THE UNIVERSITY of TENNESSEE KNOXVILLE

TCE Laboratory Safety Day

Nuclear Engineering

8/15/2024

Our Purpose

- General Safety Training Requirements
- Provide access to resources to meet safety needs
- Communicate safety expectations of the university and the department
- Ensure a safe and productive research environment

College Safety Culture

THE UNIVERSITY of TENNESSEE KNOXVILLE

C

Cutting Edge Safety
Cutting edge engineering requires cutting edge safety.

U

Unity of Effort
Every instructional or research laboratory has safe operations as a result of a unified effort within the community to appreciate and practice safety culture.

L

Leadership
Leaders will encourage participation by all to achieve and improve laboratory safety.

T

Transparency
A transparent environment is encouraged; learning from successes, near-misses and incidents never stops.

U

Understanding
A shared understanding of strong safety culture exists between our corporate partners and the employers of our students.

R

Respect
Students, staff, and faculty members will all articulate safety concerns because they are all respected and trusted.

E

Everybody, Every Task, Every Time
Everyone is responsible for ensuring safe operations for every task, every time.

This website is a great starting place to ensure safety and compliance: https://tickle.utk.edu/research/safety/

Nuclear Safety Culture

- The NRC defines nuclear safety culture as the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment.

- The NRC's Safety Culture Policy Statement includes a list of nine traits further defining a positive safety culture.

Nuclear Safety Culture

- Leadership Safety Values and Actions
- Problem Identification and Resolution
- Personal Accountability
- Work Processes
- Continuous Learning
- Environment for Raising Concerns
- Effective Safety Communications
- Respectful Work Environment
- Questioning Attitude

General Safety Training Requirements

- Most training is online via Canvas
- Open source training is in-person and must be scheduled in advance
  - Radiation safety office facilitates closed/open source, X-ray, and laser safety training
  - You must contact Radiation Safety to be added to a course (jholber2@utk.edu)

Training	Training Location
Undergraduate/Minor lab safety (UG only)	Canvas
Electrical Safety Awareness (Intro)	Canvas
General Lab Safety Training	Canvas
Hazardous Communication Training	Canvas
CHP Training (by PI)	See the PI
Hazardous Waste & Chemical Spills Training	Canvas (separate from other EHS)
PPE Training	Canvas
Fire Extinguisher Training	Canvas
Gas Cylinder Training	Canvas
Chemical Fume Hood Training	Canvas
Lead (Pb) Training	Canvas
Closed Source Training	Online – Radiation Safety Department
X-ray Radiation Safety Training	Online – Radiation Safety Department
Laser Safety Training	Online – Radiation Safety Department
Hydrofluoric Acid Training	Canvas

General Safety Training Requirements

- **Hazardous Communication Training** is updated when a new review of the CHP is required
- **Hazardous Waste Training** is required annually by TDEC
- **Fire Extinguisher Training** required annually by OSHA

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Laser Safety Training	Online – Radiation Safety Department
Hydrofluoric Acid Training	Canvas

General Safety Training Requirements

- All laboratories must have a list of required training to enter the lab
  - Additional training is process specific through SOPs or more advanced sessions for tasks that are particularly hazardous
- Keys/card access will not be granted unless proof is provided
  - Students, staff, and faculty must have completed all training
  - Everyone entering a laboratory space unescorted or working in the space must have had access granted to them
    - When giving tours, **hazards should be communicated** to the guest before entering the space (see door placard)
    - **Non-compliance** with this policy will result in individuals retaking all training modules **before access is granted again**

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Hydrofluoric Acid Training	Canvas

General Safety Training Requirements

- Our website: https://ne.utk.edu/safety/
  - Training matrix by lab consistent with CHP for that lab
  - Dosimetry request form
  - Accident reporting process

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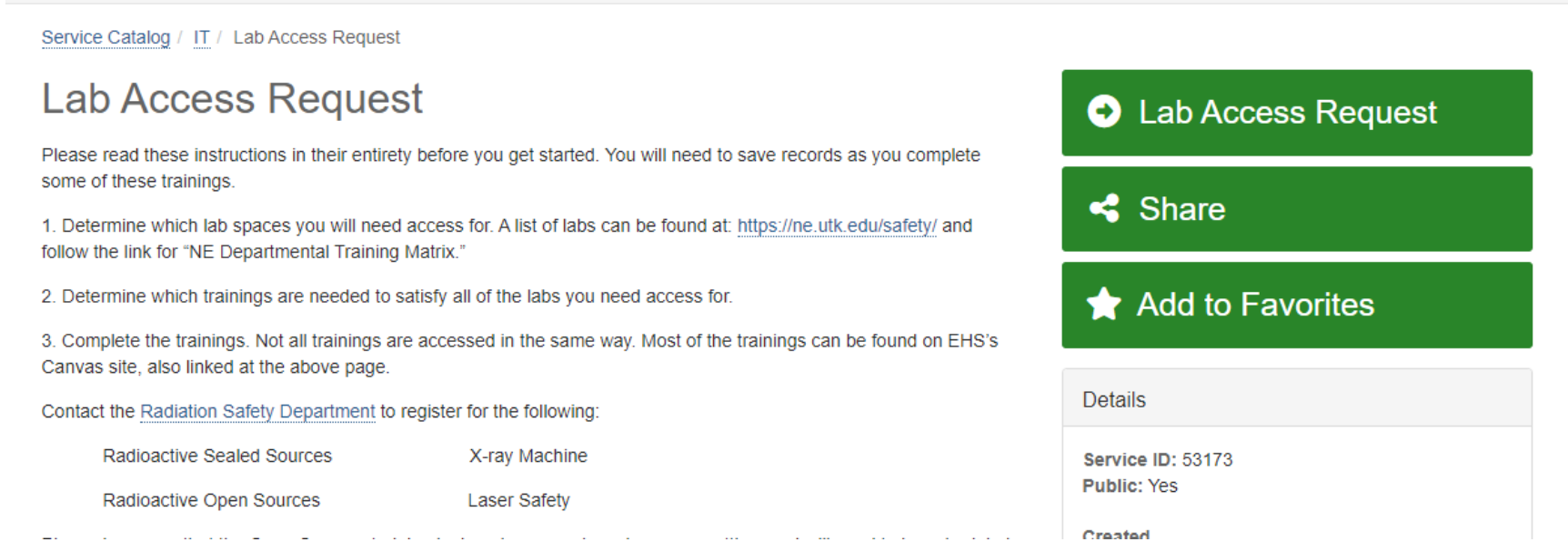
Hydrofluoric Acid Training	Canvas

