential contamination. Spills involving infectious materials must be contained, decontaminated, and cleaned up by staff properly trained and equipped to work with infectious material. Equipment must be decontaminated before repair, maintenance, or removal from the laboratory.
19. Non-research related animals and plants in the laboratory
Animals and plants not associated with the work being performed are not permitted in the laboratory.
20. Aerosol generating procedures
All procedures involving the manipulation of infectious materials that may generate an aerosol should be conducted within a BSC or other physical containment devices.
21. Exposure incidents
Incidents that may result in exposure to infectious materials must be immediately evaluated and treated according to the following procedures. All such incidents must be reported to the laboratory supervisor. Medical evaluation, surveillance, and treatment should be provided and appropriate records maintained.

What to do in the Event of an Exposure

When an exposure incident occurs, immediate action is essential. Follow these guidelines:

1. **Flush exposed area with water for 15 minutes.** If your eyes were exposed, rinse eyes in an eyewash station for 15 minutes holding your eyelids open. If you skin was exposed, wash with soap and water and continue to rinse with water for 15 minutes.
2. **Notify your research advisor immediately.**
3. **Report all exposure incidents according to the following guidelines and inform medical personnel what infectious agent was involved:**

Incidents involving employees:

- ❖ In the event that an employee was exposed or potentially exposed to a hazardous chemical or biological agent or sustained an injury on the job, the chair must be immediately informed as to the situation. In the event that the chair is not available, the incident must be reported to the department's secretary or the safety coordinator. Accidents during evening classes must be reported to public safety 323-3333.
- ❖ When medical treatment is needed, the supervisor must contact Compendium Services at 877-709-2667 to file a First Report of Injury and to receive authorization for treatment. All non-emergency medical treatment must be pre-approved by Compendium Services. Medical treatment is provided by: Occumed at Riverview Medical Center, 1393 Celanese Road, Rock Hill, SC 29732, 803-327-0033
- ❖ The PI must also report the injury or illness to Thadd Bridges, Workers' Compensation Administrator at 323-2392.

Incidents involving students:

- ❖ Notify the chair of the department immediately. If the chair is unavailable, the incident must be reported to the department's secretary or the department's safety coordinator.
- ❖ Incidents during evening classes must be reported to public safety at 323-3333.
- ❖ For minor incidents, the student must go to Crawford Health Services. The student's supervisor (or a designated University representative) should accompany them to ensure the student makes it safety.

C. Safety Equipment (Primary Barriers and Personal Protective Equipment)

1. Biological safety cabinet

Properly maintained BSCs, other appropriate personal protective equipment, and/or other physical containment devices must be used whenever:

- a. Procedures with a potential for creating infectious aerosols or splashes are conducted. These may include pipetting, centrifuging, grinding, blending, shaking, mixing, sonicating, opening containers of infectious materials, inoculating animals intranasally, and harvesting infected tissues from animals or eggs.
- b. High concentrations or large volumes of infectious agents are used. Such materials may be centrifuged in the open laboratory using sealed rotor heads or centrifuge safety cups.

2. Personal protective equipment

Protective laboratory coats designated for laboratory use must be worn while working with hazardous materials. Remove protective clothing before leaving the laboratory. Lab coats are laundered through the department's lab coat program. Disposable protective clothing must be disposed of with other contaminated waste.

Splash goggles must be worn when there is the potential for splashes of microorganisms or hazardous materials. Personnel who wear contact lenses in laboratories must also wear eye protection.

Gloves must be worn to protect hands from exposure to hazardous materials. Glove selection should be based on an appropriate risk assessment. Alternatives to latex gloves

should be available. Wash hands prior to leaving the laboratory. In addition, BSL-2 workers should:

- ❖ Change gloves when contaminated, glove integrity is compromised, or when otherwise necessary.
- ❖ Remove gloves and wash hands when work with hazardous materials has been completed and before leaving the laboratory.
- ❖ Do not wash or reuse disposable gloves. Dispose of used gloves with other contaminated laboratory waste. Hand washing protocols must be rigorously followed.

D. Laboratory Facilities (Secondary Barriers)

1. Doors

Laboratory doors should be self-closing. Doors must be kept closed when work is in progress and kept locked when no one is presenting the laboratory.

2. Sink

Laboratories must have a sink for hand washing and supplied with soap and paper towels.

3. Laboratory Cleaning

The laboratory should be designed so that it can be easily cleaned. Carpets and rugs in laboratories are not appropriate.

4. Laboratory furniture

Laboratory furniture must be capable of supporting anticipated loads and uses. Spaces between benches, cabinets, and equipment should be accessible for cleaning. Bench tops must be impervious to water and resistant to heat, organic solvents, acids, alkalis, and other chemicals. Chairs used in laboratory work must be covered with a non-porous material that can be easily cleaned and decontaminated with appropriate disinfectant.

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Laboratories windows that open to the exterior should be fitted with screens.

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Biohazard Waste Procedures

- ❖ All biohazard waste is double bagged in autoclave bags and taped with autoclave tape.
- ❖ The biohazard waste must then be autoclaved on the waste cycle. If the autoclave, indicator tape changed colors, then the autoclaved waste bag is placed in a dark, plastic garbage bag, sealed with regular tape and disposed with the regular waste stream.
- ❖ If the autoclave indicator tape did not change colors, the waste must be run through another waste cycle. If the indicator type did not change colors after the second waste cycle, the autoclave must be serviced by a trained technician.

7. Biological safety cabinets (BSC)

BSCs must be installed so that fluctuations of the room air supply and exhaust do not interfere with proper operations. BSCs should be located away from doors, windows that can be opened, heavily traveled laboratory areas, and other possible airflow disruptions. BSCs must be inspected and certified to manufacture specifications by an outside agency on a yearly basis. Each BSC must be identified with a certification date which must be displayed on the hood. Yearly certification of all BSC will be initiated by the Chemistry Instrumentation Manager.

8. Vacuum lines

Vacuum lines should be protected with liquid disinfectant traps.

9. Eyewash stations

An eyewash station must be readily available.

10. Exhaust air from Class II BSC

HEPA filtered exhaust air from a Class II BSC can be safely recirculation back into the laboratory environment if the cabinet is tested and certified at least annually and operated according to manufacturer's recommendations. BSCs can also be connected to the laboratory exhaust system by either a thimble (canopy) connection or directly exhausted to the outside through a hard connection. Provisions to assure proper safety cabinet performance and air system operation must be verified.