

# Personal Protective Equipment (PPE)

**NOTE:** This information is almost the same as the Flash file. Some of the wording was altered for this type of document. That wording will not change the content information nor will it affect the quiz questions.

## Who Is Responsible?

It is **YOUR** responsibility to protect **your** exposed skin, eyes, and respiratory system by using the appropriate PPE. This course covers:

- Choosing the appropriate clothing to wear underneath a lab coat or disposable gown,
- Wearing the correct shoes for work in a research lab,
- Restricting the use of cosmetics in the lab,
- Wearing a lab coat properly,
- Wearing the right gloves for the job,
- Choosing the appropriate eye protection,
- Using the correct respiratory protection, and
- Deciding if hearing protection is needed.

Disclaimer: Most of the names used in this course are fictitious and are not those of any actual persons – unless otherwise stated. However, some of the events have actually happened at other universities. When those are used, we will list the references to the articles.

## What Should You Wear? What Does UAB Say?

While *The You and UAB Handbook* does not specifically address the issue of personal protective equipment, or PPE, it does state that you must adhere to special dress standards or uniforms that have been established in patient care areas or in any other department or unit at UAB.

For more information, see [The You and UAB Handbook](#) page 64 – **7.5 Personal Appearance, Dress Code, and Uniforms**.

If you work in a research area, hazardous materials or conditions may also be present. Wearing the proper personal protective equipment (PPE) in a research area is critical and essential to ensuring your health and safety in a potentially dangerous environment.

Wearing the appropriate work attire really depends on the type of work you do. However, if you work with hazardous materials, objects, or animals, you need to cover as much skin as possible.

## Cover the Legs!

You should wear long pants and shoes that completely enclose your feet. These will act as a barrier of protection between you and the hazard. However, long pants should NOT drag the floor. They can pick up particles with contaminants and spread them across the floor. They can also absorb possibly contaminated liquids left on the floor.



If you have questions about your attire, ask your supervisor or manager.

It's best if your legs are covered, but we do acknowledge that basically anything that goes **below the knee is acceptable**. This includes:

- dresses,
- skirts,
- capris, and
- cargo pants.

## Appropriate Types of Shoes

Sandals, flip-flops, and open-toed or open-heeled shoes **should never be worn** when working around hazards. Canvas shoes may absorb liquids and are not advised.

To avoid spills, contamination, falling objects, and broken bones, wear shoes that completely enclose your feet – yes, even the heels. The thickness of the shoe depends on the type of work you perform.

## Accidents DO Happen

The next two stories are real. These accidents did not occur at UAB. They happened at other universities in their labs.

Only a few drops of a highly corrosive chemical caused these burns. The lab researcher was working at Berkley at the time. He didn't think he needed a lab coat or gown.



For more information, visit:

<http://www.ehs.berkeley.edu/lessonslearned/labslessons17.html>



Meet Sheharbano Sangji, known as Sheri to her friends, age 23. She was a student at UCLA. She was transferring a couple of ounces of tertiary butyl lithium from one container to another with a syringe on Dec. 29, 2008. When the plunger either ejected or was pulled out, a small amount of the hazardous chemical splashed onto her.

The highly flammable compound ignited upon contact with air and immediately caught fire. Sheri was using nitrile gloves to handle the chemical but was not wearing a lab coat or apron.

A co-worker extinguished the fire with his lab coat and doused her with water. Emergency responders immediately moved her to an emergency shower, drenching her with water before transporting her to the hospital.

It was too late. She had second- and third-degree burns over more than 40% of her body.

Sheri died two weeks later at Grossman Burn Center in Sherman Oaks, California.

For more information, visit:

<http://newsroom.ucla.edu/portal/ucla/lab-assistant-dies-of-injuries-78543.aspx>

In November 2007, a UCLA grad student working as a paid researcher suffered first- and second-degree burns on his hands and chest. The ethanol he was handling splashed onto his clothing and hands and was ignited by a Bunsen burner.



"On this day, the injured employee was wearing a polyester shirt over a cotton shirt," the report noted. "The polyester material melted, resulting in serious burn injuries on the employee's chest. "

Records show that the injured student made it to UCLA Medical Center's emergency room under his own power and was admitted to a burn unit the next day. He spent a week in the hospital.

The lack of protective PPE was a factor in both Sheri Sanji's fatal fire accident and this one.

For more information, visit:

<http://articles.latimes.com/2010/mar/13/local/la-me-ucla13-2010mar13>

## Wearing the Appropriate PPE

Yes, this picture was taken at UAB, but she is **not** wearing the correct clothing or PPE. There are several things wrong here.

