Other Training Offered

- Bloodborne Pathogens Awareness Training
- Infectious Materials Shippers Training
- Radiation Safety Orientation
- BSL–3 Facility Awareness Training
- ABSL–3 Facility Awareness Training
- Select Agent and High Containment Awareness Training
- Laser Safety Training
What are the Regulatory and Training Requirements For Laboratory Employees?
Bloodborne Pathogens Standard (29 CFR 1910.1030)

- Applies to **all** employees who have a risk of occupational exposure to blood or other potentially infectious materials (OPIM)
- “Bloodborne Pathogens Awareness” training
  - Required annually
  - Available online
- Exposure Control Plan (available online)
Occupational Safety and Health Administration

- Laboratory Standard (29 CFR 1910.1450)
  - Occupational Exposure to Hazardous Chemicals in Laboratories
  - Chemical Hygiene Plan (available online)

  - Discloses toxic and hazardous substances in the workplace
  - Includes requirements for training, labels, safety data sheet retention, and exposure monitoring

- Globally Harmonized System (GHS)
  - Pictograms
  - Signal Words
    - Warning – less severe
    - Danger – more severe
  - Standardized Safety Data Sheets (SDS)
GHS - Hazard Pictograms and correlated exemplary Hazard Classes

Physical Hazards

- Explosives, Self-Reactives, Organic Peroxides
- Flammables, Pyrophorics, Self-Heating, Emits Flammable Gas, Self Reactives, Organic Peroxides
- Oxidizers
- Compressed Gases
- Corrosive to Metals

Health Hazards

- Acute Toxicity (Fatal or Toxic)
- Skin Corrosion/Burns, Eye Damage
- Irritant (Skin and Eye), Skin Sensitizer, Acute Toxicity (Harmful), Narcotic Effects, Respiratory Tract Irritant
- Hazardous to Ozone Layer

Env. Hazards

- Carcinogen, Mutagenicity, Reproductive Toxicity, Respiratory Sensitizer
- Target Organ Toxicity, Aspiration Hazard

- Hazardous to the Aquatic Environment
Safety Data Sheet (SDS)

Information Required for an SDS

1. Identification
(a) Product identifier used on the label;
(b) Other means of identification;
(c) Recommended use of the chemical and restrictions on use;
(d) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party;
(e) Emergency phone number.

2. Hazard(s) identification
(a) Classification of the chemical in accordance with paragraph (d) of §1510.1200;
(b) Signal word, hazard statement(s), symbols, and precautionary statement(s) in accordance with paragraph (d) of §1510.1200. (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones);
(c) Describe any hazards not otherwise classified that have been identified during the classification process;
(d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration ≥ 1% and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required.

3. Composition/Information on ingredients
Except as provided for in paragraph (i) of §1510.1200 on trade secrets:
For Substances
(a) Chemical name;
(b) Common name and synonyms;
(c) CAS number and other unique identifiers;
(d) Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance;
For Mixtures
To add information required for substances:
(a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1510.1200 and (1) are present above their cut-off/concentration limits, or (2) present a health risk below the cut-off/concentration limits;
(b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with paragraph (i) of §1510.1200, when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (See 19CFR 15.112) with similar chemical composition. In these cases, concentration ranges may be used.
For All Chemicals Where a Trade Secret Is Claimed
Where a trade secret is claimed in accordance with paragraph (i) of §1510.1200, a statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

4. First-aid measures
(a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion;
(b) Most important symptoms/effects, acute and delayed;
(c) Indication of immediate medical attention and special treatment needed, if necessary.

5. Fire-fighting measures
(a) Suitable and/or extinguishing media.
(b) Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products);
(c) Special protective equipment and precautions for fire-fighters.

6. Accidental release measures
(a) Personal precautions, protective equipment, and emergency procedures;
(b) Methods and materials for containment and cleaning up.

7. Handling and storage
(a) Precautions for safe handling;
(b) Conditions for safe storage, including any incompatibilities.

8. Exposure controls/personal protection
(a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended

9. Physical and chemical properties
(a) Appearance (physical state, color, etc.);
(b) Odor;
(c) Odor threshold;
(d) pH;
(e) Melting point/freezing point;
(f) Initial boiling point and boiling range;
(g) Flash point;
(h) Evaporation rate;
(i) Flammability (solid, gas);
(j) Upper/lower flammability or explosive limits;
(k) Vapor pressure;
(l) Vapor density;
(m) Relative density;
(n) Solubility(s);
(o) Partition coefficient n-octanol/water;
(p) Auto-ignition temperature;
(q) Decomposition temperature;
(r) Viscosity

10. Stability and reactivity
(a) Reactivity;
(b) Chemical stability;
(c) Possibility of hazardous reactions;
(d) Conditions to avoid (e.g., static discharge, shock, or vibration);
(e) Incompatible materials;
(f) Hazardous decomposition products.