Training Matrix – still being updated

Location	PI	Chemical Fume Hood	Compressed Gas Cylinder	Electrical Safety	Fire Extinguisher Training	General Lab Safety	Hazard Communication & GHS	Hazardous Waste Management	Hydrofluoric Acid Annual	Lead (Pb) Awareness	PPE Training	Radiation Safety: Closed Source	Radiation Safety: Open Source	Radiation Safety: X-ray	Radiation Safety: Laser	Bloodbourne Pathogens	BioSafety Principles	Animal Use and Care IACUC
ZEC Nuclear Suite	Dept		X	X	X	X	X	X		X	X	X	X	X				
ZEC G102/G104	Coble	X		X	X	X	X											
ZEC G110	Dept			X	X	X	X	X		X	X	X	X					
ZEC G116A	Hayward			X	X	X	X	X		X	X	X	X	X				
ZEC G116B	Hines/Hayward			X	X	X	X	X		X	X	X	X					
ZEC G118	Dept		X	X	X	X	X				X							
ZEC 110	Heilbronn/Lukosi /Dept	X	X		X	X	X	X	X		X	X	X					
ZEC 111	Zinkle	X	X		X	X	X	X			X							
ZEC 113	Lang/Dept	X	X			X	X	X			X							
ZEC 115	Lang	X	X			X	X	X			X	X			?			
ZEC 115 A	Lang	X	x			X	X	X			X	X	X					
ZEC 115 B	Lang	X				X	X	X			X	X						
ZEC 117	Donovan		X	X		X	X				X							
ZEC 211	Chaple/Hall	X	X			X	X	X			X							
ZEC 212	Chaple		X			X	X	X			X	X	X			X	X	X
ZEC 214	Chaple	X	X			X	X	X			X	X	X			X	X	X
ZEC 215	Hayward		X			X	X	X		X	X	X						
ZEC 216	Chaple	X	X			X	X	X		X	X	X	X			X		X
ZEC 218	Hall					X	X	X			X							
ZEC 511	Hayward																	
SERF 106	Hall					X	X	X			X							
SERF 107(Storage)	Hall					X	X	X	X		X	X	X					
SERF 108	Hall/Shared					X	X	X			X							
SERF 309	Ang	X	X	X	X	X	X	X	X		X							
SERF 519	Hall	X	X			X	X	X	X		X	X	X					
SERF 522	Hall	X	X			X	X	X	X		X	X	X					
SERF 530	Hall	X	X			X	X	X			X							
SERF 531/531A	Hall	X	X			X	X	X	X		X	X	X					
TIBML	Hattar	X	X	X	X	X	X				X	X		X	?			
IAMM 204	Lukosi		X				X	X				X		X	?			
IAMM 206	Lukosi	X	X		X	X	X	X			X	X						
IAMM 216 CR	Lukosi	X	X		X	X	X	X	X		X							
IAMM 258	Zinkle		X			X	X	X			X							

How to submit training records

- New for Fall 2024, we will be using an online ticket system for submittal of training records
- tiny.utk.edu/nukelabs



Service Catalog / IT / Lab Access Request

Lab Access Request

Please read these instructions in their entirety before you get started. You will need to save records as you complete some of these trainings.

1. Determine which lab spaces you will need access for. A list of labs can be found at: https://ne.utk.edu/safety/ and follow the link for "NE Departmental Training Matrix."

2. Determine which trainings are needed to satisfy all of the labs you need access for.

3. Complete the trainings. Not all trainings are accessed in the same way. Most of the trainings can be found on EHS's Canvas site, also linked at the above page.

Contact the Radiation Safety Department to register for the following:

Radioactive Sealed Sources	X-ray Machine
Radioactive Open Sources	Laser Safety

Lab Access Request

Share

Add to Favorites

Details

Service ID: 53173
Public: Yes

Created

Also new for Fall 2024

- ~~The mixture of Annual and Tri-Annual trainings is a source of confusion for many in our department~~
- ~~Starting August 31, 2024, all required safety training will be renewed on an **annual** basis~~
- All safety trainings due that year should be refreshed in the month following the start of the Fall semester, regardless of when the previous training was completed

Why the changes?