1. She is wearing a sweatshirt. Sweatshirts are usually made out of polyester that is not flame retardant.
2. Sweatshirts tend to absorb liquids faster than most clothing.
3. She should be wearing a clean, buttoned lab coat as a barrier between her clothing and the chemicals.
4. Where are her gloves? She should be wearing the appropriate gloves to protect her hands.



We do not want you to make these mistakes here at UAB.

## The Absolute Basic Requirements for PPE

The basic PPE requirement is a clean, **buttoned** lab coat or properly tied gown and the appropriate gloves. Other PPE might be necessary depending on your job.

The University provides the appropriate PPE, but it's up to you to wear it on the job and wear it correctly. The lab manager, supervisor, or principal investigator should make sure that it is worn and worn correctly.

## Where to Find the Appropriate PPE

Many areas have their PPE (gloves, shoe covers, and disposable gowns) located near the entrance of a lab or facility.

Some PPE is located on rolling carts, but other facilities may have their PPE stored in cabinets in a separate room near the entrance.

## Contaminated or Possibly Contaminated PPE

A designated trash container should always be located near the exit to a lab or facility so that possibly contaminated PPE can be removed and disposed of **before** leaving the area.

There should also be a place to put non-disposable PPE, such as lab coats, for laundering. Never take your lab coat home to wash it! This could possibly contaminate you, your clothes, your vehicle, your family, and the other clothes in the washing machine.

Different areas have different rules for what should be done with dirty or contaminated clothing. Check with your manager or supervisor for more information.

## Disposable Shoe Coverings (or Booties)

Disposable shoe coverings (or booties) are required in ALL animal facility areas to protect research and prevent transmission of pathogen from one area to another.

Put the booties on when you enter the animal facility. Remove them and dispose of them **before** leaving the area.

If you have questions, contact the Animal Resources Program or your supervisor or manager.

## Door Postings and PPE

Due to the nature of some animal research, door postings for PPE and other considerations are necessary. Before entering an animal area that has this type of posting, make sure that you read and follow the instructions carefully.

As you can see here, a uniform or street clothes with lab coat or gown is required for entry into this area as are booties whether contact is made or not. Gloves are required only if physical contact is made. In some cases, a surgical mask is required.

OUTERWEAR REQUIREMENTS (May be augmented or superseded by outerwear requirements based on research-associated risks or personal susceptibility.) DO NOT WEAR OPEN-TOED SHOES or LOOSE JEWELRY.		
Minimum Required Outerwear	No Contact <sup>1</sup>	Contact <sup>2</sup>
Uniform OR Street Clothes		
Uniform OR Street Clothes with Lab Coat or Gown	X	X
Uniform with Lab Coat or Gown OR Street Clothes with Lab Coat or Gown		
Gloves		X
Surgical Mask		(X) <sup>3</sup>
Dust Mask N90 (Requires fit testing)		
N95 Mask (Requires fit testing)		
Goggles or Face Shield		
Bonnet		
Shoe Covers	X	X
Slip-resistant Shoes		
Ear Plugs		
Tyvek Suit		

<sup>1</sup>No Contact – Activity in animal room that does not require contacting animals or soiled cage equipment. Examples include entering room to observe animals, conducting census counts, checking environmental conditions, and restocking supplies.  
<sup>2</sup>Contact – Activity that requires physical contact with animals or soiled cage equipment. Includes cleaning cages and moving animals into or out of cages. Recommendations for outerwear applicable regardless of whether contact occurs in animal housing area, procedure room, lab, or field situation.  
<sup>3</sup>(X) – Surgical masks should be worn if cages are not opened in a biosafety cabinet.

If you have questions, contact the Animal Resources Program or your supervisor or manager.

## Lab Coats or Disposable Gowns

Always wear a clean buttoned lab coat (or disposable gown) and the appropriate gloves when working with hazardous materials. Lab coats or disposable gowns...

- Act as a barrier between you and infectious substances, chemicals, hazardous waste, and flying objects,
- Help delay the transfer of hazardous materials to your clothes and skin,
- Protect your clothes from possible contamination
- Protect lab equipment, materials, specimens, patients, and animals from contamination from you
- Should remain in the area where they are used. They should not be worn outside of the area no matter where you are going – into a break room, from one building to another one, out to lunch or taken home. This protects you, your co-workers, your work and others from the possibility of contamination.

## Gloves

Never put on, or don, gloves just because they are in a lab or are readily available. **Read the label** and determine if the glove is best for the hazard that you'll be working with.

Also, one type of glove does not work for all types of chemicals and/or hazardous materials. The following are examples of different types of gloves and the hazards.



The glove shown on the left is made of latex. It is a basic type of rubber glove good for wearing while working with some water-based chemicals and/or hazardous materials. If you have an allergy to latex, you use should Nitrile gloves.

