

## Introduction

All employees and students who work at UAB in areas where hazardous materials are used and/or stored must complete this course. The regulatory agencies require this training as a part of your [Right-To-Know](#).

“...that employees have both a need and a right to know the hazards and the identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring.”

*OSHA’s Hazard Communication Standard*

If you handle hazardous chemicals, you should also take the *Chemical Safety Training* course (CS 101). If you manifest hazardous chemicals, you should also take the *Hazardous Waste Handling and Packing* course (CS 055).

## How This Course is Designed

This PDF file is divided into sections.

1. This section, and the Reality Check that follows, covers what you **MUST KNOW** in order to stay safe and protect your health as well as those who work with you.
2. The material in the Appendix contains general knowledge – regulators, regulations, procedures, etc.

Does this mean the “general knowledge” in the Appendix is not important? Absolutely not! We expect you to know about these policies and procedures - at least where to find the information if you need it.

If you supervise/manage a lab, are a Principal Investigator (PI), or a researcher, we expect you to have a thorough knowledge of the materials covered in the Appendix.

## Personal Protective Equipment (PPE)

Wearing the appropriate Personal Protective Equipment (PPE) is very important when working with or around hazardous substances or materials. The appropriate PPE should be available **and used** by all persons, including visitors, who enter areas where hazardous materials are used or stored. If you need assistance with what to wear, you may contact your supervisor, manager, PI, or OH&S. There is a course on PPE that you can take if you want more information.

The most important way to know what to wear for **your protection** is to READ! Read labels, signage, the Safety Data Sheets (SDS), etc. If you read these, they can tell you what you need to protect your health and safety.

## Hazardous Chemicals

A hazardous chemical is “**any chemical which is a physical or a health hazard.**”

*OSHA's Definition of a Hazardous Chemical*

### *Physical Hazards*

Physical hazards are hazards based on the physical properties of substances.

Type	Example
Flammables and Combustibles	Acetone or Isopropyl Alcohol
Explosives	Nitroglycerin or Dry Picric Acid
Compressed gases	Oxygen or Nitrous Oxide
Oxidizers	Bleach and Hydrogen Peroxide
Reactive materials	Sodium or Phosphorus

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### Health Hazards

Most of the health effects are dependent on the quantity of material that gets into the system.

This is affected by:

- the concentration of the hazardous substance
- how long you are exposed to the substance
- how it gets into your system (ingested, inhaled, or through the skin)

A health hazard is based on the chemical properties of the material. There are several.

Type	Possible Effects	Example(s)
Toxins (poisons)	Possible damage to the reproductive capabilities and fetuses	Lead
Corrosives	Can destroy or cause irreversible alterations to living tissue	Sulfur Chlorides, Acetyl Bromide
Carcinogens	May cause cancer	Benzene
Nephrotoxins	Produces kidney damage	Naproxen Sodium (Ibuprofen)
Hepatotoxins	Produces liver damage	Ethylene Bromide
Sensitizers	May cause allergic reactions	Formaldehyde
Irritants	May cause irritating, itchy reactions	Hydrochloric Acid

### Chemicals of Special Concern

Some areas work with chemicals/drugs that must be registered with OH&S as well as other regulatory agencies.

#### *Select Agents*

Ricin, Monkeypox virus, and the avian influenza virus are a few that are recognizable from the news media. These are Select Agents and must be registered with both OH&S as well as the CDC.

#### *Controlled Substances*

Heroin, marihuana, pentobarbital, and diazepam (Valium®) are examples of controlled substances. These substances must be kept secured (locked up in a safe) when not in use. They are strictly controlled at UAB and by regulatory agencies. Researchers using controlled substances in their research must be licensed through OH&S and must complete the course *Use of Controlled Substances in Research, Teaching, and Veterinary Care at UAB* (CS 245).

