General Laboratory Safety Training

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COURSE TOPICS

- Introduction to the Laboratory
- Be aware of your surroundings
- The Lab Safety plan
- Good Lab Safety practices
- The MSDS and labeling
- Personal Protective Equipment
- Compressed gas safety
- Sharps
- Safety equipment and barriers
- Decontamination
- Spills
- Waste – Hazardous & Bio type
- Disposal
- Wrap-up Quiz
This training presentation has been created for any student or employee that is required to undergo general laboratory safety training prior to working with hazardous substances in a laboratory environment.

It is also recommended for any other training environment where hazardous chemicals or gases are used such as John Mitchell Center or the Art Department.
INTRODUCTION

Laboratory safety is the key to preventing injury and illness as a result of working in a teaching or research laboratory. There are opportunities for exposure to hazards in a laboratory that may not have been considered as hazardous before.

It is important to have proper training so you as the employee or student are aware of the potential dangers so that correct precautions and safe guards are learned and practiced.
INTRODUCTION

As we go through this training presentation, you should develop a better understanding regarding the concept of safety and how important safety is in a laboratory environment.

The University has an obligation to protect every student and employee on our campuses. There are various regulations pertaining to Lab and chemical safety that USM must abide by.

Let’s take a look at the different agencies that develop and enforce these regulations.
BLS is not OSHA, but the Bureau is in charge of enforcing regulations related to safe work conditions and promoting the elimination of physical and health hazards in the work place. The areas of regulation include topics such as Hazardous Materials, Hazard Communication, Bloodborne Pathogens, and Occupational Exposure to Hazardous Chemicals in Laboratories, etc.
State of Maine - Department of Environmental Protection (DEP)

The DEP is in charge of the wastes that USM generates and stores. Many hazardous wastes are used in research laboratories and they pose a threat to humans, animals, plants, and the environment. There are also bio-hazardous wastes that are regulated and must be properly decontaminated and disposed of.
Centers for Disease Control and Prevention (CDC)

In charge of laboratories that use or contain infectious agents. They are focused on protecting personnel and the laboratory environmental from exposure to infectious agents. They are also aiming at preventative measures by adhering to strict containment.
National Institute of Health (NIH)

The National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, is the nation’s medical research agency—making important discoveries that improve health and save lives.
University Environmental Health & Safety Office (UEHS)
The UEHS office plays a major role in overseeing various laboratory activities that take place on campus. They interpret laws and regulations, and maintain up-to-date written programs based on current health and safety standards. The duties range from fire safety and laboratory safety to training and emergency action plans.
WHY TRAINING?

Training is by far the most important aspect of safety. Training not only reduces illness/injury but also increases worker efficiency and awareness.

Training is required by regulation and USM has a high regard for fulfilling this commitment. Eliminating hazards, preventing accidents, and increasing awareness is the goal of the UEHS office.
WHY TRAINING?

Everyone on campus is responsible for training and compliance. The employee or student is responsible for participation in the training, comprehending the information, and utilizing the information for the specific duties.

The supervisor, lab manager, or Principle Investigator (PI) is responsible for providing proper and effective training. The UEHS office provides assistance to departments in achieving regulatory compliance and developing proactive strategies.
Working in a laboratory can be an exciting experience. It can also contain many dangers and hazards that a traditional classroom does not. That is why it is important to know your surroundings.

Know where the exits to your room are. There may be more than one exit which could be critical in the case of an emergency. Your Lab Manager or PI will go over the emergency action plan including the escape route procedures for the lab.
It is also recommended that you learn the locations of the fire extinguishers in your laboratory. In the event of a fire the first action is to evacuate the area and notify Public Safety (Campus Police)!

Any campus phone will initially direct calls to the USM Police Dept. and from there the fire department will be dispatched. From any campus phone just dial 911. Do not wait any longer than necessary to call, time is of the essence!

Only employees trained in correct fire extinguisher use should attempt to extinguish a fire by following PASS, Pull-Aim-Squeeze-Sweep
KNOW YOUR SURROUNDINGS

Know where the fire alarm is in proximity to your laboratory. Is it right down the hall or is it next to the door to the stairwell?

If there is a fire, a quick response is the best response. The Lab Manager or instructor should show you the closest alarm (pull station). The fire safety aspect of the Lab safety training will detail the safety procedures for your lab.
Most laboratories contain hazardous substances.