- This will synchronize the training schedules, eliminating reminders to retrain throughout the year
- This change allows us to “purge” old records and move them to archival storage
- This change eliminates the need to continuously review training records throughout the year, removal access in the middle of a semester, or even on a holiday

Chemical Hygiene Plan (CHP)

- Every laboratory is required to have a CHP
  - One CHP can be used for multiple lab spaces **if and only if** they have the same significant hazards
    - Example: chemical processing in one lab and none in another should result in two CHPs, one for each laboratory
  - This is reviewed annually during EHS inspections
  - You can download the template here: https://ehs.utk.edu/index.php/table-of-policies-plans-procedures-guides/chemical-hygiene-plans/
- The campus CHP does not need to be duplicated in lab-specific CHPs
- We will go over the more important documents now

CHP Sections

- I strongly encourage you all to review your CHPs in depth, especially as your work evolves/changes

Getting Started

Your lab's Chemical Hygiene Plan will be completed in **three steps**.

1. **Download the Campus Plan**
2. **Complete Lab Specific Plan Sections and Forms**
3. **Store the CHP in a accessible location**

Step 1 – UTK Campus CHP

Download the Campus Plan provided by EHS. This document contains all parts of the plan that you do not have to fill out.

See what parts are in the campus plan

Step 2 – Lab Specific Forms by Topic

Complete the following forms as needed for your lab to complete the Lab Specific Requirements. They include Appendix A and other Appendices.

Note: Most sections will be completed once and some, such as the SOP form, may have several versions for separate procedures.

- LabSpecific-Instructions
- Sec00-Cover
- Sec01-Personnel
- Sec02-Laboratory Room Locations
- Sec03-Lab-Specific Rules & Requirements
- Sec04.1-SOP-Form
- Sec04.2-TaskTableForm
- Sec05-Orientation Checklist
- Sec06.1-Master List of Required Training
- Sec06.2-Documentation of Training
- Sec07-Prior Approvals
- Sec08-SDSs and Inventory of Hazardous Chemicals
- Sec09-Exposure Monitoring Records
- Sec10-References
- AppE(Tool)-PPE Training Certification Form
- AppF-Chemical Spill Response

Step 3 – Store the Completed CHP

Store the combined CHP in an accessible location. EHS requests that you update the Chemical Inventory File located in the Chemical Inventory SharePoint Site; A paper copy in a binder may be prudent as well.

Chemical Hygiene Plan (CHP)

- LS-20-CHP-AppA-LabSpecific-Sec01-Personnel
  - This document must include all persons with access to the lab
- LS-020-CHP-AppA-LabSpecific-Sec03-Lab-Specific-Rules-Requirements
  - This document outlines general laboratory requirements, such as you must wear a minimum set of PPE when entering
- Folder called “Section 4.1 SOPs”
  - This is where all **PI-generated** SOPs must be stored

The standard operating procedure

- The template may be downloaded here: https://ehs.utk.edu/wp-content/uploads/2020/02/LS-020-CHP-AppA-LabSpecific-Sec04.1-SOP-Form.pdf
- Document contains a description of the work/procedure, a full list of hazards/chemicals involved, required PPE, location of work, controls (engineering, administrative), waste generation and disposal, additional training (if any), etc.
  - PIs may generate their own SOPs if the template is insufficient

LS-020-CHP-AppA-LabSpecific-Sec04.2-TaskTableForm

- LS-020-CHP-AppA-LabSpecific-Sec04.2-TaskTableForm
  - This document contains a simple list of primary hazards, effects, and required PPE

4.2 Task Table

Prepared By: Eric Lukosi **Revision Date:** 2/22/22

*For many procedures, a simple description of the tasks, the associated hazards, and the PPE required to mitigate risks is acceptable. This table is **not appropriate** for work involving Particularly Hazardous Substances or for use of chemicals that pose a high risk due to reactivity or other properties. This table is appropriate for describing safety requirements for miscellaneous tasks performed in a laboratory.*

Task	Hazard Description	Required PPE and Engineering Controls
Chemical processing	Burns and fires	Fume hood, gloves, lab coat, eye protection
Radiation use	Cancer and Acute Effects	Dosimeter and proper shielding
Liquid Nitrogen	Burns	Cryogloves, goggles, face shield, leather shoes, no cuffs on pants

Chemical Hygiene Plan (CHP)

- Section 5: Orientation Checklist
  - Must be filled out for everyone listed on section 1 of the CHP
- LS-020-CHP-AppA-LabSpecific-Sec06.1-Master-List-of-Required-Training
  - This document lists what training is required to enter the space
    - This is where another CHP is needed as training for one lab space may not be the same for another laboratory space
  - This training should be all-inclusive for all SOPs in the laboratory **to ensure safety of students/staff**, even if they are not conducting all experimental procedures taking place in said laboratory

Chemical Hygiene Plan (CHP)

- LS-020-CHP-AppA-LabSpecific-Sec07-Prior-Approvals
  - This document refers to a PI's specific approval for a particularly hazardous process
  - This document could be used to sign off on all students for being trained on an SOP, but is not required
    - Excessive time consumed signing via Adobe for each SOP and student
- LS-020-CHP-AppA-LabSpecific-Sec09-Exposure-Monitoring-Records
  - This is for processes where the *permissible exposure limit (PEL)* may be exceeded over the reporting period. Work with radioactive materials requires consultation with radiation safety.