#### *Gas Cylinders*

Chemicals inside compressed gas cylinders may be flammable, combustible, explosive, oxidizing, corrosive, or toxic. The sudden release of these materials can cause fire and/or explosions, exposure to toxic gases, or even asphyxiation (suffocation) if the released gas displaces room air.

**Compressed gas cylinders that are not secured properly can pose both chemical and physical hazards.** If you see gas cylinders that are not chained or bound correctly, report it immediately to your supervisor or manager.

## Hazardous Waste

Hazardous waste is any material that has been discarded, abandoned, or recycled and may have a negative impact on human health or the environment if it is improperly disposed of or spilled.\*

Hazardous waste is separated into five types at UAB:

- Hazardous chemical waste (example: chemicals)
- Universal waste (examples: batteries, lights)
- Low level radioactive waste (examples: tritium, contaminated items exposed to radiation)
- Biohazardous infectious waste (medical waste), and
- Nonhazardous waste or common trash.

This course is designed to cover only the hazardous chemical waste.



\* This definition has been reworded and reduced from the definitions provided by the Environmental Protection Agency (EPA), Alabama Department of Environmental Management (ADEM), and the Jefferson County Commission.

Every effort has been made to stay true to the original goals and purposes of all regulatory agencies involved with hazardous materials.

## Signage and Labeling

If you walk around your area, you may see signs posted. You should know how to read these signs as well as what to do if you need to go into the area where the hazards exist.

### ***Animal Facility Areas***

If you work in an animal facility, you may see an **Animal Use and Safety Information sheet (AUSI)** form on the door. If you *must* go into the room, **read the form first!** Make sure that you know what hazards may exist inside the room as well as what Personal Protective Equipment (PPE) to wear. Unless you have been properly trained or are with someone who has been trained, you should stay out of these areas.

### ***Radiation***

If you work in an area where radioisotopes are present, talk with your supervisor or manager about the possibility of exposure. You may also call OH&S if you have concerns. Most employees/students working in administrative or support positions in these areas usually have very low levels of exposure if any.












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## Pictograms

Pictograms are a new addition to labels that are a part of the Hazard Communication Standard (HCS). These pictograms are requirement for all chemical labels as of June 1, 2015. Please familiarize yourself with them now.

**HCS Pictograms and Hazards**

<p><b>Health Hazard</b></p>  <ul style="list-style-type: none"><li>• Carcinogen</li><li>• Mutagenicity</li><li>• Reproductive Toxicity</li><li>• Respiratory Sensitizer</li><li>• Target Organ Toxicity</li><li>• Aspiration Toxicity</li></ul>	<p><b>Flame</b></p>  <ul style="list-style-type: none"><li>• Flammables</li><li>• Pyrophorics</li><li>• Self-Heating</li><li>• Emits Flammable Gas</li><li>• Self-Reactives</li><li>• Organic Peroxides</li></ul>	<p><b>Exclamation Mark</b></p>  <ul style="list-style-type: none"><li>• Irritant (skin and eye)</li><li>• Skin Sensitizer</li><li>• Acute Toxicity</li><li>• Narcotic Effects</li><li>• Respiratory Tract Irritant</li><li>• Hazardous to Ozone Layer (Non-Mandatory)</li></ul>
<p><b>Gas Cylinder</b></p>  <ul style="list-style-type: none"><li>• Gases Under Pressure</li></ul>	<p><b>Corrosion</b></p>  <ul style="list-style-type: none"><li>• Skin Corrosion/Burns</li><li>• Eye Damage</li><li>• Corrosive to Metals</li></ul>	<p><b>Exploding Bomb</b></p>  <ul style="list-style-type: none"><li>• Explosives</li><li>• Self-Reactives</li><li>• Organic Peroxides</li></ul>
<p><b>Flame Over Circle</b></p>  <ul style="list-style-type: none"><li>• Oxidizers</li></ul>	<p><b>Environment (Non-Mandatory)</b></p>  <ul style="list-style-type: none"><li>• Aquatic Toxicity</li></ul>	<p><b>Skull and Crossbones</b></p>  <ul style="list-style-type: none"><li>• Acute Toxicity (fatal or toxic)</li></ul>



With the new changes implemented by OSHA and the Global Harmonized System (GHS), you should look for the appropriate pictogram or the signal word on labels.

