



BIOSAFETY TRAINING

Scope

This SOP applies to all work at UNL that is subject to the **UNL Biosafety Guidelines**. The content of this SOP is based on training requirements established under the following standards:

- NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines), National Institutes of Health
- Biosafety in Microbiological and Biomedical Laboratories (BMBL), Centers for Disease Control and National Institutes of Health
- Bloodborne Pathogens Standard, 29 CFR 1910.1030, Occupational Safety and Health Administration

This information can be used by Principal Investigators (PIs) to develop a compliant training plan for workers under their supervision. This SOP is primarily intended for laboratory operations conducted under biosafety containment levels 1 and 2. Additional and specific training requirements apply to work with select agents and/or work conducted at biosafety containment level 3, which are beyond the scope of this SOP. Consult with the UNL Biosafety Officer for guidance on training applicable in these special circumstances.

Training must be completed upon initial assignment in a lab. Repetition of one or more of the training modules described may be required if one of the following situations occurs:

- When procedures or policy changes occur or new hazards are introduced that render previous training incomplete or obsolete.
- When observations of the employee's skills or knowledge indicate that prior training was insufficient or not retained.
- When deemed necessary by the IBC or Biosafety Officer

Required Biosafety Training Modules

Biosafety training at UNL is composed of four (4) primary modules available online at <http://ehs.unl.edu> or as an instructor-led course. All individuals working in laboratories that are handling materials covered by the **UNL Biosafety Guidelines** are required to take appropriate biosafety training. These courses should be taken in the order listed below and as applicable to the work being performed.

(1) Biosafety 100: Research Compliance (All Bio Labs)

This comprehensive training module covers the regulatory compliance aspects of work with biological materials at UNL. The roles and responsibilities of various stakeholders on campus are introduced as well as the role and responsibility of the Institutional Biosafety Committee (IBC), the faculty committee that reviews most biological research on campus. The training provides an overview of the regulations that apply to work with all biological agents subject to UNL's Biosafety Guidelines (including but not limited to recombinant and synthetic nucleic acids) and describes the application and review process for research protocols submitted to the IBC.

(2) Biosafety 101 (All Bio Labs)

Lab personnel who work at BSL-1 and/or ABSL-1 or higher containment must take the **Biosafety 101** training module prior to beginning work. If you work at BSL-2 or higher containment, you must also complete the **Biosafety 201** module described below.

(3) Biosafety 201 (BSL-2 and ABSL-2)

All personnel working in labs operating at BSL-2 and/or ABSL-2 containment or higher must take the **Biosafety 201** training module following completion of the **Biosafety 100** and **Biosafety 101** modules and prior to beginning work in the lab. This training should be supplemented with lab-specific instruction by the PI or designee (as described in the **Lab-Specific Training** section below).

(4) Bloodborne Pathogens Training

Lab workers and other employees who work with or are exposed to human materials including human cell lines, tissues, organs, and certain body fluids (blood, semen, vaginal fluid, cerebrospinal fluid, etc.) or certain Bloodborne pathogens (HIV and Hepatitis B) are required to enroll in the UNL Bloodborne Pathogens (BBP) program and take OSHA *Bloodborne Pathogens* training. This training is available at: <http://ehs.unl.edu/>. OSHA's Bloodborne Pathogen Standard requires annual re-training. Therefore, all staff enrolled in the UNL BBP program must complete the EHS web-based **Bloodborne Pathogens** training module each year. **Refer to the UNL Exposure Control Plan** (<http://ehs.unl.edu/documents/bloodborne-pathogens>) for more details about this program.

Supplemental Training Modules

Autoclave Training

All laboratory personnel that operate autoclaves on campus are encouraged to take the EHS online autoclave training module. This module introduces autoclave function and operating principles in addition to best practices and procedures related to participation in the EHS autoclave verification program. The EHS SOP, **Autoclave Operation and Use** has more information about autoclave operation. There is also a video resource available on Autoclave Operation on the EHS website (<http://ehs.unl.edu>) under Training>Video Resources.

Lab-specific Training (All Labs)

The laboratory-specific biosafety manual forms the basis for lab-specific training (See EHS SOP, **Preparing a Laboratory Biosafety Manual**). Reading the manual is imperative. However, hands-on demonstration of proficiency is also important. The PI is responsible to ensure that all laboratory workers receive adequate training. EHS will review documentation of initial lab-specific training. A training log template is provided in Appendix A-2.

