

LABORATORY SAFETY

A. Introduction:

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C. Policies, Practices, and Procedures:

1. General Safety: Generally, it is prudent to avoid working alone in a laboratory. Under normal working conditions, you should make arrangements with individuals working in separate laborato

the individual that is using the lab space once they grant another individual before or after hours access.

Please follow the guidelines listed here to assure continued before and after hours usage of UNE labs:

- a. Work in labs should only be conducted with prior approval from faculty, staff, or a supervisor.
- b. All individuals working in labs must complete the required labo

Please be considerate of your classmates and instructors as well as the housekeeping staff.

It is everyone's responsibility that the laboratory be maintained in good working order.

- i. If you are asked to leave, please do so quickly and in a reasonable manner.

20. Electrical: The typical laboratory requires a large quantity of electrical power. This increases the likelihood of electrically-related problems and hazards. One must address both the electrical shock hazard to the facility occupants and the fire hazard potential. The following recommendations are basic to a sound electrical safety program in the laboratory.

- a. All electrical equipment will be properly grounded.
- b. All electrical equipment will be UL listed, grounded, and approved by Facilities Management. (See Chapter 5 on Electrical Protection for more detailed information).
- c. Sufficient room (36 inches) for work must be present in the area of breaker boxes. All the circuit breakers and the fuses will be labeled to indicate whether they are in the on or off position, and what appliance or room area is served. Circuit breakers must be properly rated.
- d. Equipment cords/plugs, appliance cords/plugs, and power strips will be in good condition.
- e. Extension cords will not be used as a substitute for permanent wiring.
- f. Electrical cords or other lines will not be suspended unsupported across rooms or passageways.
- g. Multi-outlet plugs will not be used unless they have a built-in circuit breaker. This causes overloading on electrical wiring, which will cause damage and possible overheating.
- h. All building electrical repairs, splices, and wiring will be performed by the Facilities Management Department.

21. Vacuum Operations: In an evacuated system, the higher pressure is on the outside, rather than the inside, so that a break causes an implosion rather than an explosion. The resulting hazards consist of flying glass, spattered chemicals, and possibly fire. The following is a list of precautions to be taken when conducting vacuum operations.

- a. When working with a vacuum, be aware of implosion hazards.
- b. Apply vacuum only to glassware specifically designed for this purpose, i.e. e., heavy walled filter flasks, desiccators, etc.
- c. Never evacuate scratched, cracked, or etched glassware. Always check for stars or cracks before use.
- d. Vacuum glassware which has been cooled to liquid nitrogen temperature or below should be annealed prior to reuse under vacuum. Rotary evaporator condensers, receiving flasks, and traps should be taped or kept behind safety shields when under a vacuum.
- e. After completion of an operation in which a cold trap has been used, the system should be vented. This venting is important because volatile substances that have been collected

in the trap may vaporize when the coolant has evaporated and cause a pressure buildup that could blow the apparatus apart.

22. Handling Glassware:

a. Glass breakage is a common cause of injuries in laboratories.

- i. Only glass in good condition will be used.
- ii. Discard or send for repair all broken, chipped, starred or badly scratched glassware in marked "broken glass" containers only.
- iii. Hand protection should be used when picking up broken glass.
- iv. The following precautions should be taken when working with glass.

Clean all glassware before sending for repair.

When using glass tubing, all ends should be fire polished.

b. Lubricate tubing with glycerin or water before inserting into rubber stoppers or rubber tubing.

- i. Protect hands with leather gloves when inserting glass tubing.
- ii. Hold elbows close to the body to limit movement when handling tubing.
- iii. Do not store glassware near the edge of shelves.
- iv. Store large or heavier glassware on lower shelves.
- v. Use glassware of the proper size. Allow at least 20% free space. Grasp a three-neck flask by the middle neck, not a side neck.
- vi. Conventional laboratory glassware must never be pressurized.

23. Laboratory Equipment: The following safety equipment should be available for laboratory personnel working with hazardous materials.

a. Drench Showers: Drench showers and other emergency wash systems are used in an emergency to flush chemicals that have accidentally come in contact with laboratory personnel. In order to wash the body properly, clothing should be removed as water is applied. The drench shower can be used to extinguish a clothing fire, but this is not recommended if the shower is more than a couple of feet away.