Chemical Hygiene Plan (CHP)

- LS-020-CHP-AppA-LabSpecific-Sec10-References
  - This is another location where you can link to websites or other entities for reference to items not contained within the CHP
  - Reference to journal articles, reports, etc. for particularly hazardous processes are useful to backup scientific approach and supporting evidence for required training to maximize outcome (**safety and results**)

Chemical Hygiene Plan (CHP)

- LS-020-CHP-AppF-**Chemical-Spill-Response**
  - Students are not faculty and we cannot assume the same level of respect for or response to a dangerous situation
  - The SOP must identify the appropriate response for all experiments in the case of an accident, not just a chemical spill
  - Appropriate pads are required for chemical spills and are easily found online
    - Example: https://www.absorbentsonline.com/hazmatpadsrolls.htm

Chemical Hygiene Plan (CHP)

- Section 8 SDSs and Inventory of Hazardous Chemicals
  - SDS for all chemicals/materials should be placed in this folder
  - The inventory should be updated when new chemicals are ordered and when old chemicals are disposed (**also on SharePoint**)
  - **EHS will check this list during annual inspection**
- Section 11 Appendix E PPE Training Certification Forms
  - This document certifies that the PI has properly trained each person on what PPE is required and how to use, inspect for damage, and dispose it
  - Every person working under this CHP must fill out this form and have it signed by the PI

Chemical Hygiene Plan (CHP)

- EHS states that every laboratory should have a physical copy for each laboratory space but can have a digital copy if everyone using the laboratories has access to the CHP
  - Student training will be stored by the department (through the new ticket system). A document in section 6.2 stating where the training records may be found is necessary
  - Signing the SOPs
    - Include a document for each person that states that they have read and received approval by the laboratory PI for a provided list of SOPs
    - Could also list this on "Sec07-Prior Approvals," but this will be more work for the PI (repeating digital signatures versus one per student)

Chemical Hygiene Plan (CHP)

- **Every student is required to read the CHP and sign these forms, which are stored in the CHP**
  - Acknowledgement of training for specific SOPs (section 4.2)
  - Certification that all training has been completed and is up-to-date (section 6.2)
  - Orientation checklist (section 5)
  - Ensure name is added to section 01, Personnel document
  - Section 11, Appendix E PPE training certification form
- The PI is responsible for the safety of all employees, and the most critical step is fully understanding the CHP and relevant SOPs

Chemical Inventory

- The University performs their inventory process with Safety Stratus.
  - https://ehs.utk.edu/index.php/safety-stratus/
- All chemicals present in each space need to be included here
  - In an emergency, EHS needs to tell emergency responders what is in the lab so they can safely execute operations
- The inventory in section 8 of the CHP can simply point to this location, but a consistent record between the two locations is ideal

Summary of Important CHP Requirements

- Every lab needs a CHP
- All SOPs need to be evaluated periodically
- All chemicals need to be listed on the UTK Safety Stratus system
- All personnel, including students, need
  - Acknowledgement of training for specific SOPs (section 4.2)
  - Certification that all training has been completed and is up-to-date (section 6.2)
  - Orientation checklist (section 5)
  - Ensure name is added to section 01, Personnel document
  - Section 11, Appendix E PPE training certification form

Door Placard

- The door placard is a quick reference of all hazards in the lab, special hazards of particular risk (e.g., HF processes), and emergency contacts
- Should be consistent with the CHP
- To make or modify the placard, download the template, modify in Adobe (not browser), and submit to the lab placard coordinator
  - https://ehs.utk.edu/index.php/laboratory-safety/lab-safety-administration/lab-door-placards/


THE UNIVERSITY OF TENNESSEE KNOXVILLE

Building: SERF Room #: 888
Department: Dept. of Science & Engineering
Lab Type: Polymer Synthesis Rev.Date: 03/20/2015

CAUTION: The Selected Hazards May Be Present

BIOHAZARD ☐ BSL Class:__ | Explosive/Reactive ☐ | Gas Cylinder ☑ | Acutely Toxic ☑ | Exclamation Mark ☑
Materials ☐ X-ray: ☐ | Flammable Materials ☑ | Corrosive Materials ☑ | Health Hazard ☐ | Oxidizers ☑

Other Hazards
☐ Laser(s) (Class ____)
☐ High Pressure Equipment
☐ High Voltage ≥ 480 Volts
☐ Natural Gas
☑ Air/Water Reactive
☑ Hazardous Waste Storage
☑ Cryogenic Materials

Special Hazards or Precautions
Flammable liquids stored in flammable storage cabinet. Air/Water reactive chemicals stored in glove boxes under nitrogen.

Required PPE & MSDS/SDS Location
Eye protection and lab coat must be worn in lab work areas.
Safety Data Sheets located in notebook near main door.