Lab-specific training must be conducted at the following frequency:

- **Upon initial assignment**
- **In response to one of the following:**
 - When procedures or policy changes occur or new hazards are introduced that render previous training incomplete or obsolete.
 - When observations of the employee's skills or knowledge indicate that prior training was insufficient or not retained.
 - When deemed necessary by the IBC or Biosafety Officer.

Topics to include in lab-specific training:

Some of these topics may not apply to a specific lab, but the relevant topics must be covered in lab specific training.

1. **Agent Hazard Information:** Potential hazards posed by the agent in use, as well as personal health conditions that may affect an individual's susceptibility to infection. This information is generally captured in the risk assessment conducted in support of the protocol, which is reviewed by the Institutional Biosafety Committee (IBC). A copy of the approved protocol must be included in the laboratory-specific biosafety manual. Agent hazard information for some human pathogens can be found at the following web site: Public Health Agency of Canada - <https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment.html>.

2. **Medical Surveillance:** Instruction on specific medical qualification, testing, or surveillance that is required as a condition of the IBC's approval of the protocol, and the basis/reasoning for such requirements. This information is generally captured in the approved protocol.
3. **Lab Security and Access Restrictions:** Instruction/guidance relative to laboratory access restrictions, as well as specific entry, exit, and security policies and procedures. This information is generally captured in the protocol that is reviewed by the IBC and documented on the laboratory door placard. The EHS SOP, ***Door Postings for Potentially Hazardous Locations***, provides explanatory information.
4. **Lab-specific Procedures:** PIs must provide laboratory workers with access to written, relevant, and laboratory-specific procedures by including these in the laboratory-specific biosafety manual. In the case of inexperienced workers, a progression of work activities must be assigned as techniques are learned and proficiency is demonstrated with standard and special microbial practices, aseptic technique, and lab-specific procedures and protocols.
5. **Decontamination and Disposal Methods:** Lab workers must be trained in the proper methods for decontamination and disposal of biohazardous waste. Refer to the EHS SOP, ***Disposing of Biohazardous Materials Including Recombinant Nucleic Acids***, for guidance on this topic. This training should also include instruction in proper operation of the autoclave (if applicable). See the EHS SOP, ***Autoclave Operation and Use*** and prior discussion regarding the EHS on-line training module, ***Autoclave Operation***.
6. **Personal Protective Equipment (PPE):** Instruction on the proper use, care, maintenance, and limitations of assigned and appropriate PPE based on the tasks conducted by an individual.
7. **Containment Equipment Operation:** Proper use of containment equipment, including but not limited to biosafety cabinets. Refer to the EHS SOPs, ***Biosafety Cabinets*** and ***Working in a Biosafety Cabinet***. EHS also provides an on-line training video, ***Biosafety Cabinets*** (<http://ehs.unl.edu> under Training>Video Resources).
8. **Emergency procedures:** All lab workers should know what to do in case of a spill of biological materials and exposure to a biological agent. Refer to the EHS SOP, ***Spill and Exposure Response for Biohazardous Materials (including Recombinant and Synthetic Nucleic Acids)***.

Annual Refresher Training

(1) General Biosafety

Refresher training in biosafety topics is **required annually** for all biological lab workers. Refresher training is intended to prevent complacency in lab safety and improve the culture of safety in all bio labs on campus. This requirement can be met in several ways; below are some examples of acceptable refresher training.

- Complete the ***Biosafety Refresher Training*** module online at ehs.unl.edu
 - *This online module covers common safety issues observed in labs as well as special topics. EHS will update the annual refresher training every October, therefore the content will change each year.*
- Request EHS staff members to conduct instructor-led training at a location of your choice in a biosafety topic that is particularly relevant to your laboratory.
- Hold a meeting with laboratory workers:
 - review relevant lab-specific or EHS procedures; and/or
 - discuss a relevant near miss incident or laboratory acquired infection and lessons learned (this could be an incident that occurred anywhere);
 - Watch a safety video as a lab. A curated YouTube playlist of biosafety-related videos is available at this address: <https://go.unl.edu/zp39> or by scanning the QR code to the right.



The training will be most beneficial when it is lab-specific and relevant to the work conducted in the lab. If any of the non-EHS-facilitated options above are chosen, the training **must** be documented by recording the date of training, attendees and the content of the training. The training log template in **Appendix B** of this SOP can be used for that purpose or you can create your own documentation.