- i. Three square feet of space is required beneath the shower.
- ii. The area will be kept free of all obstacles.
- iii. EHS inspects drench showers each semester for proper flow and operation.

iv. A tag or card is hung on the unit, indicating whether the shower is properly functioning or out of service. Facilities Management is then notified if the shower is out of service so that necessary repairs can be made.

v. Once repairs are made, Facilities Management notifies EHS and the drench shower is checked for proper flow and operation.

iv. Drench hoses and showers should not be altered or removed in any lab space without the approval of the Environmental Health and Safety Department.

b. Eye and Face Washes:

i. The best treatment for chemical splashes of the eye and face is immediate flushing with copious amounts of water for 15 minutes.

ii. Eye and Face Washes are equipped with a stay

b. When full, sharps containers should be sealed, labeled and disposed of by calling

e. High strength barriers coupled with remote handling devices may be necessary for safe use of extremely shock sensitive or reactive chemicals.

F. Emergencies and Accidents:

1. To request emergency assistance on campus (fire, police, or ambulance), dial 911.
2. In all emergencies and accidents, the first consideration is your safety and the safety of those around you.
3. Large Chemical Spills (5 gallons or more):
 - a. Alert all persons nearby.
 - b. Evacuate the room. Upon leaving, close the door to the laboratory.
 - c. Contact EHS as soon as possible, (on weekends, and after 4 p. m. contact Security, for advice and assistance).

Be prepared to provide the identity, amount, and location of the spill, as well as your location and a phone number where you can be reached - not your lab phone, since you should not remain in the lab after the spill.

4. Small Chemical Spills:
 - a. Small spills will be cleaned immediately, providing that the person cleaning the spill is familiar with the material and has the proper equipment. There is a small spill kit in each lab contained in a 5-gallon pail that can be utilized for small spills.
 - b. Water spills can create a hazard because of the slip potential and flooding of instruments (particularly on the floor below.)
 - c. All spills need to be reported to EHS in a timely manner and spill kits will need to be restocked.
5. Fire: In case of fire, follow these procedures:
 - a. Close the door to the fire area.
 - b. Activate the building fire alarm system.
 - c. Dial 911 and report exact location of fire.
 - d.

b. All other injuries should be assessed by a medical care provider at the Health Center for students and a physician at our off-site employee healthcare provider for employees. All incidents should be reported as soon as possible to the responsible faculty member, supervisor, Human Resources and EHS. The Students Affairs Office will also be notified if a student is involved.

H. Chemical Exposure Incidents: In the event of a chemical exposure incident, medical personnel should be given the following information:

a. Identity of chemical(s)

b.

c. Estimate the amount of chemical required for each experiment and order only what is necessary based on current inventories. *Excess chemicals are very expensive to dispose of and can cause a hazard if stored too long.*

d. Request SDS from chemical vendor at the time of purchase:

e. Upon arrival, send one copy of the SDS to EHS.

f. Safety Data Sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, in all cases the required information is provided for each hazardous chemical,

i. SDS' must be readily accessible during each work shift to employees when they are in their work area(s).

ii. Electronic access and other alternatives to maintaining paper copies of the material safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.

iii. In addition, an SDS file is maintained by EHS.

g. Before opening a package containing hazardous substances, inspect the packaging carefully for any signs of breakage or leakage of material. If there are any signs of leakage, place package in chemical fume hood, protect yourself from exposure, and call EHS for assistance.

h. Each department is responsible for determining what additional procedures and storage requirements are required and if available.

2. Storage:

a. The quantity of chemicals that need to be stored should be reduced to an absolute minimum.

b. Chemicals should be stored based on their compatibility and not in alphabetical order (See chemical compatibility chart in Appendix S). The following are general guidelines:

- i. Storage areas should be well ventilated (consult with EHS).
- ii. Large containers of reagents should be stored on low shelving, preferably in trays to contain all leaks and spills.
- iii. Inventories of storage areas should be conducted at least annually. Please see Chapter 17 for inventory procedures.
- iv. Chemicals with strong odors should be stored inside cabinets or underneath fume hoods.
- v. Reactive chemicals should be stored in air-tight containers or at very low temperatures.
- vi. Flammables requiring refrigeration should be stored in explosion-safe refrigerators.

3. Labeling: All containers including beakers, vials and flasks must be dated and labeled with the chemical constituents, hazard, and the user's name on the label.

a. Labels on incoming containers must not be removed or defaced.

b. Dating is especially important in the case of compounds which have a specified shelf life, such as those that will form peroxides (e. g. ethyl ether).

c. Identifying unknowns for disposal is extremely costly.

d. All laboratory personnel who are leaving the University are responsible for identifying and properly disposing of the chemical waste in their laboratory.