11. Toxicological information
Description of the various toxicological (health) effects and the available data used to identify those effects, including:
(a) Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);
(b) Symptoms related to the physical, chemical and toxicological characteristics;
(c) Delayed and immediate effects and also chronic effects from short- and long-term exposure;
(d) Numerical measures of toxicity (such as acute toxicity estimates);
(e) Whether the hazardous chemical is listed in the National Toxology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition), or by OSHA.

12. Ecological information
(a) Ecotoxicity (aquatic and terrestrial, where available);
(b) Persistence and degradability;
(c) Bioaccumulative potential;
(d) Mobility in soil;
(e) Other adverse effects (such as hazardous to the ozone layer).

13. Disposal considerations
(a) Disposal methods and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

14. Transport information
(a) UN number;
(b) UN proper shipping name;
(c) Transport hazard class(es);
(d) Packing group, if applicable;
(e) Environmental hazards (e.g., Marine pollutant (Yes/No));
(f) Transport in bulk (according to Annex II of MARPOL 73/78 and the BWC Code);
(g) Special precautions which a user needs to be aware of, and to comply with, in connection with transport or conveyance either within or outside their premises.

15. Regulatory information
(a) Safety, health and environmental regulations specific for the product in question.

16. Other information, including date of preparation or last revision
The date of preparation of the SDS or the last change to it.
Labeling Chemical Containers

- Chemical Names
  - No abbreviations
  - List all components

- Chemical Concentration
  (if applicable)

- Hazards

Ethanol (70%)
Flammable
Exposure monitoring is available for all employees working with chemicals

Chemical Monitoring Devices (badges) are used to monitor an employee’s work exposure

Results are compared to the OSHA Permissible Exposure Limits (PEL’s) that are found on the Safety Data Sheets

Contact EHS with any Indoor Air Quality concerns
Exposures (Biological, Chemical, or Radioactive)

- **Inhalation** (Breathe in a hazard)
  - Remove exposed personnel to fresh air

- **Ingestion** (Swallow a hazard)
  - Improperly stored/handled items
  - Inadequate handwashing before eating
  - Contact Public Safety immediately (314) 977–3000

- **Skin or Eye Contact** (Absorbed through direct skin or eye contact)
  - Improperly stored/handled items
  - Splashes/spills
  - Wash/flush the area with water

- **Injection** (Contaminated object breaks the skin)
  - Needles, broken glass, animal bites/scratches, etc.
  - Wash the area with soap and water
Hierarchy of Controls

1. Elimination
   - Physically remove the hazard

2. Substitution
   - Replace the hazard

3. Engineering Controls
   - Isolate people from the hazard

4. Administrative Controls
   - Change the way people work

5. PPE
   - Protect the worker with Personal Protective Equipment
Personal Protective Equipment

- Eye Protection
  - Wear what is appropriate for the hazard (safety glasses, goggles, etc.)

- Gloves
  - Nitrile, Latex, Vinyl, etc.

- Lab Coats

- Respiratory Protection
  - Medical Questionnaire
  - Respirator Fit Test
  - Respirator Training

- Closed-Toed Shoes

- Pants
  - No shorts in laboratory
Choose proper gloves
Inspect gloves before and during use
All gloves are porous – CHANGE REGULARLY
Do not re-use disposable gloves
Do not wear gloves outside the laboratory
Wash hands regularly
Laboratory Inspections

- Inspection forms are available on the EHS website
  - Review the inspection items regularly
  - Keep compliance records in the lab
    - Training certificates, Safety Data Sheets
  - A fume hood test will be conducted annually
Laboratory Hazard Signage

- Contact EHS to update signage
- Lab Contact can be a lab phone number
- Emergency Contact should be a cell number reachable 24 hrs.
Chemical Storage in the Lab

- Designate storage for food and beverages outside of the lab
- Keep hazardous chemicals below eye level
- Store incompatibles in separate containment
- Use designated storage cabinets for acids and flammables
- NEVER store chemicals on the floor
- Check on the condition of your chemicals periodically
Gas Cylinders