(2) Bloodborne Pathogens

The OSHA Bloodborne Pathogen Standard requires re-training on an annual basis. This is accomplished by completing the EHS Bloodborne Pathogen web-based training module each year. EHS can also provide instructor-led training, upon request.

Additional Considerations

Additional information on many of these items can be found on the EHS website at <http://ehs.unl.edu>

1. Use of a respirator requires full participation in UNL's Respiratory Protection Program, which includes medical qualification, annual training, and fit testing. Training is accomplished via EHS.
2. All laboratory workers should complete EHS Core Training, which includes the following web-based modules: **Injury and Illness Prevention Plan, Emergency Preparedness, and Chemical Safety** training. Additional web-based training modules may be applicable as described in the EHS **Training Needs Assessment** (https://ehs.unl.edu/Training_Needs_Assessment.pdf).
3. PIs are encouraged to create a general laboratory safety manual, as well as a biosafety manual. The EHS Virtual Manual tool can be used for this purpose (<https://scsapps.unl.edu/VirtualManual/>).
4. Use of radioactive materials and/or radiation-producing devices is subject to prior approval by the Radiation Safety Committee and requires specific training, delivered solely by EHS.
5. Use of vertebrate animals is subject to prior approval by the Institutional Animal Care and Use Committee (IACUC) and requires specific training. <https://research.unl.edu/researchresponsibility/iacp/>
6. Any person who participates in a transport function related to hazardous materials/dangerous goods (e.g., signs paperwork, conducts packaging, etc.) must participate in the EHS DOT/IATA training program. Many body fluids, human and animal diagnostic specimens, cultures, and even small quantities of chemicals or preservatives are considered dangerous goods.

Training Records

EHS will maintain training records for any training (instructor-led or web-based) delivered by EHS. PIs (or their delegate) are responsible to maintain records of laboratory-specific training that is not delivered by EHS.

Training records should be maintained for a minimum of three years.

Sample training documentation forms are included in **Appendices A** and **B** to this SOP. These forms are provided for convenience only. Equivalent documentation is acceptable such as printed certificates from EHS online training.

Appendix A-1

Record of Initial Biosafety Training for Authorized Laboratory Personnel

**Recommended training modules*

Personnel must print and sign their name as indicated below Printed Name Signature (Cross out names of individuals no longer working in the lab)		Record Date Completed (MM/YY) (Record NA if Not-Applicable)								
		EHS Online Training								
		Core: Injury/Illness Core: Emerg. Prep.	Chemical Safety (Modules 1-4)	PPE Training*	Biosafety 100: Research Compliance	Biosafety 101	Biosafety 201	Autoclave Training*	Bloodborne Pathogens (If applicable)	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Appendix A-2

Record of Initial Biosafety Training for Authorized Laboratory Personnel (Continued)

Personnel must print and sign their name as indicated below Printed Name Signature (Cross out names of individuals no longer working in the lab)		Record Date Completed (MM/YY) (Record NA if Not-Applicable)							
		Lab-Specific Training							
		Read Biosafety Manual	Demonstrated proficiency with Standard and Special Microbial Practices; Lab-Specific Procedures; and Aseptic Technique	Disinfection and Decontamination	PPE use, limitation, care, and maintenance	Proper use of containment equipment & BSC	Lab Security Provisions	Medical Surveillance Provisions	Emergency Procedures and Spill Protocols
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Appendix B

Lab-Specific Biosafety Refresher Training

Use additional pages as necessary.

Topics Covered (check all that apply)

- | | |
|---|--|
| <input type="checkbox"/> Biohazard Spill Response | <input type="checkbox"/> Emergency Procedures and Spill Protocols |
| <input type="checkbox"/> Standard and Special Microbial Practices | <input type="checkbox"/> Proper use of BSC & containment equipment |
| <input type="checkbox"/> Lab-Specific Special Procedures | <input type="checkbox"/> Lab Security Provisions |
| <input type="checkbox"/> Agent hazard information | <input type="checkbox"/> Medical Surveillance Provisions |
| <input type="checkbox"/> Disinfection and Decontamination | <input type="checkbox"/> Near-miss and Injury Prevention |
| <input type="checkbox"/> PPE use, limitation, care, and maintenance | <input type="checkbox"/> Other: <input style="width: 150px; height: 20px;" type="text"/> |

	Printed Name	<i>Signature</i>	Date Completed (MM/DD/YY)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Trainer

Printed Name _____ Signature _____