### Other Hazard Warning Systems - NFPA

There are two other common hazard-warning systems used in the United States. One you will see most often is the National Fire Protection Association (**NFPA**). Look for these on large tanks that contain chemicals. Some areas/buildings may have these as well.

#### **Blue=Health**

The number and color indicates the health effects of the substance:

Numbers 0 - 4 indicates level of risk for health effects

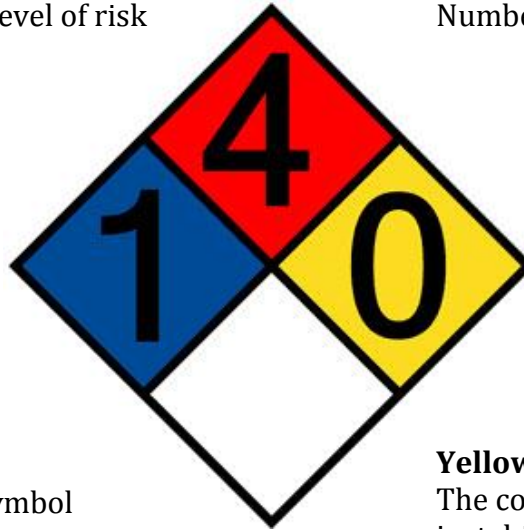
0 = little or no risk  
4 = extreme risk

#### **Red=Flammability**

The color and the number indicates the flammability of the substance:

Numbers 0 - 4 indicates level of flammability

0 = least flammable  
4 = extremely flammable



#### **White=Other**

Both the color and the symbol indicate if there are any special hazards associated with the material.

#### **Yellow=Instability**

The color and the number indicates the instability of the material:

Numbers 0 - 4 indicates level of stability

0 = normally stable  
3 or 4 = would explode in a fire

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### Other Hazard Warning Systems - DOT

The Department of Transportation uses placards and labels with warning symbols on trucks and boxes that contain hazardous materials here are examples of placards and the hazard classes they represent.



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## Manufacturer Label Requirements

The best method of protecting yourself and others from the hazardous materials in your area is to read the label **before** using the product. Hazardous materials are required to have labels written in **English**. Other languages may be present on the label, but regulations require the primary language to be English.

Original labels on the chemicals are the best source of information for obtaining information about the hazards, emergency information, and storage.

By law, the manufacturer's label **must**:

- identify the chemical substance by name
- give the contact information of the manufacturer
- contain any hazard or warning information appropriate for the chemical including
  - a hazard pictogram
  - a signal word
    - **Danger**
    - **Warning**
    - Danger is the more hazardous of the two.

SAMPLE LABEL	
<b>PRODUCT IDENTIFIER</b> CODE _____ Product Name _____	<b>HAZARD PICTOGRAMS</b> 
<b>SUPPLIER IDENTIFICATION</b> Company Name _____ Street Address _____ City _____ State _____ Postal Code _____ Country _____ Emergency Phone Number _____	<b>SIGNAL WORD</b> <b>Danger</b>
<b>PRECAUTIONARY STATEMENTS</b> Keep container tightly closed. Store in cool, well-ventilated place that is locked. Keep away from heat/sparks/open flame. No smoking. Only use non-sparking tools. Use explosion-proof electrical equipment. Take precautionary measure against static discharge. Ground and bond container and receiving equipment. Do not breathe vapors. Wear Protective gloves. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Dispose of in accordance with local, regional, national, international regulations as specified.	<b>HAZARD STATEMENT</b> Highly flammable liquid and vapor. May cause liver and kidney damage.
<b>In Case of Fire:</b> use dry chemical (BC) or Carbon dioxide (CO <sub>2</sub> ) fire extinguisher to extinguish.	<b>SUPPLEMENTAL INFORMATION</b> Directions for use _____ Fill weight: _____ Lot Number: _____ Gross weight: _____ Fill Date: _____ Expiration Date: _____
<b>First Aid</b> If exposed call Poison Center. If on skin (on hair): Take off immediately any contaminated clothing. Rinse skin with water.	