Contact Information

	Office Phone	Home/Mobile
Principle Investigator	865-974-0000	865-555-1234
Primary Contact (PI) Post Doc	865-974-0000	865-555-1234
Secondary Contact Safety Officer	865-974-0000	865-555-1234
Dept. Safety Officer Department Head	865-974-0000	865-555-1234

Emergency Contact

Police/Fire/Medical:	911
UT Police:	974-3111
EHS	974-5084

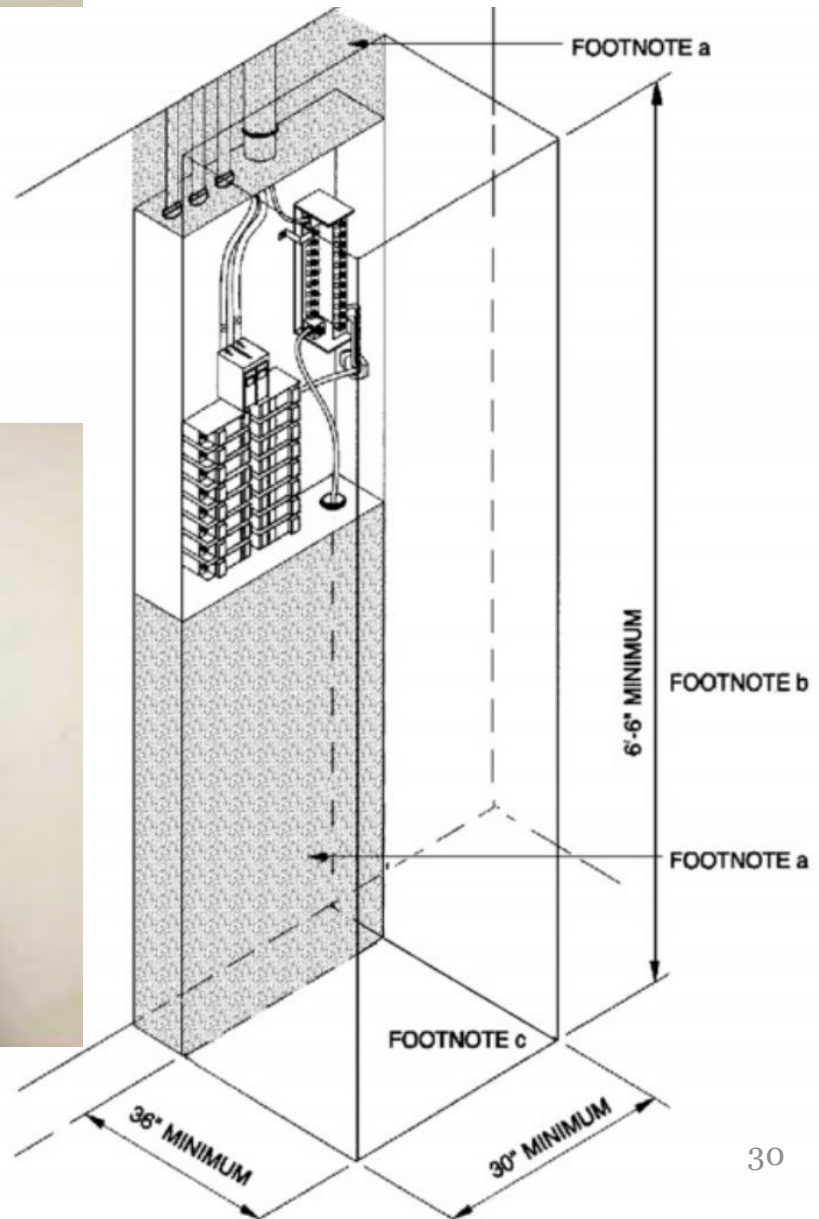
Information is to be updated as information changes or annually, whichever comes first. For questions about this posting please contact Environmental Health and Safety.

Door Placard

- I have noticed a few of these are in need of updating, so I will be requesting time with each of you to do an in-person walkdown of your lab spaces to help ensure the placards are correctly filled out
- There are numerical criteria for many of these hazards, and I have put together a checklist to simplify this task

Disconnect boxes

- Do not attempt to work with live wires or circuits (**>50 V maximum**). This must be coordinated with facilities services
- To limit fire hazards, no materials may be stored or placed within the working area
  - 36-48 inches wide
  - 36 inches in front
  - 78 inches high



https://up.codes/viewer/virginia/va-residential-code-2012/chapter/34/general-requirements#E3405.1

Chemical Showers, Eyewash, and First aid

- No items may be stored under or along the wall of safety showers
- Eyewash stations must be clear of obstacles
- Eyewash stations must be checked **weekly** with a local log for evidence
- Every laboratory needs a first aid kit that is not expired
  - These may already be in your lab upon move-in, but they need to be periodically changed
  - Special first aid items must not be expired (e.g., calcium gluconate gel)

Food, Drink, and Appliances

- The probability that a lab space is suitable for food and/or drink is unlikely
  - This includes coffee makers, minifridges, and microwaves
- If you believe that this is permissible, please email me to evaluate the space for safety compliance
- If storing chemicals in a cold environment, ensure the compatibility of the fridge with the chemicals
  - If they are flammable, they cannot be placed in a **dorm-style minifridge!!!**

Appropriate Gloves for the Job

- There are many glove options, and the PI must make it clear to their personnel what is safe and what is not
  - Thermal gloves are not suitable for liquid nitrogen
  - Nitrile gloves are not compatible with acetone
- Each vendor will list different compatibilities for different chemicals
  - The thickness of the glove matters!
- General guidance can be found here, but it is not all-inclusive
  - https://www.aaesi.com/ansell_8th-edition-chemical-resistance-guide/

Table of Glove Suitability by Type and Chemical

8th EDITION Permeation/Degradation Resistance Guide for Ansell Gloves

The first square in each column for each glove type is color coded to provide an overall rating for both Degradation and Permeation. The letter in each colored square is for Degradation alone.