The blue gloves on the right are Nitrile gloves. Made of synthetic material, they contain no latex proteins. They offer excellent resistance to punctures and tears. Nitrile gloves are three times more puncture resistant than rubber and can be used to offer superior resistance to many types of chemicals.

Both are commonly found in medical areas and in laboratories, but this does not mean that they can be used for everything.

## Types of Gloves



Leather gloves are most often found in construction areas and may be cut-resistant. These are useful when working with abrasive materials.



Neoprene gloves are made from synthetic rubber that is highly liquid-proof and chemical-resistant. They are great for specialized chemical applications involving acids, caustics, oils, alcohols, and solvents, but they are not very flexible.



Butyl gloves are highly flexible and made from cheap rubber. These are useful for handling some types of strong corrosives, acids, or solvents.



Heat resistant gloves can be found on UAB's campus in areas where autoclaves and other heat or steam cleaning machines are used. Here you see a UAB employee removing sterile drinking bottles from a rack washer located in one of the animal facilities.



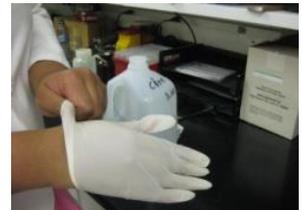
Cryogenic gloves are required when handling liquid nitrogen. These gloves usually have thermal protection built in since they are designed to work in ultra-cold temperatures. They can be water-resistant or waterproof.

If you have questions, call OH&S for more information.

## The Proper Way to Don Gloves

Before donning your gloves, you may want to remove any jewelry that could puncture the gloves. This is only a suggestion. It is not a requirement.

- Pick up the first glove and slip the open end of the glove over the hand and thumb.
- Gently pull the glove on to avoid tearing or ripping it. In this picture, she has her thumb inside the glove, but her fingers are curled around the edge of the glove.
- Make sure that the fingers and thumb of the glove fit correctly.
- Pull the glove up around the wrist.



- Repeat the procedure with the other hand. In this picture, she has the thumb tucked inside and the fingers curled around the edge of the glove to pull it on just like the first one.



- Both gloves should feel like they fit properly without being too loose or too tight. If you are wearing a disposable gown, the top of the glove should go over the gown's cuff area to provide complete protection.

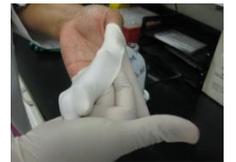


## Properly Doffing Your Gloves

To remove or doff your gloves, gently pick up the edge between two fingers and pull down.



Place your gloved fingers under the edge (as shown in this picture) and continue to pull the glove off.



Keep pulling until the glove is off and inside out on your remaining gloved hand.



Stick one finger from the ungloved hand down into the glove. Remember to hang on to the glove you just removed in your gloved hand!



Grab the underside of the glove with the fingers of your ungloved hand.



Gently pull until the glove covers the first glove you removed.



Continue to gently pull until the glove covers the first glove you removed.



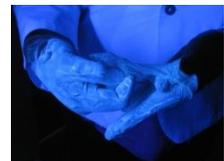
Both gloves should be inside out.



PLACE the gloves in the proper waste receptacle. Slinging or tossing them could spread contaminated materials.

### **Are YOU Contaminated When You Remove Your Gloves?**

You are about to see what happens when a professional removes her gloves. She removes her gloves properly being careful not to spread contamination that she can't see in normal light.



Even after properly removing her gloves, she still has contamination on her fingers and hands. Fortunately, it was Glow Dust on her gloves and NOT contaminated materials.

Watch the video of the Biobabes singing – “Stop and Remove Your Gloves!” on the home page.

### **Wash Your Hands**

Always wash your hands after doffing your gloves. Washing your hands eliminates most contaminants.

If it helps, sing! Singing “Happy Birthday to You” or “Old MacDonald Had a Farm” twice while washing means that you’ve spent enough time, soap, and water to ensure cleanliness. It may be silly, but you’ll have clean hands.

## Eye Protection



Goggles



Safety Glasses



Face Shield

Many jobs may not need or require eye protection. However, if the materials you are working with pose any danger to your eyes, wear the appropriate protective gear — such as goggles or a face shield. There is NO cure for blindness.

Goggles are primary protectors intended to shield the eyes against liquid or chemical splash, irritating mists, vapors, and fumes. Most are made of soft, but durable plastic.

Safety glasses are also primary protectors usually worn when performing tasks such as chipping, grinding, machining, masonry work, riveting, sanding, and when working with materials that may break or explode posing a danger to the eyes. Safety glasses are sturdier than normal glasses or goggles. Some are heat resistant.

Face shields are **secondary** protectors intended to protect the entire face against exposure to splashes.