4. Transportation of Chemicals:

a.

i. If you are a woman of childbearing age, handle these substances only in a hood whose satisfactory performance has been confirmed, using appropriate protective apparel

for which all people with access are aware of the substances being used and necessary precautions.

2. Transport of Biological Materials:

- a. Transportation of Biological materials off campus is strictly prohibited without the assistance of the EHS department. Contact EHS if biological materials need to be transported or shipped off campus.
- b. Secondary containers such as sealable plastic containers are required when biological materials are carried to another laboratory or building.
- c.

M. Chemical Hygiene Plans: UNE is required by 29 CFR 1910 section 1450 of subpart Z (Occupational Exposures to Hazardous Chemicals in Laboratories) to develop a chemical hygiene plan for each laboratory that use hazardous chemicals.

1. The development of a detailed written chemical hygiene plan is necessary to establish

N. Cell phone use in laboratories:

1. Cell phones may be used in laboratories for educational or emergency purposes only; however certain guidelines must be followed to ensure that the cell phone is not contaminated by chemical or biological agents:

- a. Option 1: If you are wearing gloves in a lab to prevent contamination, remove your gloves before picking up the cell phone, use the phone for whatever task is needed and don a new pair of gloves. This process must be used each time the cell phone is used.
- b. Option 2: If you are going to be using the cell phone while wearing contaminated gloves, the phone must be decontaminated and wiped down with an appropriate cleaning agent while wearing clean, non-contaminated gloves before leaving the laboratory.

2. Cell phones should not be used for personal reasons in the lab and should be stored with your personal items if that are not being used for educational or emergency purposes to prevent contamination.

O. Children in laboratories:

1. The University of New England is committed to introducing minors to interesting and challenging scientific, scholarly, pursuits and fields at a young age. These experiences should be handled in ways that will promote the safety of the minors and that will not impair the normal functions of the University. This policy establishes restrictions relating to and conditions under which certain minors are permitted to be in UNE laboratories and other UNE facilities that could pose risks to minors.

This policy applies to all minors who will visit, tour, observe, or conduct research or a scholarly activity in a UNE laboratory as part of an organized tour program or as an individual observer or volunteer. It does not apply to emancipated minors, minors who are matriculated UNE students or minors who are employed by UNE. It also does not apply to summer camps or events coordinated through UNE's Conference Services Department or Campus Center programs. *This policy is instituted for laboratory facilities only.*

2. Children of Faculty/Staff and Visiting Children: For the safety of children visiting the UNE campuses with a faculty or staff member, we cannot allow them to enter any of the lab spaces on campus. This is to reduce the likelihood of a chemical or a biological exposure to any child that visits UNE and to preserve the integrity and accuracy of all research studies.

- a. Any minor under the age of 18 years that is a child, relative, or visitor brought in by a UNE faculty or staff member is not permitted in any laboratory space. All children must be limited to office areas and common areas on campus and must be escorted by a faculty/staff member at all times in these areas.

- b. Any minor under the age of 18 years that is a child, relative, or visitor brought in by a UNE faculty or staff member must be supervised at all time by that faculty or staff member with no exceptions.
- c. If a child brought on campus by a UNE faculty or staff member is found in the laboratory space, they will be asked to relocate to an office area or common area.

Please reference **APPENDIX C CHILDREN ON CAMPUS GUIDELINES** in the UNE Personnel Handbook provided by Human Resources. Guidelines regarding visiting children of faculty/staff are outlined in this section very clearly.

2. **Pets in Laboratory Spaces:** No pets are permitted in any building that contains a laboratory space. There are no exceptions to this policy. If the use of a service dog is required, please notify the Department VP or Dean before the animal is used in the facility as a common courtesy to the occupants of the building.