- GREEN: The glove is very well suited for application with that chemical.
- YELLOW: The glove is suitable for that application under careful control of its use.
- RED: Avoid use of the glove with this chemical.

SPECIAL NOTE: The chemicals in this guide highlighted in BLUE are experimental carcinogens, according to the ninth edition of Sax' *Dangerous Properties of Industrial Materials*. Chemicals highlighted in GRAY are listed as suspected carcinogens, experimental carcinogens at extremely high dosages, and other materials which pose a lesser risk of cancer.

CHEMICAL	LAMINATE FILM BARRIER™			NITRILE SOL-VEX®			UNSUPPORTED NEOPRENE 29-SERIES			SUPPORTED POLYVINYL ALCOHOL PVA™			POLYVINYL CHLORIDE (Vinyl) SNORKEL®			NATURAL RUBBER *CANNERS AND HANDLERS™			NEOPRENE/ NATURAL RUBBER BLEND *CHEMI-PRO®			BUTYL UNSUPPORTED CHEMTEK™ BUTYL			VITON/BUTYL UNSUPPORTED CHEMTEK™ VITON/BUTYL		
	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate
1. Acetaldehyde	■	380	E	P	—	—	E	10	F	NR	—	—	NR	—	—	E	13	F	E	10	F	—	—	—	—	—	—
2. Acetic Acid, Glacial, 99.7%	■	150	—	G	158	—	E	390	—	NR	—	—	F	45	G	E	110	—	E	263	—	E	>480	—	DD	>480	—
3. Acetone	▲	>480	E	NR	—	—	G	10	F	P	143	G	NR	<5	—	E	10	F	G	12	G	E	>480	E	DD	93	VG
4. Acetonitrile	▲	>480	E	F	30	F	E	20	VG	■	150	G	NR	—	—	E	4	VG	E	13	VG	E	>480	E	DD	70	E
5. Acrylic Acid	—	—	—	G	120	—	E	395	—	NR	—	—	NR	—	—	E	80	—	E	67	—	—	—	—	—	—	—
6. Acrylonitrile	▲	>480	E	—	—	—	—	—	—	▲	>480	—	—	—	—	E	5	F	—	—	—	E	>480	—	E	>480	—
7. Allyl Alcohol	▲	>480	E	F	140	F	E	140	VG	P	—	—	P	60	G	E	10	VG	E	20	VG	E	>480	—	E	>180	—
8. Ammonia Gas	■	19	E	▲	>480	E	▲	>480	—	—	—	—	—	—	—	—	—	—	■	27	E	—	—	—	—	—	—
9. Ammonium Fluoride, 40%	▲	>480	E	E	>360	—	E	>480	—	NR	—	—	E	>360	—	E	>360	—	E	>360	—	—	—	—	—	—	—
10. Ammonium Hydroxide, Conc. (28-30% Ammonia)	E	30	—	E	>360	—	E	250	—	NR	—	—	E	240	—	E	90	—	E	247	—	E	>480	—	E	>480	—
11. n-Amyl Acetate	▲	470	E	E	198	G	NR	—	—	G	>360	E	P	—	—	NR	—	—	P	—	—	E	128	G	F	<10	F
12. Amyl Alcohol	▲	>480	E	E	>480	E	E	348	VG	G	180	G	G	12	E	E	25	VG	E	52	VG	E	>480	E	E	>480	E
13. Aniline	▲	>480	E	NR	—	—	E	145	F	F	>360	E	F	62	G	E	25	VG	E	82	G	E	>480	E	E	>480	E
14. Aqua Regia	—	—	—	F	>360	—	G	>480	—	NR	—	—	G	120	—	NR	—	—	G	193	—	E	>480	—	E	>480	—
15. Benzaldehyde	▲	>480	E	NR	—	—	NR	—	—	G	>360	E	NR	—	—	G	10	VG	G	27	F	E	>480	E	E	100	E
16. Benzene (Benzol)	▲	>480	E	P	—	—	NR	—	—	E	>360	E	NR	—	—	NR	—	—	NR	—	—	E	20	F	E	253	VG
17. Benzotrichloride	▲	>480	E	E	>480	E	NR	—	—	—	—	—	G	—	—	NR	—	—	NR	—	—	—	—	—	—	—	—

Cross Contamination and PPE Assignment

- It is common to see students wearing gloves touching non-work surfaces, their phones, computer, body, doorknobs, elevator buttons, etc.
- Students must be constantly reminded that the gloves are worn for **personal** safety, so we don't touch other items without first removing the gloves
- PPE is assigned and is not shared by other personnel
  - Example, years ago a student got HF on a lab coat and another student put it on, requiring that both students go to the hospital for treatment

General safety in workspaces

- A cluttered work environment is an unsafe environment
  - Work areas should be cleaned at the end of the day
  - No chemicals will be stored in fume hood and no processes left unattended without clear signage and posting (e.g., beaker)
  - Hazardous spills out of the fume hood can be greatly minimized by
    - Using secondary containment when moving from storage
    - Keeping all processes 6 inches from the edge of the hood
- Always evaluate chemical compatibility in your waste streams
  - See EHS training for procedures pertaining to waste streams (labeling)
  - Always check the SDS before creating processes that use mixed waste streams
  - Generally, acids, bases, and solvents should have different waste streams
    - A bomb can be made as simply as mixing H_2O_2 and acetone

Example of Nitric Acid and isopropyl alcohol

Area in fume hood where waste was stored.