- Ensure contents of cylinders are properly identified
- Keep cylinders capped until gas is ready to be used
- Keep gas cylinders upright and secure at all times
- Use cylinder carts to move cylinders – Do Not “Roll” or “Walk” cylinders
- Do not force connection fittings or tamper with safety devices in cylinder valves or regulators
Fume Hood Guidelines

- Keep sash at the appropriate height
- Fume hoods are certified annually by EHS
- Keep items six inches from the front
- Keep adequate work space clear
- All containers must be capped, labeled, and in good condition
- Do not block the opening at the back of the hood
- Keep the fume hood organized and clean regularly
Safety Shower / Eyewash Station

- Document weekly inspections of the eyewash in your laboratory
  - Ensure it is functioning properly
  - Allow debris to be flushed from the plumbing weekly and after building water has been shut off
- Do not block access to the safety shower/eyewash
- Facilities Service Request
  - myslu.slu.edu
  - (314) 977–2955 (Urgent Requests!)
Laboratory Specific Training

- Must be completed and documented for all personnel working in the lab
- Identify hazards and safety features present in your lab
- Review SOPs for work with certain chemicals:
  - carcinogens
  - cryogenics
  - gas cylinders

Saint Louis University
Laboratory Specific Training Outline

Employee Name: ___________________  Principal Investigator: ___________________
Department: ___________________  Building/Rooms/Laboratories: ________________

All laboratory faculty, staff, students and volunteers shall review and complete the following upon initial hire and any time a new significant hazard is introduced into the work area:

Review and list the location of the following items:

<table>
<thead>
<tr>
<th>Laboratory Safety Manual location:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Hygiene Plan/Exposure Control Plan reviewed on:</td>
<td></td>
</tr>
<tr>
<td>Copies of MSDS/SDS are located:</td>
<td></td>
</tr>
<tr>
<td>Hazardous chemical inventory is located:</td>
<td></td>
</tr>
<tr>
<td>First aid kit is located:</td>
<td></td>
</tr>
</tbody>
</table>

Personnel has been instructed on:

<table>
<thead>
<tr>
<th>Properly labeling ALL chemical waste with the following:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Waste or hazardous waste</td>
<td></td>
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<tr>
<td>- All containers within the container</td>
<td></td>
</tr>
<tr>
<td>- Accumulation start date (mm/dd/yyyy)</td>
<td></td>
</tr>
<tr>
<td>Proper disposing of ALL biological waste</td>
<td></td>
</tr>
<tr>
<td>- Sharps in an OSHA approved sharps container</td>
<td></td>
</tr>
<tr>
<td>- Location of biohazard boxes/inoculue procedures</td>
<td></td>
</tr>
<tr>
<td>Properly labeling ALL chemical containers with the following:</td>
<td></td>
</tr>
<tr>
<td>- Chemical Name</td>
<td></td>
</tr>
<tr>
<td>- Concentration (if applicable)</td>
<td></td>
</tr>
<tr>
<td>- Hazard Class (i.e., Flammable, Toxic, Corrosive, etc.)</td>
<td></td>
</tr>
<tr>
<td>Detecting the presence or release of a hazardous chemical and how to report concerns</td>
<td></td>
</tr>
<tr>
<td>- Examples: odor, color change, etc.</td>
<td></td>
</tr>
<tr>
<td>Biological and chemical spill procedures</td>
<td></td>
</tr>
<tr>
<td>Laboratory specific standard operating procedures (SOPs) and/or protocols</td>
<td></td>
</tr>
<tr>
<td>Lab specific biosafety training (i.e., agent, signs and symptoms of exposure, human derived materials)</td>
<td></td>
</tr>
<tr>
<td>Appropriate personal protective equipment (PPE) use and storage location</td>
<td></td>
</tr>
<tr>
<td>Location of the nearest eye wash station, safety shower and the extinguishers</td>
<td></td>
</tr>
<tr>
<td>Location of emergency contact information (i.e., PI, ORHS, DPNEP, Employee Health)</td>
<td></td>
</tr>
<tr>
<td>All applicable emergency procedures</td>
<td></td>
</tr>
<tr>
<td>Proper storage of hazardous chemicals (compatibility, conditions) within the lab</td>
<td></td>
</tr>
<tr>
<td>Proper use of specific laboratory equipment</td>
<td></td>
</tr>
<tr>
<td>An acceptable location for food and drinks. These items cannot be in the lab.</td>
<td></td>
</tr>
</tbody>
</table>

Training Administered by: ___________________
Employee Signature: ___________________  Date: _______________
ChemKlenz

- Currently available in all buildings with laboratories – look for the green wall mounted bottle holders

- Use ChemKlenz for small spills and contact EHS for disposal instructions and to report the spill

- Do not use for mercury, biological, or radioactive spills

- Waste is considered hazardous and must be disposed of by Environmental Health and Safety

- For large spills, contact DPS at (314) 977–3000
MERCURY THERMOMETER TRADE-IN PROGRAM

What:
The Office of Environmental Health and Safety will trade-in mercury thermometers for mercury-free thermometers.