A **hazardous substance** is defined as a material/substance that poses a physical or health hazard. This includes both chemicals and biological agents.

A **Biohazard** is defined as a biological agent or condition (as an infectious organism or insecure laboratory procedures) that constitutes a hazard to humans or the environment.

There are differences between a physical hazard and a health hazard. Let’s take a look.
A health hazard has one or more of the following characteristics:

- Carcinogen
- Toxic or highly toxic
- Reproductive Toxins
- Irritants
- Corrosives
- Sensitizers
- Hepatotoxins
- Nephrotoxins
- Neurotoxins
A physical hazard has one or more of the following characteristics:

- Explosive
- Flammable
- Oxidizer
- Pyrophoric
- Organic peroxide
- Compressed gas
- Combustible liquid
- Unstable (Reactive)
- Water-reactive
When chemical hazards exist, it is very important to know where the eye wash/safety shower is located. Unexpected accidents do occur and knowing where to go at the time of an emergency can reduce injury/illness.

When using an eyewash or shower to remove chemical, 15 minutes of flushing is strongly advised.

Removal of exposed clothing is also advised.

Laboratory Managers are responsible for inspecting emergency eyewash stations and showers regularly.

They must be activated and evaluated for unimpeded access, adequate flow, proper function, and tepid water temperature.

Inspections must be documented.

Mechanical deficiencies should be reported to Facilities for corrective action.

Housekeeping deficiencies should be addressed with the personnel using the lab.
First aid kits have a variety of quick relief items. If your lab has a first aid kit, find out where it is. If more than basic 1st aid is needed, it is recommended to go to Student Health Services or a local medical services provider for further treatment.

Also, if the injury requires treatment more than basic 1st aid, please report the incident to the Lab Instructor and UEHS office as soon as possible.
When there are chemical or biological substances being used an emergency spill kit should be available. If there is a spill kit in your lab find its location. Further Spill response information will be addressed later in this presentation.
Each laboratory has a telephone in a designated area for use (near lab doors in some cases). The emergency contact numbers should be posted near the phone in every laboratory on the USM campus.
Lab Safety - The Plan
The Lab Safety Plan (LSP), otherwise known as the Chemical Hygiene Plan, is similar to the Hazard Communication Program. The Hazard Communication Program looks at chemicals in any workplace.

The LSP focuses primarily on chemical and bio-hazards in a laboratory environment. The point of the LSP is to relay information regarding procedures, equipment, PPE, and work practices that protect students and employees from lab hazards.

If you are working with acids or solvents or recombinant DNA, the individual should know what personal protective equipment is necessary and what health hazards are associated with these substances.
THE PLAN

According to the laboratory standard, for those labs that have chemicals the following training topics must be addressed:

- Methods and observations that may be used to detect the presence or release of a hazardous chemicals.
- Physical and health hazards
- Measures employees can take to protect themselves from hazards
- Details of the LSP
Methods and observations used to detect the presence or release of chemicals will be specific to your lab. A good indication of the presence of a chemical is to rely on your senses. Can you see it or smell it? Is a monitoring device needed to detect it? This can be important information if the chemical is an asphyxiate and pushes oxygen out of the room you are in.
Protection against chemicals is a combination of work procedures or practices, emergency procedures, and PPE. Some chemicals can only be handled under certain conditions. It is important to use proper handling procedures and practices as advised.

The emergency procedures for chemical accidents is to first evacuate the area, notify your supervisor, USM campus police, and UEHS office if necessary.
THE PLAN

Each lab that has chemicals will have a lab specific Lab Safety Plan (LSP) or Section F. The Lab Specific section will detail the procedures and practices for your specific location. It is your responsibility to review the LSP at least annually to insure the it is up-to-date and accurate for the space(s) it represents.
LAB SAFETY – ACCORDING TO WHO?

When chemicals are used in the laboratory, the hazards of that chemical must be communicated to you. According to Occupational Safety and Health Administration (OSHA), a Chemical Hygiene or Lab Safety Plan (LSP) is required to relay information regarding procedures, equipment, PPE, and work practices that are meant to protect the student and employees from the hazards.

The Lab Manager or PI is in charge of providing you the information contained in the LSP.

