1 - PURPOSE

The purpose of this policy is to communicate the safe work practices expected of CAPS' personnel (employees, students, and visitors) who conduct research in any of CAPS' laboratories. The policy establishes rules and responsibilities in an effort to ensure both human and equipment safety while research is being conducted in the potentially dangerous environments of CAPS' laboratories. The policy was developed using the National Fire Protection Agency (NFPA) – Standard 70E, and information from Florida State University's Department of Environmental Health & Safety as references.

The intent of this document is to promote safe work practices and policies at CAPS, to:

- provide guidance to principal investigators and lab supervisors in the establishment of lab-specific training
- communicate the expectation of CAPS' personnel in the research environment, and
- encourage CAPS' personnel to comply with safe work practices.

CAPS Personnel are expected to understand and adhere to the safety rules and work practices described in both CAPS general and their lab-specific training, and to communicate any safety issues to their supervisor and/or CAPS Safety Coordinator.

Work performed by FSU maintenance personnel, hired contractors, and clients contracting with CAPS to conduct research are not covered by this policy.

This policy consists of the following sections:

Any questions, comments, or suggestions regarding this policy should be directed to the CAPS Safety Coordinator.

2 - RESPONSIBILITIES

CAPS Administrators and Safety Coordinator

- Promote safe work practices and policies
- Make general safety training readily accessible to CAPS' personnel
- Furnish CAPS' personnel with appropriate PPE
- Assist principal investigators and lab supervisors in the establishment of lab-specific training
- Facilitate the appropriate response to any safety-related incident experienced at CAPS' facilities

Principal Investigators and Lab Supervisors

- Understand and adhere to CAPS safety policy
- Develop lab specific safety protocols for their lab area(s)
- Ensure that appropriate PPE is available to, and in good working condition for CAPS' personnel under their supervision
- Educate CAPS' personnel under their supervision about the specific hazards associated with their research
- Encourage CAPS' personnel under their supervision to comply with CAPS policies and safe work practices

Personnel, Students and Visitor Responsibility

- Understand and adhere to the safety rules and work practices described in both CAPS general and their lab-specific training
- Communicate any safety issues to their supervisor and CAPS Safety Coordinator

3 - SAFE WORK PRACTICES

Personal Protective Equipment (PPE):
At the request of a PI, a work hazard inspection team shall analyze electrical hazards in each laboratory and determine the required PPE to be worn. The expected use of PPE shall be communicated in the lab specific safety protocols posting.

- Personnel shall wear task-appropriate gloves, long sleeve shirt, long pants, close-toed shoes, and safety glasses when working in CAPS laboratories
- PPE shall be worn in accordance with NFPA 70E, and/or the posted lab safety protocols for the lab
- PPE shall be worn while working on or near exposed energized equipment
- Clothing materials shall be made from non-melting materials
- PPE shall be supplied by the CAPS Safety Coordinator or the laboratory PI/supervisor
- The user shall inspect PPE for damage prior to each use to verify that it is in safe operating condition

Lock-out
Lock-out is a method to control the source of energy so as to minimize employee exposure to hazards. A copy of CAPS Lock-out Tag-out procedure is available upon request.

- When performing maintenance on, setting up or modifying equipment, the power source must be disconnected from the equipment and locked-out by a qualified person. Each person who will work on the equipment must apply their own lock to the power source. After de-energizing and locking out the equipment, a qualified person shall test the equipment and verify that it is safe to be worked on
- Locks shall include a tag indicating the owner of the lock
- Only the owner of the lock may remove the lock
- Locks and tags for lock-outs will be provided by the CAPS Facilities Coordinator
- If any person encounters a piece of equipment that has been locked-out, that person shall not attempt to remove the lock/tag or attempt to energize the equipment. This is to ensure the safety of the person(s) who applied the lock(s), the equipment, and the equipment operator
- Laboratory PI's and supervisors are responsible for making sure that CAPS' personnel under their supervision understand the restrictions associated with locked-out equipment

Additional Safe Work Practices

- No food or drink is permitted in lab areas
- Lab workers shall employ the "buddy system", in which at least one person in addition to the primary researcher, who is familiar with the lab hazards, safety protocols, and emergency response procedures attentively participates in or observes the primary researcher's activities, to ensure that if one person is injured, the other can provide or solicit help
- All electrical enclosures shall conform to NFPA 70E – Standard for Electrical Safety in the Workplace
- All exposed energized parts shall be made inaccessible to unqualified personnel
- Approach boundaries shall be established where exposed energized parts exist that could be accessible to unqualified personnel. Approach boundaries shall be established according to NFPA 70E. Only qualified personnel are permitted to work within any approach boundary. PPE must be worn when working within approach boundaries
- Only qualified personnel shall work on or near energized electrical parts
- CAPS' personnel shall not work on or near exposed energized parts of any voltage level that are not directly related to their research
- Qualified personnel may work on or near exposed energized parts only to test to ensure that the parts are safe to be worked (i.e. to ensure that the parts are de-energized) on or to trouble shoot a circuit
- When trouble shooting a circuit or testing parts that are known to be energized, a qualified person must wear appropriate PPE, use appropriately insulated tools, and follow laboratory safety procedures, developed by the PI
- Parts are considered safe to be worked on only after they have been physically isolated from the voltage source (including stored energy devices) and have been tested by adequate measurement devices to ensure they are de-energized
- Research lab areas that have exposed energized parts at any voltage level shall post safety signs to warn other personnel about the electrical hazards in that lab area
- Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit access to work areas containing exposed energized parts
- If it is deemed necessary by CAPS administration that work on energized on or work near equipment is necessary, no less than two qualified people shall be involved in the work, to ensure that if one person is injured, the other can provide or solicit help
- All after-hours research shall be approved by the Principal Investigator/Lab Supervisor