How:
Fill out a form on our website noting the amount of mercury thermometers you would like to trade-in and select the thermometer(s) that you would like to receive in return.

Why:
A broken mercury thermometer can unnecessarily expose lab personnel to mercury vapor & a monomethylmercury.
Each broken mercury thermometer has the potential to cost $8000 for proper disposal.

For more details, visit our website.
oehs.slu.edu

OEHS Quick Links – Mercury Thermometer Trade-in Program
Hazardous Waste

- Any waste (liquid, solid, gas, sludge) that because of its quantity or characteristics may pose a threat to human health or the environment

- Items that are ignitable, corrosive, reactive, toxic, or biological in origin

- Examples include, but are not limited to:
  - Flammable and non-flammable organic solvents
  - Corrosives – acids & bases (caustics)
  - Oxidizers – nitric acid, nitrates, hydrogen peroxide, sulfuric acid
  - Reactives – hydrides, azides, picric acid
  - Toxics – poisons, mutagens, carcinogens, dyes and stains
  - Controlled substances
  - Heavy metals – Ag, As, Ba, Cd, Cr, Pb, Hg, Se
  - Acutely hazardous chemicals
  - UV germicidal lamps/sodium vapor lamps
  - Paper and cloth rags used to clean solvent spills
  - Photo-fixer, photo-developer, x-ray film
As the generator, you are responsible for chemical waste in your satellite accumulation area. It is your responsibility to:

- Determine what is “HAZARDOUS WASTE” and label the container properly.
- Include all the chemical components (solvents, buffers, etc.)
- Include the accumulation start date
  - Month/Day/Year
- Request a chemical waste pickup before starting a second container.
Waste Removal Requests

- Online Chemical Waste Removal Form
- chemwaste@slu.edu
  - Chemical waste questions
  - Send additional info (SDS, content info, etc.)
Laboratory Waste Disposal

- All Hazardous Waste Must Be Collected by Environmental Safety for proper disposal
- Do NOT put hazardous chemicals down sewer drain!
- Dilution/Evaporation is NOT the solution !!!

CONTACT
ENVIRONMENTAL SAFETY FIRST!!!
Laboratory Waste Disposal

Approved for Regular Trash Disposal
- Paper / Paper Towels / Plastic
- Gloves (not contaminated)
- Triple rinsed chemical containers
- Non-hazardous solid chemicals
- Lab ware, pipette tips, etc. free of visible chemical contamination
- Glass Box – Clean glass and clean broken glass (Must be labeled appropriately for housekeeping staff)

Approved for Drain Disposal
- Non-hazardous salt solutions
- Bleach used as a disinfectant
- Buffers (depending on components)
- Non-hazardous chemicals
- Chemicals released during a laboratory process that deems the collection of the chemical impossible or unsafe
Electronics Recycling

- Alkaline Batteries
- Other Batteries
- Equipment

Facilities Service Request
What Can Go Into Glass Disposal Boxes?

- No Mercury Instruments!
- No Mercury Containing Lamps!
- No Metal Sharps!
- Clean Glass (Broken or Unbroken)
Saint Louis University
Emergency Procedure Guide

Medical Emergency
Report patient condition, locate AED if needed and provide care
CALL 977-3000 OR 911

Gas Leak or Chemical Spill
Evacuate and wait for safety guidance from first responders
CALL 977-3000

Biological or Radioactive Materials
Do not leave the immediate area
CALL 977-3000

Fire
Activate fire pull stations, utilize a fire extinguisher if trained and evacuate the building
CALL 977-3000

Violent Intruder
RUN and evacuate or BARRICADE and HIDE or prepare to FIGHT
CALL 977-3000 OR 911

Severe Storms
Seek shelter in an interior room or hallway away from windows and report damage
CALL 977-3000

Earthquake
DROP to the ground and take COVER under a sturdy table or other piece of furniture and HOLD ON until the shaking stops, then EVACUATE the building
CALL 977-3000

Campus Safety
Report Crime, suspicious persons, or safety concerns
CALL 977-3000
Types of Fires

- **Class A** – Combustible solids (paper, wood, etc)
- **Class B** – Flammable liquids and gases
- **Class C** – Electrical (computers, lab equipment, etc)
- **Class D** – Metals (not common)
Fire Safety Reminders

- Corridors/Stairways
  - Designated safe areas for egress
  - Must not be used for storage
  - Remove combustible materials and chemicals
  - Do not stage equipment in the hallways when being received/moved

- Know location (before an emergency):
  - Evacuation route
  - Fire extinguishers
  - Pull stations (may not be on every floor)
  - Fire exits / Evacuation routes

- Plan ahead!