Waste label indicating incompatible waste mixture..

General Safety in Workspaces

- Always ensure that you have sufficient space to conduct your work
  - Coordination with your lab partners is key
- Eye protection is highly recommended when in any laboratory
  - It costs little to wear and the consequences are high
- General tools
  - Only use tools for their intended purpose (a rachet is not a hammer)
  - Always follow manufacturer precautions for tools
  - Training is required to use the machine shop. This training is provided in-person by Luke Harrill.

Gas Cylinder Safety

- Gas cylinders must always be secured to a wall or appropriate table
- Cylinders must have its regulator removed and capped when not in use

General Safety in Experimental Design

- Unlike at National Labs, there is little support on campus to review the safety of processes and custom experiments and apparatuses
- Feel free to utilize me as a resource to review any new process that there may be a concern
- At a minimum, no system should be single fault that could cause an immediate danger to life and health
  - Example, SERF evacuated for 2 hours due to an uncontrolled BCl_3 leak

Safe Working Conditions

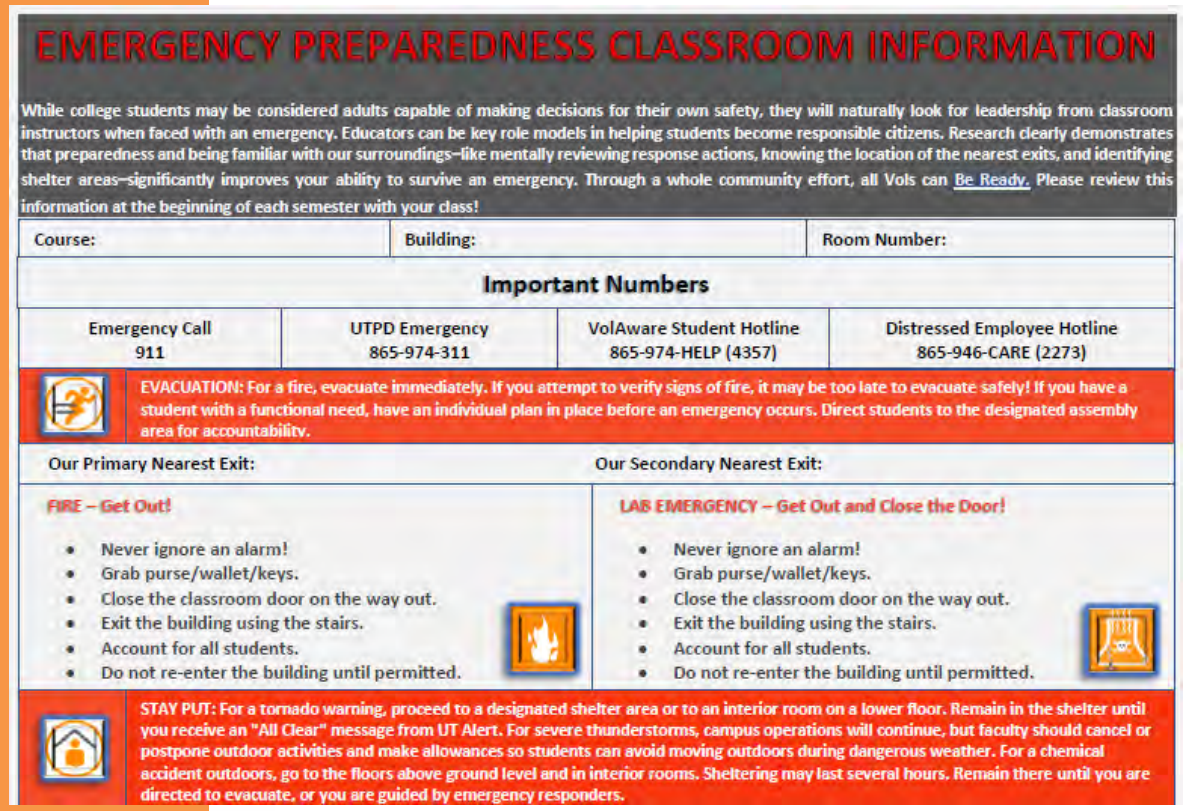
- If you see something dangerous, say something
  - Everyone has the *authority* and the *responsibility* to immediately stop someone from working in an unsafe manner
  - Incidents should be reported to the department heads for further action

Injury Reporting

- All injuries, whether or not medical treatment is required, must be reported to their supervisor
- Step 0: If life threatening, seek immediate emergency care (911)
- Step 1: Report the injury to your supervisor and CorVel at 1-866-245-8588, option 1
  - A 24/7 triage nurse will assess whether immediate care is necessary and will direct the injured worker to the nearest State of TN authorized treating physician
  - If an employee seeks care before calling, a $500 fine will be imposed to the department
  - If not reported by either the employee or employer within 3 business days, a $500 fine will be imposed to the department
  - The employee should never present their health insurance card for treatment of work-related accidents

Injury Reporting

- Step 2: supervisor completes the paperwork
  - Workers' compensation procedures
  - Workers' compensation injury report
  - Lost time/return to work calendar
  - Transitional duty plan
    - Only required if given light duty work restrictions
- Complete guidelines and forms may be found here:
  - https://riskmanagement.tennessee.edu/workers-compensation/



EMERGENCY PREPAREDNESS CLASSROOM INFORMATION

While college students may be considered adults capable of making decisions for their own safety, they will naturally look for leadership from classroom instructors when faced with an emergency. Educators can be key role models in helping students become responsible citizens. Research clearly demonstrates that preparedness and being familiar with our surroundings–like mentally reviewing response actions, knowing the location of the nearest exits, and identifying shelter areas–significantly improves your ability to survive an emergency. Through a whole community effort, all Vols can Be Ready. Please review this information at the beginning of each semester with your class!