The Chemical Hygiene Officer (CHO) oversees the development and implementation of the Chemical Hygiene or Lab Safety plan. The CHO is also responsible for insuring the Lab Safety Plan is adhered to.
LAB SAFETY

Chemicals can pose a significant hazard. They should be limited to use under a properly working fume hood. Chemicals can release hazardous vapors which not only harm the environment, but they can be a major health threat. They must be handled carefully and disposed of properly.
The following guidelines have been established to minimize the hazards in a laboratory setting. It is important to take responsibility for your actions and to keep in mind that irresponsible acts could have permanent and lasting effects.

The next portion of the training is meant to remind you of responsible conduct in a laboratory setting. As the hazards increase, the risks increase and the responsibility must increase.
LAB SAFETY - LAB ATTIRE

✓ No open-toed shoes
✓ No shorts or similar attire in labs
✓ Restrain hair when working with hazardous materials
✓ Remove protective clothing and gloves before leaving
✓ Keep PPE clean and away from chemicals
✓ Always inspect PPE for defects before using
✓ Advise Lab Manager if PPE becomes defective – replace
LAB SAFETY - PERSONAL HABITS

Personal habits play a large role in minimizing exposure and accidents. The following measures must be taken:

- Do not eat, drink, smoke, chew gum or apply cosmetics, or remove/insert contact lenses while in the laboratory
- Do not store food or beverages in the lab or in chemical refrigerator
- Do not mouth pipette
- Wash hands before leaving laboratory or after handling contaminated material
LAB SAFETY - SAFE PRACTICES

These safe practices should be followed to ensure safe working conditions:

- Do not use chipped or cracked glassware
- When working with hazardous materials, have a second person nearby
- Know emergency procedures
- Keep the laboratory neat and clean
- Use hazardous chemicals under a fume hood and biohazardous materials under a biosafety cabinet (BSC)
- Decontaminate whenever feasible
- All procedures should be performed to minimize aerosol generation
Each lab contains an **Emergency Action Plan (EAP)** which is required for emergency situations. This is used to inform faculty/students of the procedures to follow in the event of an emergency. This includes the following information:

- Evacuation procedures
- Actions in the event of a fire
- Chemical spill actions
- Medical emergencies
- Lab specific hazards & related information
- Contact information
Why is an MSDS important? When you know characteristics about a substance it can aid in precautionary measure to take when using it. Also, if there is a spill either on a surface or on your skin, the MSDS can supply you with the information needed for effective first aid.

There are several constituents that are covered in the Laboratory Standard. Among these constituents includes labeling and the MSDS. Let’s look more closely at an MSDS.
In addition to labeling in a laboratory, the next most important type of communication regarding hazards is the MSDS. This is the acronym for Material Safety Data Sheet. This will communicate the information necessary regarding the hazards associated with chemicals and biological agents.

The links listed below are good sources for chemical MSDS sheets.

http://siri.org/msds/
http://www.ilpi.com/msds/
http://www.msdssearch.com/
So what is an MSDS? An **MSDS** is a document that relays vital information about a chemical or biological agent. It’s usually divided up into 16 sections.

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<thead>
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<th>The 16 sections:</th>
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<tr>
<td>* Identification</td>
<td>* Physical and chemical properties</td>
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<tr>
<td>* Hazard(s) identification</td>
<td>* Stability and reactivity</td>
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<td>* Composition/information on ingredients</td>
<td>* Toxicological information</td>
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<td>* First-aid measures</td>
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<td>* Fire-fighting measures</td>
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<td>* Accidental release measures</td>
<td>* Transport information</td>
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<td>* Handling and storage</td>
<td>* Regulatory information</td>
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<tr>
<td>* Exposure controls/personal protection</td>
<td>* Other information</td>
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Signs and Labeling

- Danger: Eye protection required beyond this point
- Biohazards: No food or drink storage in this refrigerator
It is important to know as much about a chemical as possible. The most dangerous substance is the one that has no label. Communicating information is essential in the science field.
Chemical labeling has been briefly touched on earlier in the presentation. One must remember that if any chemical is transferred to a secondary container, this container must be labeled unless the chemical is used immediately. If the chemical will be used by the end of the work shift, then labeling is not necessary. Good science practices would encourage you to label all containers.
Hazard information will often be found on an MSDS sheet in the form of an NFPA or HMIS label.