## Transferring Chemical Labels

Chemicals that are transferred to another container should have the following information.

- The name of the chemical on the new container
  - Use acronyms, abbreviations and formulas, **but also include the proper name of the substance.**

<b>Xylene</b> Irritant Toxic to blood, kidneys, nervous system, liver
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- All warnings and target organ information from the label of the original container on the new container

If you see unlabeled, unknown chemical containers in your area, ask those in your area if they can identify and label the container. If no one knows what is in the container, call OH&S.

However, there could be a charge for this service. Everyone in the area should immediately label transferred chemicals in the “new” container.

### Safety Data Sheets (SDS)

Federal law requires that Safety Data Sheets (formerly known as Material Data Sheets or MSDS) be sent with, or before, all hazardous chemicals the first time they are ordered by a facility. They must be available to employees whenever at the workplace. OH&S can assist you with ordering these if necessary.

## Spills

### Understanding Your Spill Plan

Hazardous material spills are an unfortunate consequence of working with hazardous materials. Because of the unique hazards of biological materials and infectious agents, a spill plan **must** be developed for the agents in your specific area.

Everyone working in the area should be familiar with the plan. Your area’s plan should include these four essential elements:

- Personal protective equipment
  - This should include a list of all the PPE you may need when a spill occurs in the area.
- Assessment of the extent and nature of the spill
  - In other words, what constitutes a large or small spill and could a small spill be considered large due to the nature of the substance or material.

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- Disinfection and methods of disinfection
  - Not all disinfectants work with all substances or materials.
- Disposal
  - What to do with the materials used to clean up the spill

A guide for developing a basic spill plan can be found on the Occupational Health and Safety web site.

### A Basic Spill Kit

There should be a spill kit readily available in all areas where hazardous materials are used or stored. They can be purchased “readymade” or assembled from readily available materials.



For more information about spills and spill kits, go to the OH&S website. There are several PDF files available to review and/or print.

### Spill Sizes

At UAB, spills are classified as small or large based on the volume of the spilled material.

1. Spills of 500 ml (one pint/two cups) or less are considered small.
2. Spills of less than 500 ml may be considered large spills if the material involved is particularly hazardous. (Call the OH&S Support Facility at 934-42487.)
3. Spills of more than 500 ml are considered large. (Call the OH&S Support Facility at 934-42487.)

### When a Spill Occurs...

If you are not trained to handle spills (whether it is a chemical, biohazardous, or radioactive spill), do not attempt to clean it up. It is critical that you do know where the eyewash stations

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and the hall showers are located should an emergency occur. Getting to these could prevent serious injuries and/or save a life.

### Emergency Information

For emergencies or spills during the normal business day, call the OH&S direct line – (205) 934-2487. They will direct your call to the proper person.

During non-business hours and holidays, please call the Director-on-Call through UAB Paging at 934-3411 or page 8744 through the online link [www.paging.uab.edu](http://www.paging.uab.edu).

### Conclusion

This concludes the OH&S Hazard Communications course.

### The Reality Check

In the next section of this course, you will be asked to respond to real life situations. This is **NOT** the assessment, but the assessment will be based on these scenarios. Answer carefully and quickly.

### The Assessment

Take the assessment after you have completed the reality check. You must score 80% or higher to pass.

You are allowed to take the assessment three (3) times. If you fail all three (3) attempts, it will be recorded on your transcript as a failed course and will not be removed. You will then have to re-enroll in the course.