3. **Minors Visiting UNE Laboratories for Educational Purposes**

a. **Definitions:**

- i. **Covered Activities** refers to the activities that Covered Minors may perform in certain laboratories. These may include, but are not limited to, Covered Minors observing ongoing research, scholarly or artistic activities, Covered Minors actively participating in research, scholarly or artistic activities, or Covered Minors actively participating in training exercises to learn skills associated with research, scholarly or artistic activities.
- ii. **Covered Minor(s)** refers to person(s) at least 6 years old, but younger than 18

- iv. **Lab Tour** refers to when one or more Covered Minor(s) visit a particular laboratory at particular times on one day to observe pre-selected and pre-arranged research, scholarly activities.
- v. **Lab Class** refers to when one or more Covered Minor(s) attend a pre-scheduled class or laboratory program on campus through an organizational program or school system.
- vi. **Lab Supervisor** refers to the UNE staff member or faculty member, including but not limited to a Principal Investigator, who has the ultimate control and responsibility for all activities and matters associated with a particular laboratory. This staff member or faculty member has the responsibility for ensuring that Covered Minors have satisfied all the conditions and requirements in this policy. The Lab Supervisor is responsible for guaranteeing that all appropriate UNE paperwork, requirements, and conditions have been completed *before* a minor is allowed into a Laboratory (consulting with the appropriate university offices, collecting mandatory forms from Covered Minors, etc.).
- vii. **Monitor** refers to the UNE staff member, faculty member or graduate student with the primary responsibility for supervising Covered Minors who are assigned to the Monitor while they are in the Monitor's designated Laboratory. In certain cases, the Monitor and the Lab Supervisor may be the same individual.

b. Restrictions

- i. Prohibited Minors: Persons under the age of six (6) are not permitted in any Laboratory.
- ii. Prohibited Laboratories: Covered Minors are not permitted under any circumstances in the following laboratories:

Laboratories where radiation or radioactive materials are stored or used,

Laboratories with Class IIIB or IV Lasers,

Laboratories classified at a level of containment of Biosafety Level 2 (BSL-2) or above,

Animal Care Facilities classified at a level of containment of Animal Biosafety Level 2 or above.

- vi. Collect a properly signed UNE Recreational Activities Waiver from each such Covered Minor.

d. Controls Applicable to the Lab Tour/Class

- i. The Monitor will confirm the names of all Covered Minors actually participating in the tour/class.

While Covered Minors are in the Laboratory, their assigned Monitor will supervise the Covered Minors and will ensure that they are always in compliance with all applicable requirements or conditions included in this policy, in the tour or course materials (if any), in any EHS or other safety training materials or directives, and in any Lab-

Ensure that all the necessary forms, including the UNE Recreational Activities Waiver are on file for the Covered Minor

Ensure that the Covered Minor *has received and understands all safety training* required by EHS and all Lab-specific guidelines and protocols, including but not limited to, the use of personal protective equipment.

Anytime the Covered Minor is participating in Covered Activities or is otherwise in the Laboratory, the Monitor, coordinating whenever necessary with the Lab Supervisor or his/her designee and EHS, will ensure that:

- The Covered Minor is supervised by the Monitor at all times;
 - The Covered Minor participates only in the itemized Covered Activities;
 - The Covered Minor follows all applicable requirements or conditions included in this policy, in the program materials (if any), in any EHS or other safety training materials or directives, and in any Lab-specific guidelines and protocols, including but not limited to, the use of personal protective equipment.
 - The maximum number of Covered Minors allowed to participate in Covered Minors allowed to participate in Covered Activities in that Laboratory at any one time is not exceeded; and
 - The Monitor and Lab Supervisor are immediately notified of misconduct by Covered Minors and of any damages, safety concerns, injuries, or similar incidents relating to a Covered Minor's participation in Covered Activities or presence in the Laboratory.
- i. **Retention of Records associated with Covered Activities:** The Monitor or Lab Supervisor will ensure that a signed UNE Recreational Activities Waiver for each Covered Minor participating in Covered Activities and other appropriate documentation relating to the Covered Minor and to the Covered Activities are retained by the Department Chair under whom the Laboratory is housed.
- j. **Exceptions to the Policy**

- i. When an exception may be authorized: An exception to provision(s) found in this policy may be initiated by a Lab Supervisor and granted as provided below if the following determination is made:

The benefits or outreach opportunities associated with a Lab Tour or Covered Activities outweigh any potential risks or disadvantages that may result from deviations to such provision(s).

Who must approve an exception: If the Lab Supervisor makes the determination stated then he/she should document the deviations to this policy and the rationale supporting the determination, and then forward the request to their Dean AND the EHS department.

k. Suspensions of Covered Minor's Privileges

- i. The Dean, Department VP, Lab Supervisor or EHS may temporarily suspend a Lab Tour or Covered Activities, or a Covered Minor's participation in a Lab Tour/Class or in all or part of the listed Covered Activities if violations, safety deficiencies or other conditions occur.
- ii. The Dean, Department VP, Lab Supervisor or EHS may permanently suspend future Lab Tours/Classes and Covered Activities,