The NFPA label shown on the lower left shows a rating of hazard level for four different categories using 0-4 rating of severity with 4 being the most severe.

The HMIS label on the right follows a similar rating process.
SIGNS

Signs are a way of communicating important information. It is a way to heighten awareness about hazards that exist.

There may be signs on laboratory refrigerators reminding you that no food or drink can be stored in it. There may be radioactive or biological materials that could possibly be absorbed in food.

Other signs may denote what PPE must be used.
SIGNS

Labs which use recombinant DNA and infectious agents must have a sign posted on the outside of the door. Before someone enters the lab, they will have the information they need to protect themselves. Always read the signs carefully so you know what precautions to take.
Personal Protective Equipment (PPE)
What is PPE?

PPE is short for “personal protective equipment”. This is the equipment that is necessary to protect the user from hazardous and biohazardous materials. PPE could be gloves, safety glasses, lab coat, shoe covers, respirator or any other item that could protect you from contact with dangerous materials that you may encounter in the lab.
Knowing what to use and when to use it is the key to properly protecting yourself. There could be situations that would be more of a risk and require more PPE than others. The next few slides will help you in determining what you should be using!

Note: A chemical MSDS is a good resource for identifying what is the best PPE for the given chemical being handled.
When chemicals are being used there is always the possibility of splashing. The proper PPE to use when chemicals are involved should include:

- Safety glasses/goggles
- Gloves
- Chemical Apron
Proper Use of (PPE)

- When handling chemicals, use of eye protection is mandatory
  - Goggles or safety glasses with side shields are preferred
  - Chemically resistant gloves are also strongly recommended
  - Overall, *Laminate Film or Silver Shield* are the most chemically resistant and protective gloves available.
Proper Use of (PPE)

- Chemically resistant gloves are always strongly recommended
  - Neoprene or Nitrile type gloves are good for many acids and solvents
  - Latex examination gloves are excellent as a barrier to biohazards but not all chemicals
Knowing how to properly use PPE can be the key to adequate protection. Not only do you want to make sure it is the proper size for you, but also make sure you are wearing it properly. If it is too big or too small, it is not right for you! Let your supervisor know if you need a different size.

Note: A face shield is used to protect the face when splash or splinter hazards are possible.
The use of respiratory protection in USM labs is deemed more a voluntary use preference rather than a health and safety requirement due to exposure and exposure limits.

Following Appendix D from the Respiratory Standard 29CFR1910.134, the user should still take certain precautions to insure the respirator is worn correctly and does not present a hazard in itself.

Follow manufacturers recommendations concerning use, maintenance, cleaning, and care of the respirator.

Choose the right respirator for the contaminant of concern. The N95 shown below is primarily for nuisance dust or odor.

If you think you need a respirator talk with the Lab Manager or contact UEHS (780-5406)
LOCATION & AVAILABILITY OF PPE

Each Lab should have a designated area for the PPE. The PPE should also be readily available when working with materials that require it. If the proper equipment is not available, you should not proceed with the work. Notify your supervisor when you need to order PPE.

PPE should always be stored in a clean area separate from any chemical or biohazard.

PPE should be inspected for defects before use and at least annually.
COMPRESSED GAS SAFETY
COMPRESSED GAS SAFETY

✓ Compressed gases can be both chemically and physically hazardous.
  ✓ Compressed gases can be flammable, toxic, reactive, corrosive, or a simple asphyxiate (displaces oxygen).
✓ The actual pressure of the gas escaping can be hazardous, i.e. 3000psi.
✓ Safe handling and storage of compressed gas cylinders is imperative to having a safe and accident free lab.
✓ Simple precautions and practices can prevent accidents.
✓ Follows these simple rules when working with compressed gases.
COMPRESSED GAS SAFETY

- Gas cylinder labels should always be visible and legible.
  - Color identification is not a reliable form of ID.
- Gas lines should be identified based on contents.
- Gas cylinders need to be secured from tip over – chains or straps are suitable.
- Cylinder valves should **always** be opened slowly.
- Oxygen cylinders should always be stored at least 20 ft. from flammable gas.
- Acetylene or hydrogen gas should never be stored near heat source.
- Never apply oil or grease to cylinder valve threads.
COMPRESSED GAS SAFETY

- Eye protection should always be worn when handling cylinders.
  - A face shield is preferred when connecting or disconnecting cylinders.
- The cylinder covers should be screwed on hand tight when in storage.
- Always use cylinder cart when moving cylinder to another location.
- Never store cylinders horizontally especially acetylene
- Keep empty cylinders separate from full ones
- Contact the gas supply vendor or the UEHS office if any problems develop with a gas cylinder.
- Wear special cryogenic gloves when handling N2 cylinders
  - Never touch liquid N2
WHAT IS A “SHARP”?