- Keep fire doors closed
How to use a Fire Extinguisher

Remember P.A.S.S.

- **Pull** the pin
- **Aim** the nozzle at the base of the fire
- **Squeeze** the handle
- **Sweep** side to side

** Fire extinguishers are provided for your protection and voluntary use for actual emergencies ** “1 and Done”
General Radiation Safety Awareness

- **Restricted Areas**
  - These signs indicate restricted areas where radioactive materials are used and stored.
  - Do not be afraid to enter these areas; take appropriate precautions and be respectful of the presence of radioactive material.

- **Radioactive Work Areas and Waste Storage Areas**
  - Radioactive work areas and waste storage areas are labeled for your safety.
  - Do not attempt to handle equipment or labware in radioactive work areas unless you are trained and authorized.
  - Do not lean on countertops in radioactive work areas.
  - Do not attempt to handle radioactive waste or containers unless you are trained and authorized.
  - Do not handle any items marked “RADIOACTIVE” whether handwritten or marked with yellow/magenta trefoil labels unless you are trained and authorized to do so.
General Radiation Safety Awareness

- **Radioactive Packages**
  - You may not order radioactive materials without authorization.
  - Do not attempt to open a radioactive package unless you are trained and authorized to do so AND it has been processed by Radiation Safety.

- **Security**
  - Make sure doors are closed and locked when leaving a restricted area.

- **Food and Drink**
  - Do not consume or store food and drink in restricted areas.
  - This includes applying cosmetics, lip balm, and contact lenses.

- **Radioactive Spills**
  - If you suspect radioactive materials have been spilled, stay where you are and call for assistance, 314–977–3000.
  - Do not attempt to leave area until cleared to prevent the spread of radioactive contamination.

- **Questions: Contact Radiation Safety**
  - 314–977–8609 or https://slu.edu/ehs
Minors in Labs

- Applies to all minors (STARS and Non-STARS) in the laboratory.
- Must be approved by EHS

Minors in Labs Documents

- Policy on Minors in Laboratories
- Form A - Request for Approval of Research Project Involving Minor Participants in Laboratories
- Form B - Parent/Guardian Consent for a Minor in Laboratories
- Minors in Laboratories - Faculty Step by Step Guide to Approval and Onboarding
- STARS Students at SLU: How to Obtain an ID Badge
- OHP Enrollment Form: Medical History Questionnaire
Questions / Comments

Renee Knoll
Asst. Director and Chemical Hygiene Officer
reneeknoll@slu.edu or (314) 977–6884

Jared Arter
Environmental Compliance Manager
jared.arter@slu.edu or (314) 977–6882

Connor Magner
Environmental Safety Specialist
connor.magnersackman@slu.edu or (314) 977–6795

Amanda Nethington
Environmental Safety Specialist
amandanethington@health.slu.edu or (314) 977–6883

chemwaste@slu.edu  ehs@slu.edu

chemwaste@slu.edu ehs@slu.edu
Biological Safety
Biosafety training outline

- Risk groups and biosafety levels
- Work practices and procedures
- Regulatory aspects, standards & guidelines
Risk Groups and Biosafety levels
Risk Groups (RG) and Biosafety levels (BSL)

Definitions

- **Biohazard** – An agent of biological origin that has the capacity to produce harmful effects on humans or the environment.

- **Biosafety** – The application of knowledge, techniques and equipment to prevent personal, laboratory and environmental exposure to potentially infectious agents or biohazards.
Laboratory Acquired Infections (LAI)

Exposures:
- Most are acquired via inhalation
- Other: ingestion, inoculation (sharps), splashes, direct & indirect contact

51% LAIs occur in research laboratories
- Viral:
  - 16% from clinical labs
  - 70% from research labs
    - 32% from animal related activities
- Bacterial:
  - 76% from clinical labs
  - 8% from research labs

Other:
- Parasites
- Molds
- Fungi
- Prions
The Risk Group (RG) of an agent is an important factor to be considered during the biosafety risk assessment process.

Biological agents and toxins are assigned to their relevant Risk Groups based on their ability to cause disease in healthy human adults and spread within the community.