Course:	Building:	Room Number:

Important Numbers

Emergency Call	UTPD Emergency	VolAware Student Hotline	Distressed Employee Hotline
911	865-974-311	865-974-HELP (4357)	865-946-CARE (2273)

EVACUATION: For a fire, evacuate immediately. If you attempt to verify signs of fire, it may be too late to evacuate safely! If you have a student with a functional need, have an individual plan in place before an emergency occurs. Direct students to the designated assembly area for accountability.

Our Primary Nearest Exit: Our Secondary Nearest Exit:

FIRE – Get Out!

- Never ignore an alarm!
- Grab purse/wallet/keys.
- Close the classroom door on the way out.
- Exit the building using the stairs.
- Account for all students.
- Do not re-enter the building until permitted.

LAB EMERGENCY – Get Out and Close the Door!

- Never ignore an alarm!
- Grab purse/wallet/keys.
- Close the classroom door on the way out.
- Exit the building using the stairs.
- Account for all students.
- Do not re-enter the building until permitted.

STAY PUT: For a tornado warning, proceed to a designated shelter area or to an interior room on a lower floor. Remain in the shelter until you receive an "All Clear" message from UT Alert. For severe thunderstorms, campus operations will continue, but faculty should cancel or postpone outdoor activities and make allowances so students can avoid moving outdoors during dangerous weather. For a chemical accident outdoors, go to the floors above ground level and in interior rooms. Sheltering may last several hours. Remain there until you are directed to evacuate, or you are guided by emergency responders.

Severe Weather Shelter:

TORNADOES AND SEVERE WEATHER – SHELTER!

- Go to a designated shelter area or take shelter in a lower part of the building.
- Remain in shelter area until UT Alert "All Clear" is issued.
- Severe Weather Guidance Can Be Found Here

Outside Chemical Shelter:

CHEMICAL ACCIDENT OUTSIDE – Shelter Above Ground Level!

- Be prepared to evacuate, if directed.
- Close all windows and doors.
- Seal room with towels, plastic, and tape.
- Turn off ventilation system.
- Follow direction from first responders on-scene.

ACTIVE SHOOTER: The UT Alert system will be activated immediately upon notification, but the information provided will initially be limited. The alert will provide the last known location of the threat, but the shooter might have moved.

ACTIVE SHOOTER - Decide!

- RUN: If you have personal knowledge of the assailant's location and you have a clear exit.
- HIDE: In most cases, the best action is to barricade to avoid exposing yourself to the threat.
- Consider methods to lock/barricade in advance.
- Lock and barricade doors, seek cover, and avoid signs that the room is occupied.
- FIGHT: As a last resort, incapacitate the shooter with superior numbers of people and aggression.
- To request Active Shooter training for your department, follow this link.

THE UNIVERSITY OF TENNESSEE KNOXVILLE
OFFICE OF EMERGENCY MANAGEMENT

Visit prepare.utk.edu for more detailed information.

Contact the Office of Emergency Management at 865-974-9347 for assistance or training.

Location of AEDs:

Atrium walls
Basement
Second Floor
Fourth Floor

Floor Wardens in East Wing:

Basement:	Michael Ratliff
First Floor:	Ashly Pearson
Second Floor:	Jamie Coble, Lawrence Heilbronn
Third Floor:	Khalid Hattar, David Donovan
Fourth Floor:	Ken Carter

Protect Your Research!!!

- **Identify** threats that your research may be vulnerable to
  - Power, temperature, security, animals, administrative
- **Prevent** threats through proper engineering controls
  - UPS, cloud or redundant data storage, utilize space only as intended, evaluate supply chain risks and mitigation strategies, communicate with appropriate stakeholders (e.g., FS)
- **Mitigate** damage from incidents
  - Keep CHP and student training up-to-date, anchor equipment to support structures, know how to contact EHS and UTK Police Department

College Goal for FY25

- In the afternoon, each laboratory-based research group led by their faculty member will get together to improve lab safety with activities such as:
  - Welcome new members
  - Review SOPs
  - Review training plans
  - Do lab cleanup, which is strongly encouraged by Dean Mench

Useful links

- UTNE Safety Website: https://ne.utk.edu/safety/
- TCE Safety Website: https://tickle.utk.edu/research/safety/
- CHP: https://ehs.utk.edu/index.php/table-of-policies-plans-procedures-guides/chemical-hygiene-plans/
- SOP Template: https://ehs.utk.edu/wp-content/uploads/2020/02/LS-020-CHP-AppA-LabSpecific-Sec04.1-SOP-Form.pdf
- Door Placard: https://ehs.utk.edu/index.php/laboratory-safety/lab-safety-administration/lab-door-placards/
- Glove Selection Guide: https://www.aaesi.com/ansell_8th-edition-chemical-resistance-guide/
- Injury Reporting: https://riskmanagement.tennessee.edu/workers-compensation/
- Emergency Preparedness/Management: https://prepare.utk.edu/be-ready/