A sharp is defined as any instrument, tool, or item that has rigid, acute edges, protuberances or corners capable of cutting, piercing, ripping or puncturing such as syringes, blades, and broken glass. Items that have the potential for shattering or breaking are also considered sharps.
When using a sharp there is a risk of being cut or stuck by the object and possible infection occurring depending on what the sharp was used for. If hypodermic needles are used, special precautions must be taken to reduce the risk of a needle stick. After use of the needle do not recap, place directly in the sharp container.
SHARPS - SAFE PRACTICES

All sharps must be placed into a rigid, puncture, and leak-resistant container that is also impervious to moisture. The sharps container must be labeled either with “Biohazard” or “Infectious Waste”. Do not over fill the sharps container.
When the sharps container is full it must be collected by the UEHS office. A waste pick-up form can be completed and a collection can be scheduled. A waste pick-up can be scheduled by contacting the UEHS office (207 780-5406).
Responsible practices and techniques are required when working with hazardous materials. This is one very important way to reduce accidents/injuries. Your supervisor will train you on the responsible use of hazardous materials specific to your laboratory.
SAFETY EQUIPMENT

THE PRIMARY BARRIERS
Certain equipment is necessary to achieve compliance and most importantly to provide adequate protection.

The safety equipment that is needed is known as primary and secondary barriers. Let’s take a look at the difference in the barriers.
Primary barriers are referring to protective measures including engineering controls.

Engineering controls - eliminate or reduce exposure to a chemical or physical hazards through the use or substitution of engineered machinery or equipment. Examples include self-capping syringe needles, ventilation systems such as a fume hood, sound-dampening materials to reduce noise levels, safety interlocks, and radiation shielding.

This includes not only PPE that has already been covered, but it also includes fume hoods, bio safety cabinets, and autoclaves.

It is important to know when and how to use this equipment. We’ll address that in the next few slides/
PRIMARY BARRIERS

Let’s look at the following barriers:

- Fume hood
- Biological Safety Cabinet (BSC)
- Autoclave
The fume hood is used with chemicals. The main function is to exhaust the vapors and gases that are generated in the hood to the outside. The hood is designed to minimize your exposure to airborne contaminants. This is **not** to be used with bio-hazardous materials.
The fume hood sash (the glass door that slides up and down on the fume hood front) acts as a barrier between the user and chemical fumes or chemical splashes.

Should the sash be raised above the maximum allowable height, as indicated by the label on the right or left side panels, air flow may be insufficient to capture all chemical fumes and/or chemical splashes.
When using the fume hood you first need to make sure the exhaust blower is operating and air is entering the hood.

Remember, keep head and face outside of the hood!

Minimize storage of chemicals in the hood.

Clean up *small spills immediately.

Work with the sash at the proper operating level as indicated by the sash height sticker.

* 2 cups or less
The biological safety cabinet (BSC) is used as a containment for infectious agents. The BSC has a HEPA filter in the exhaust system to protect the environment and yourself.

The HEPA filter is a high efficiency particulate air filter. It is able to remove particles at a size of 0.3 \( \mu \text{m} \) with an efficiency of 99.97%. It is also able to remove both smaller and larger particles.
There are 3 classes of BSC that are used. The higher the risk group and biosafety level, the higher the class of cabinet that is used.

If there is an infectious agent being used, whether it is used in research animals or cultured, it must be manipulated inside the BSC.
BIOLOGICAL SAFETY CABINET

Do not bring contaminated materials out of the cabinet until they have been surface decontaminated. If you are unable to decontaminate, place the material into a closed container to transfer it to the autoclave.
Remember to follow the work practices:

- Work in such a way that your face is above the front opening
- Wait for 1 minute after placing hands/arms inside the cabinet to stabilize the air flow
- Work at least 4 inches from the inside edge of the front of the grille
Remember to place all materials as far back in the cabinet as possible.