Biosafety Levels (BSL) are ways to contain the agent
  - facilities, safety equipment, practices, PPE, etc.

Once risk is assessed then the appropriate BSL is determined

Risk Groups are used in risk assessment

BSL are used in risk management
NIH Risk Groups

- RG1 – agents not associated with disease in healthy adults
  - RG1 ex. – adeno-associated viruses (AAV), Baculoviruses

- RG2 – agents associated with human disease which is rarely serious
  - preventive/therapeutic interventions are often available
  - RG2 ex. – human origin cells (BBP), influenza, Zika virus

- RG3 – agents associated with serious or lethal human disease
  - preventive/therapeutic interventions may be available
  - RG3 ex. – SARS-CoV-2, Mycobacterium tuberculosis, SARS

- RG4 – agents cause serious or lethal human disease
  - preventive/therapeutic interventions not usually available
  - RG4 ex. – Ebola, Marburg, Lassa
Safe Work Practices for all Biosafety Levels

- Wash hands after work; when removing gloves; before leaving lab
- No eating, drinking, applying cosmetics, handling contact lenses
- No plants or animals in laboratories that are not part of the research
- Maintain labs in clean, orderly fashion
- Limit access to lab when work with organisms is in progress
- Use good microbiological techniques (No mouth pipetting)
- Use plastic instead of glass when possible
- Dispose of sharps properly
- Plan your work
  -Know in advance what you are working with
## Biosafety Levels (BSL)

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
</table>
| **BSL–1** | - Work is typically done on the open bench  
          - Standard microbiological practices  
          - General laboratory safety & hand washing |
| **BSL–2** | - Specific agent training for the lab  
          - Biosafety cabinets (BSC) used  
          - Prevention of aerosol/splash exposures  
          - PPE, primary & secondary containment |
| **BSL–3** | - Specialized training and approval required  
          - Additional PPE, all work within BSC |
| **BSL–4** | - Not at SLU (specialized labs, suits, etc.) |
Work Practices and Procedures
Biosafety Concepts

Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition

Standard Microbiological Practices

- Awareness of potential hazards
- Trained & proficient in techniques
- Supervisors responsible for:
  - Appropriate Laboratory facilities
  - Personnel & Training
- Special practices & precautions
  - Occupational Health Programs
Biosafety Issues

*The BMBL*

**Safety Equipment**

- Minimize exposure to hazard
  - Prevent contact/Contain aerosols

- Primary Containment Barrier
  - Biological Safety Cabinets

- Engineering controls/equipment

- Personal Protective Equipment (PPE)
  - Gloves, gowns, respirator, face shield, shoe covers

- Covered or ventilated animal cage systems
Sharps Safety

- Approved sharps containers are puncture & leak-resistant and should be used for the disposal of metal sharps such as scalpels, razor blades and needles.

- Contaminated glass should also be placed in the sharps container for safe disposal.

- The sharps container should be near the working area to avoid carrying sharps.

- Do not recap needles.

- If metal sharps are found in the regular trash – Housekeeping will not remove trash & will contact EHS

- Do not leave exposed sharps on the bench.
Proper Biowaste Handling

ALL BIOLOGICAL MATERIAL MUST BE DISPOSED OF PROPERLY

- **Solid Waste (two options):**
  - Stericycle (biohazard boxes)
  - Autoclave (steam sterilization)

- **Liquid biological waste:**
  - 1:9/10% bleach concentration (final concentrations)
    - Hold 24 hours, then pour down the sink with running water
Stericycle Box Handling

- Biohazard packaging materials (boxes, bags, manifests and labels) are obtained from EHS

- DOT requires twisting & tying the red bag in a single knot
  - 5 minutes – upside down – holding water

- 45 Lbs. (lift with one hand test).

- Close and tape box as per instructions of box
  - No red bag should show once the box is sealed.

- Affix Stericycle label on the side of the box in the marked area with date visible
  - Submit biowaste pickup request through EHS “Biological Waste Pickup” form
Biohazardous waste should be collected in a red biohazard bag and autoclaved.

Autoclaves need to be validated weekly and results documented.

Autoclaved waste should either be placed into a biohazard box or into a black trash bag for regular trash disposal.

Sharps still need to be placed in a sharps approved container.
OSHA requires biohazard labels to be affixed to containers, refrigerators and freezers containing human BBPs or OPIMs

- 29 CFR 1910.1030(g)(1)(i)(A)

Labels shall be fluorescent orange or orange-red with lettering and symbols in a contrasting color.