Reusable goggles, safety glasses, and face shields should be cleaned using the appropriate cleaner on a regular basis and especially after every exposure. They should be replaced when they become too scratched, marked, or damaged to use safely. See your supervisor, manager, or OH&S for more information.

These individuals are not wearing eye protection PPE – glasses, goggles, or a face shield. The consequences could be serious injury resulting in impaired vision or blindness. Your vision needs to be protected daily. As we've said before, there is no cure for blindness.

## Respiratory Protection

Depending on the type of task being performed, a respirator may be required for your job. The respirator must be selected for the specific hazard.

The N95 disposable mask looks like a dust mask that a painter might wear. However, there is a big difference. N95 masks have been certified and approved by the U.S. Government.



The N95 mask is designed to reduce exposures to airborne particles – not eliminate them. They have a filtration efficiency of at least 95% against solid and liquid particles that do not contain oil. So you should be protected against most, airborne particles, chemical splashes, and biological agents.

If your job requires a respirator, you must have medical clearance according to the UAB Employee Health Program and the respirator must be fit-tested on an annual basis or if the type or manufacturer of respirator changes.



For more information, visit:

[http://www.youtube.com/watch?v=E6c6Va2lGPU&feature=player\\_embedded](http://www.youtube.com/watch?v=E6c6Va2lGPU&feature=player_embedded)

## Hearing Protection

“Noise is not a new hazard. Too much noise exposure may cause a temporary change in hearing (your ears may feel stuffed up) or a temporary ringing in your ears (tinnitus).

These short-term problems usually go away within a few minutes or hours after leaving the noise.

However, repeated exposures to loud noise can lead to permanent tinnitus or noise induced hearing loss.

We recommend reducing noise in the workplace whenever possible. Use hearing protectors in those situations where dangerous noise exposures have not yet been controlled or eliminated.” *(adapted from the CDC/NIOSH website on noise)*

When should you wear ear protection? Listen to your conversations during the noise.

- When noise levels are above 80 decibels (dB), people have to speak very loudly.
- When noise levels are between 85 and 90 dB, people have to shout.
- When noise levels are greater than 95 dB, people have to move close together to hear each other and speak loudly.

If the noise is prolonged or you must shout to be heard, you may want to ask your supervisor or manager about ear protection.

There are two types to choose from – the ear muffs or soft internal plugs.

The ear muff type should completely cover the ear and block most of the noise.



If you use soft ear plugs, they should be put in with clean hands and inserted properly. Visit the site below, Roll, Pull, and Hold, to view a Center for Disease Control web page on how to insert them properly.

<http://www.cdc.gov/niosh/mining/topics/hearingloss/earplug.htm>

If you aren't sure about decibels, visit the site listed below (Decibel Examples) to listen to different noise levels.

[http://www.cdc.gov/niosh/topics/noise/about/np/nisemeter\\_flash/soundMeter\\_flash.html](http://www.cdc.gov/niosh/topics/noise/about/np/nisemeter_flash/soundMeter_flash.html)

## Long Hair

If you have long hair and work around chemicals, infectious materials or open gears, we strongly recommend pulling your hair back or wearing a hair cap to avoid accidental injury or contamination.

Long, loose hair could easily be caught in machinery, contaminated by chemical, radioactive or infectious substances, or catch fire near an open flame.

Recently a Yale student died when her hair caught in a laboratory machine. For more information, visit <http://www.azcentral.com/news/articles/2011/04/14/20110414yalestudent0414.html>

## Wearing vs. Applying Cosmetics in the Lab

You may wear cosmetics, including lip balm, inside the lab or in areas where hazardous materials and/or chemicals are located. However, you may **not** apply them inside the lab or area. Applying cosmetics, even lip balm, in a lab or an area where hazardous materials are used, could pick up particulates and get in your system (by directly entering your mouth).

To prevent contamination, apply cosmetics before entering the area or after leaving the area. Wash your hands **before** applying cosmetics to minimize the chance of contaminants.

## No PPE or Incorrect PPE = Violations and/or Disciplinary Action

Meet Dr. J – a researcher whose staff uses radioactive materials on a daily basis. These are great employees, but they forget to remove their PPE before going to break rooms, bathrooms, and administrative offices. They not only risk contaminating everything they touch, but they risk contaminating others along the way.

Recently, State Inspectors witnessed one of Dr. J's staff leaving the lab without removing any of her PPE. She drank from the water fountain, went to the bathroom, took a break in the break room, and then returned to work. Tests proved that she contaminated everything she touched.

Dr. J received a citation for the employee's actions.

Unacceptable PPE, or lacking the proper PPE, or wearing it in areas where you shouldn't **may** be cause for disciplinary action.

## The End

This concludes the OH&S Personal Protective Equipment course. Please return to the home page of this course to take the quiz. 80% or higher is required to pass.