Limit storage of containers or equipment in the cabinet. These items can obstruct air flow through the cabinet and result in chemical fume or bio contaminant exposure.
When using this containment device, remember to also use the proper personal protective equipment. The following PPE should be considered depending on the BSL that is required for the organism/chemicals being use.

- Gloves
- Lab Coat
- Shoe Covers
- Safety Glasses
- Respirator
Always make sure that the Bio Safety Cabinet (BSC) has been decontaminated both before and after use. Decontamination methods vary depending on the infectious agent being used. Once the decontamination of the cabinet is complete, place the waste in a biohazard bag for autoclave.
An autoclave is used to treat infectious material and recombinant DNA. As a standard for the University, all material of this nature must be autoclaved as a safety precaution. The autoclave is able to render the material non-infectious.
The autoclave is the most effective method to use for decontamination purposes. As a general rule autoclave all materials that are considered infectious agent, recombinant DNA, or resemble components of this nature. When in doubt, AUTOCLAVE! If a material is not capable of autoclaving because of its size, material, or it is stationary, then rely on chemical disinfectant as a second option.
The autoclave is able to reach a high temperature to sterilize the agent. It is important to know the standard operating procedures (SOP) for use of the autoclave. The SOP is located on the autoclave. If the temperature or pressure is inadequate, the bag is overfilled, or the peak time is not long enough, the material will not be properly decontaminated.
The autoclave process is sensitive to time, temperature, pressure, type of container being used, and the type of waste being sterilized. When using the autoclave there are a few important points to remember in order for the process to be effective.

- Always use bags designated as “autoclave bags” rather than red “Bio waste” bags.
- Always follow instructions on front of autoclave.
- Contact the UEHS office if you have questions or concerns about the autoclave process.
PROCEDURES

The autoclave must reach a temperature of at least 121°C (250 °F) at a pressure of at least 20psi.

Depending on the material being autoclaved set the cycle time using the cycle chart that is attached to the autoclave.

After successfully being autoclaved, the material should be placed in the lined, bio waste boxes.

Contaminated sharps must be disposed of in Biowaste Sharps containers. The Sharps container does not need to be autoclaved. When the container is full, a pick up should be scheduled through UEHS. Broken glass is handled as normal trash with suitable precautions.
Each time the autoclave is used, the log must be completed by the individual using it. The log is to be located at the site of the autoclave. The information contained within the log is as follows:

- Date
- Laboratory
- Operator Name
- Contact number
- Type of material
- Cycle 1-9
- Autoclave sequence #
- Content
- Start time
- End time
Secondary barriers are the facility design and construction. These barriers are to provide protection for the individuals outside the lab, the community, and the environment.

An example of a Secondary barrier would be a laboratory. It is separate from the classroom and has limited access.

The animal room has limited access and is only available to authorized personnel.

The autoclave is located in a separate room away from the normal traffic.

The hand-washing facilities are located within the lab and not accessible by the outside students.
Decontamination is the removal or neutralization of toxic agents or the use of physical or chemical means to remove, inactivate, or destroy living organisms. This includes both sterilization and disinfection.
Decontamination is the responsibility of all laboratory workers. Failure to decontaminate can result in exposure to infectious agents which can cause illness or infection.

Most decontamination can be done by chemicals. This technique is used only when autoclaving is not possible.

The lab manager will know and instruct students and faculty on what is most appropriate for the specific substance.
DECONTAMINATION

There are a variety of chemicals that can be used as an effective method of decontamination. Depending on the agent being used, the method to use may vary along with the contact time.

For most organisms, a 10% solution of chlorine with water for 10-30 minutes is adequate. Other ready made decontaminates are available.

Contact the UEHS office for more information.
SPILLS AND ACCIDENTS
The best defense against chemical spills is prevention. Being careful and taking the time to safely pour or carry hazardous substances can mean the difference between completing a task and an accident.

Spills and accidents can pose a serious health and safety threat. When a spill occurs, an aerosol can be created which can make the spill event more potent. The best measure to take in order to protect yourself is to be prepared.

Each Lab should have specific procedures for addressing small or large chemical spills depending on the substance.
Being able to recognize the hazards, mitigate the spill, and notify supervision is important to ensuring the safety of yourself and others.