BSL-2 (agents in use) and BSL-3 laboratories require biohazard labels as noted in the BMBL, 6th ed., 2020.
Surface Decontamination

- 10% Bleach, 70% Ethanol
- Halogens (Sodium and Calcium hypochlorite)
- Quaternary Ammonium Compounds
- Aldehydes (Formalin)
- Hydrogen peroxide

BOTTOM LINE – Use a disinfectant that is proven to provide kill of the agent with which you’re working.
Aerosol Generating Procedures

- Pipetting (vigorous mixing)
- Mixing & vortexing
- Centrifugation
- Inoculating biochemicals or blood culture bottles
- Pouring of specimens
- Flaming loops
- Open bench subculturing
- Hot loop into broth or media

- Loading syringes
- Flow cytometry & sorting
- Lasers
- Grinding and homogenizing
- Opening lyophilized cultures
- Entering / opening vessels at non-ambient pressures
- Bone saw at autopsy
- Sonication
Biosafety Cabinet Use

- BSCs must be tested and certified at the time of installation, any time it is moved, and at least annually.
- No flammable compressed gas
  - Flames disrupt air flow and may damage HEPA filter
- Keep vents clear of tools/debris
  - this prevents proper airflow
- Use appropriate disinfectant
- Wear PPE (gloves, gown/coat)
Vacuum use

- Begin with fresh bleach in the flask
  - final concentration should be 10% bleach
- Empty frequently to avoid contamination
- Label the contents
- HEPA filters should be in-line to protect the house vacuum and a second overflow flask is also useful
- Use coated glass and/or secondary containment if stored on the floor
Regulatory aspects, standards & guidelines
Research & Regulatory Oversight

- Occupational Safety and Health Administration (OSHA)
  - Bloodborne Pathogens and the Laboratory Standard for working with SA Toxins

- Department of Health & Human Services (DHHS): Select Agent Program

- Centers for Disease Control and Prevention (CDC)
  - Permit requirements

- United States Department of Agriculture (USDA): Select Agent Program
  - Animal Plant and Health Inspection Service (APHIS)
  - Permit requirements

- Department of Transportation (DOT): Ground Shipping

- International Air Transport Association (IATA): Air Shipping

- NIH Guidelines for Research Involving Recombinant DNA Molecules
Registration of Research Protocols

- Institutional Biosafety Committee (IBC)
  - Biological Agents, recombinant or synthetic nucleic acids (rsNA), biological toxins, prions & select agents

- Radiation Safety Committee (RSC)
  - Radiological

- Institutional Animal Care and Use Committee (IACUC)
  - Animals

- Institutional Review Board (IRB)
  - Humans

- Conflict of Interest in Research Committee (COIRC)
IBC and IBC Protocols

- Research Institutions with NIH funding must register experiments using rsNA molecules with the Institutional Biosafety Committee (IBC).

- The IBC has responsibility for the oversight, review and approval of all biological research conducted at Saint Louis University and institutional compliance with federal, state and local requirements governing the use of biological materials.

- IBC protocols are active for five years
  - Annual continuing reviews (per NIH guidelines)
    - Ensures personnel, locations, etc. are up-to-date.

- All personnel listed on an IBC protocol are required to read the protocol as part of their eIBC protocol-specific training.

- Questions regarding IBC submissions, renewals, or continuing reviews can be emailed to eIBC@slu.edu, or contact Patricia Osmack, IBC Manager
Shippers Training

- Training is required for anyone involved in the shipping or transport process

- Required Shipper’s Training Includes:
  - General Awareness
  - Safety
  - Function Specific
  - Security Awareness
    - Dangerous Goods readied for shipment are a security risk and must be secured from unauthorized access prior to shipment.
    - All visitors must be escorted in areas where packaged Dangerous Goods await shipment.
    - Keep laboratory doors and cabinets holding dangerous goods closed and locked.
    - Call DPS 314-977-3000 for any security issues.
Shipping Hazardous Materials

- **Dangerous goods**
  - must be shipped in accordance with 49 CFR, Parts 171–180.

- **Biological agents**
  - Must be shipped following DOT and/or IATA guidelines.
  - Contact EHS with any questions about specific online training requirements.

- **Shipping Chemicals**
  - Please contact EHS prior to shipping ALL CHEMICALS
What is the OHP?
- The OHP is a medical surveillance program for assuring that employees are monitored (for occupational Laboratory and Animal Care Workers only).