## APPENDIX

### SECTION 1: Regulatory Overview

Regulations from the Federal and State government as well as local entities require this training. Chemicals and the disposal of them are highly regulated by the following agencies.

**United States Department of Transportation (U.S. D.O.T)**

**United States Environmental Protection Agency (U.S. E.P.A)**

**Alabama Department of Environmental Management (ADEM)**

**Jefferson Community Commission (JeffCo)**

**Occupational Safety and Health Administration (OSHA)**

UAB follows, **but is not regulated by**, the Occupational Safety and Health Administration (OSHA) guidelines for hazard communication, laboratory and chemical safety.

### SECTION 2: The Hazard Communication Standard

The Occupational Safety and Health Administration (OSHA) **has no regulatory authority** over UAB, but UAB strives to follow the OSHA [Hazard Communication Standard](#) as much as possible. This standard requires employers to inform workers about chemical hazards in the work place.

It specifies standards for:

- labeling hazardous materials in the workplace
- understanding how and when to use Safety Data Sheets (SDS) as well as the necessity of reading the original label
- completing an initial training course followed by completion of a refresher course every three years
- **having a required written plan**

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The purpose of the standard is to ensure that workers know the following information:

- what hazardous chemicals are present in the workplace
- where hazardous materials are stored
- how to properly store and handle the materials

### SECTION 3: UAB's Occupational Health and Safety (OH&S) Program

#### *Audits*

The Department of Occupational Health and Safety (OH&S), conducts random and required audits based on regulatory requirements and the potential for exposure.

Audits are to check:

- general safety and housekeeping problems
- environmental and personnel monitoring for exposure to hazardous chemicals
- proper chemical and waste handling

### SECTION 4: The Lab Standard and Lab Requirements

#### *The Lab Standard*

While the UAB OH&S Program is **not regulated** by OSHA, they do require that each laboratory follow **The Lab Standard**. As a part of The Lab Standard, each lab must have the following.

1. Its own **Chemical Hygiene Plan (CHP)**

Each lab must have a written Chemical Hygiene Plan (CHP) available to all employees working in the area. It should be specific to the individual lab or research group and address certain areas such as chemical inventories.

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For a [sample CHP](#), visit the OH&S website.

### 2. An appointed **Chemical Hygiene Officer (CHO)**, also known as a **Lab Coordinator**

Department heads or Principal Investigators (PIs) appoint Lab Coordinators (CHOs). They are responsible for:

- implementing and updating the Chemical Hygiene Plans
- ensuring that the laboratories they oversee have accurate and up-to-date chemical inventories
- conducting, arranging, and keeping up-to-date training records
- ensuring compliance with the Chemical Hygiene Plan (CHP)
- serving as the liaison with OH&S
- administering the Chemical Hygiene Plan (CHP)
  - This includes provisions for obtaining prior approval of especially dangerous procedures.

## SECTION 5: The Required Hazard Analysis

“A job hazard analysis is a technique that focuses on the job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. ...after you identify uncontrolled hazards, you will take steps to eliminate or reduce them to an acceptable risk level.”

*OSHA's Hazard Analysis*

A Hazard Analysis should include:

- an inventory of hazardous chemicals present in the work area
- a listing of hazards that materials present during routine use and emergencies
- an assessment of the work environment – examples include:
  - Is there sufficient lighting in work areas?

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- Are there trip hazards?
- Are there proper machine guards to provide adequate protection?
- Are there other hazardous conditions in the area?

Each building should have a building manager who has completed the **Building Life Safety for Campus course (GS 400)** and conducts building assessments from time to time.



[Occupational Exposure to Hazardous Chemicals in Laboratories](#), or OSHA's Lab Standard was written specifically to address chemical handling in the research setting. UAB follows the OSHA Lab Standard, but OSHA has **no regulatory authority** over UAB.