The first response to a spill should be to evacuate the immediate area until the scope of the hazard has been determined. Secure access to the room, and allow adequate time for any aerosols to settle.

For small spills, 2 cups or less, follow appropriate cleanup procedures and always wear the appropriate level of PPE when removing the spilled chemical. Trash associated with the clean up should be handled as hazardous waste. Contact the UEHS office to schedule a pick up of the waste.

Only trained and authorized personnel shall attempt to clean up large spills (> 2 cups). In the event of a large spill, evacuate the area and contact your lab instructor immediately. The UEH&S office should be notified.
SPILLS

Simple Spill Clean-up Procedure

- Prevent the spread of dust and vapors
- Neutralize acid or base if possible – use spill kits
- Control spread of liquid
- Absorb the liquid with chemical absorbent material or kitty litter
- Collect and contain cleanup residue
- Package waste material
- Decontaminate surfaces
- Contact UEHS to pickup waste
When a spill occurs, it must be reported. Report all spills to your instructor or Lab Manager. If medical attention is needed, either go to Student Health Services or to a local medical services provider. A chemical MSDS of the chemical causing the injury should accompany the injured employee or student. All injuries that are a result of a spill must be reported to Human Resources and the UEHS office.
WASTE MANAGEMENT
Hazardous and biohazardous waste has special guidelines for proper disposal. It is important to properly dispose of waste to ensure human and environmental health. The Maine Department of Environmental Protection (DEP) regulates the waste that is generated at USM.
Waste can be classified as either hazardous or biohazardous. Let’s take a closer look at the differences.

**Hazardous Waste** - This is a waste which contains one or more of the following characteristics:
- Toxic
- Corrosive
- Ignitable
- Flammable
- Oxidizer
WASTE

- Hazardous waste at USM is collected and stored at satellite accumulation areas (SAA’s). They are located at selected labs on campus.
- The waste is usually chemical in nature.
- Once a waste container has reached 90% of its capacity it is considered full.
- The “full date” should then be added to the label on the container and the EHS office should be notified for pick-up.
- The EHS office should collect the hazardous waste within 72 hours.
A biohazardous waste is any waste that is considered infectious and/or because of its biological make up can cause physical or health hazards to humans, animals, plants or the environment. This includes recombinant DNA and other genetically altered organisms and agents.
Certain biohazardous waste can be disposed of in regular trash once it has been rendered **non-infectious through autoclaving**.

If a biohazard labeled bag is used, make sure it is either placed in a secondary bag or a completely new bag that is not red.

Waste that is deemed biohazardous waste after autoclaving such as sharps containers or medical waste is collected for disposal by the UEHS office.
Hazardous or biohazardous waste must be disposed of through the Environmental Health & Safety office. If you need to have these types of wastes picked up contact EHS @ (207) 780-5406 or email us at safety@usm.maine.edu.
Wrap up Quiz - Laboratory Safety

1. Which state agency regulates the Lab Safety program?

2. What are the benefits of ensuring that laboratory personnel receive safety awareness training such as this one?

3. What types of attire are prohibited from being worn in a laboratory?

4. If a chemical is transferred from its original storage container into a different one, what must be done?

5. Name three common ‘primary barriers’ and describe the purpose of each.

6. True or False: Each lab is required to have a lab-specific ‘Lab Safety Plan’.

7. Name the location of your lab’s Lab Safety Plan.

8. How do latex gloves differ from nitrile gloves for protection against laboratory hazards?
9. Once a container of hazardous waste is 90% full, what must be done?

10. How frequently must inspections of emergency eyewash and shower stations be performed?

11. List three requirements for safe storage of compressed gas cylinders.

12. True or False: After using a needle, it should be recapped before being deposited into an approved sharps container.

13. In the event of a chemical spill in the laboratory, what should you do first?

14. What amount of chemical spilled constitutes a large spill?

15. What is the purpose of an Emergency Action Plan (EAP)?

Completed By: _____________________   Signature: _____________________
Department: _______________________   Date: ________________________
You have now completed the **General Lab Safety Training** presentation and quiz. Please print and sign the quiz pages and submit them to the Environmental Health and Safety Department (via interoffice mail to 88 Bedford Street, Portland, ME 04101 or via email to safety@usm.maine.edu)

If you have any questions please take the time to ask your supervisor or call EHS.

Thank you