How do I enroll?
- PI will be provided an OHP Medical Questionnaire for you to complete.
- For work with animals, the PI will also provide a “Safe Handling of Animals for OHP” form for you to complete.
- After you complete the form, it must be submitted confidentially (because it contains Personal health information) to the Occupational Health Program Manager.

Can I choose not to participate?
- If you choose not to participate in the OHP, you must notify the SLU Occupational Health Program Manager, Dr. Steven Cummings, in writing using the “Informed Consent Declination Documentation” form that is the final page of the OHP Medical Questionnaire.
- Opting out of the OHP may prevent you from participating in certain research that is part of your job. This should be discussed with your supervisor.
eIBC Protocol–Specific Training

- All Saint Louis University laboratories are required to have and document protocol–specific training* for all faculty, staff, students, and volunteers working in the laboratory.

- Principal Investigators and Managers in labs that work with any biohazardous agent should:
  
  • Require all personnel to read eIBC Protocols on which they are listed
  
  • Explain symptoms of accidental exposures to employees
  
  • Require self–reporting in the event of illness
  
  • Require reporting of any spill or release of an agent to the supervisor and to EHS.

*This training should be documented in the Biosafety Training Form
Hazardous Exposure or Spill

- Flush the contaminated area with water for $\geq 15$ minutes

- Evacuate the immediate area around a spill
  - Avoid leaving and tracking the spill to other areas

- Call Public Safety at 314–977–3000

- Provide Important Information:
  - Specific hazard name, exact location, amount spilled, phone #

- Avoid hazard inhalation, absorption and/or contamination

NEVER leave a message for an emergency !!!
Sharps Injuries

- Notify your supervisor immediately, if available.
- Determine risk of exposure to a biological agent.
- Immediately report incident to supervisor and seek treatment at Concentra Urgent Care or the emergency room to determine treatment.
- File an incident report as instructed by the Occupational Health Program (OHP).
- Follow recommendations for follow-up treatment.

Contact Concentra Urgent Care:
3100 Market Street
St. Louis, MO 63103
Phone: 314-421-2557
Hours: 8AM–5PM

Emergency or After Hours Contact:
SSM Health Saint Louis University Hospital Emergency Department
Select Agents and Toxins Awareness

- Restricted work, unless approved by RO, IBC, and CDC
- YOU MUST BE APPROVED TO ACCESS AGENT
- Covers **ALL** who have access to Select Agents and Toxins
- High–level of federal–level security and scrutiny
  - [https://www.selectagents.gov/](https://www.selectagents.gov/)
- Extensive training to work with agents

**RO:** Christopher Eickhoff  
Caroline Bldg. Rm. 305D – (314) 977–6888

**ARO:** Tammy Blevins  
Caroline Bldg. Rm. 305B – (314) 977–6870

**ARO:** Patricia Osmack  
Caroline Bldg. Rm. 305C – (314) 977–6897

42 CFR Part 73 (CDC): Human & Overlap agents  
7 CFR Part 331 (APHIS): Plant  
9 CFR Part 121 (APHIS): Animal (& Overlap agents)
Environmental Health and Safety

Environmental Health and Safety provides environmental, health and safety leadership, expertise, guidance and service in support of the University’s teaching, research, and clinical mission.

We work as a team with the faculty, staff, students and the administration of Saint Louis University to proactively incorporate and manage health and safety in all endeavors. These efforts range from basic fire and life safety to general workplace safety to biological, chemical and radiation safety, to hazardous materials removal and disposal.

In an increasingly dynamic and complex regulatory world, our health and safety programs are designed to facilitate safety by reducing regulations to best practices that can be efficiently and effectively implemented through well defined policies, safety and security procedures, routine training, and friendly professional oversight.

We are here to help assure the health and safety of all students, employees, patients and visitors to Saint Louis University, and as stewards of the environment within the Saint Louis University campus and the surrounding community.

Our Goals
Contact Us!

- **Christopher Eickhoff**
  - Biological Safety Officer & Responsible Official (RO)
  - Phone: (314) 977–6888
  - christopher.eickhoff@health.slu.edu

- **Tammy Blevins**
  - Assistant Biological Safety Officer & Alternate Responsible Official (ARO)
  - Phone: (314) 977–6870
  - tammy.blevins@health.slu.edu

- **Patricia Osmack**
  - IBC Manager & Alternate Responsible Official (ARO)
  - Phone: (314) 977–6897
  - patricia.osmack@slu.edu
Reminder!

1. Complete the [Lab Safety Training Quiz](#)

2. Retain a copy of the LST quiz results sent by email. The email serves as proof of training.

Note: Training certificates are no longer issued.