4 - SAFETY TRAINING RESOURCES

CAPS' personnel are required to complete CAPS general safety training no less than once per calendar year in order to maintain access to CAPS laboratories. Compliance with remote laboratory safety protocols (i.e. NHMFL labs, FSU main campus labs, College of Engineering labs, etc.) will not be considered sufficient for access to a CAPS laboratory. Similarly, CAPS personnel who use remote laboratory facilities must comply with the training requirements for that lab. Anyone working in a CAPS laboratory who feels that the level of safety training is inadequate for the hazards in their lab, is encouraged to contact CAPS Safety Coordinator for supplementary training. Training can entail any combination of general, lab specific training, and EH&S developed training, as required by a lab's PI. Access to CAPS training can be achieved by complying with PI requirements for training. The resources listed below are common sources for CAPS Safety Training.

- *FSU EH&S Hazardous Waste Awareness Training* – Florida State University's Department of Environmental Health and Safety requires that each person who accesses an FSU research laboratory attend Hazardous Waste Awareness training. Each person is required to attend the classroom-based training no less than one time during their career at FSU. A listing of the dates and locations of this training, entitled, "*Hazardous Waste Awareness/Introduction to Laboratory Safety/Hazard Communication*", is available online at: https://pub.extranet.fsu.edu/sites/safety/forms/Lists/Safety%20Training/AllItems.aspx. A link to the online version of this training is available from CAPS Safety Homepage (https://www.caps.fsu.edu/employee-information/safety/). Whenever CAPS personnel utilize this training, they should forward a copy of the email indicating completion to the CAPS Safety Coordinator. The requirement for EH&S Hazardous Waste Awareness Training can be waived for specific labs with approval from the CAPS Safety Committee.

- *CAPS Classroom General Safety Training* - CAPS' personnel, students and visitors who will be working on or near energized electrical equipment for research purposes shall be given the opportunity attend a training session conducted by a person no less than three times per calendar year. The classroom safety training topics shall include, but not be limited to, general laboratory safety, hazardous waste awareness, electrical safety, cryogen safety, and emergency response actions.

- *CAPS Online General Safety Training* – CAPS general safety training is available online at https://www.caps.fsu.edu/employee-information/safety/. This training is available at the user's convenience to facilitate compliance with CAPS requirement that all personnel take the general safety training at least once every 12 months. The information in the CAPS Online General Safety Training shall be functionally equivalent to the information in the

CAPS Classroom General Safety Training. If the online training option is selected, the user must attain a minimum score of 80% in order to comply with training requirements.

- *Lab-Specific Safety Training* – CAPS' personnel, students and visitors who will work in CAPS' laboratories shall receive job specific training developed by their PI in order to gain access to that specific laboratory. This training will cover the lab specific safety protocols, including, but not limited to: lab-specific hazards, hazard mitigation actions, high level experimental details, emergency contact information, emergency response actions, and any additional training required prior to acquiring lab access. The trainee may be required to demonstrate safe work practices and proper use of personal protective equipment (PPE) prior to gaining access to the laboratory. The CAPS Safety Coordinator shall be notified of completion of lab-specific training. Lab-specific safety training does not exempt lab users from the requirement to complete CAPS General Safety Training, which is a pre-requisite to gaining access to any lab.

- *FSU EH&S Training* – Florida State University's Department of Environmental Health and Safety has generated several safety training modules for specific types of hazards commonly encountered on FSU's campus. The training modules are available online at https://www.safety.fsu.edu/sections/trainingonline.php. Whenever CAPS personnel utilize this training, they should forward a copy of the email indicating completion to the CAPS Safety Coordinator. The training includes, but is not limited to:
    - Compressed Gas Safety
    - Cryogen Safety
    - Electrical Safety Awareness

5 - LAB SPECIFIC SAFETY PROTOCOLS

Lab Specific Safety Protocols

CAPS' Safety Committee shall perform a work hazard analysis for each research laboratory in CAPS' facility. The work hazard analysis shall include (but not be limited to) inspections for electrical hazards, fire hazards, cryogen hazards, chemical hazards, and rotating equipment. The team will also evaluate the need for any personal protective equipment (PPE) and/or special tools required for users to conduct research safely.

CAPS' Safety Committee shall consist of:

- Principal Investigator/Supervisor for the research lab
- CAPS Safety Coordinator
- A Representative from CAPS Facilities group
- A Representative from FSU's Department of Environmental Health and Safety (EH&S)
- Specialist(s) for addressing specific workplace hazard(s) as required

Lab specific safety protocols shall be posted in each laboratory in CAPS' facility. The postings will set forth safe work practices for all types of hazards in the lab area. The document shall identify lab-specific hazards, hazard mitigation actions, high level experimental details, emergency contact information, emergency response actions, and any additional training required prior to acquiring lab access. A hard copy of the postings shall be mounted on a wall or door in each laboratory area and be in clear view of workers.

Adherence to Lab Protocols

The procedures and safe work practices described in the lab specific safety protocols shall be followed by all CAPS' personnel working in the laboratory. It is the responsibility PI and/or the PI's designated Lab Supervisor to ensure that CAPS' personnel under their supervision are adequately trained and understand the work policies set forth in the lab posting.

In the event that anyone is found to be bypassing procedures or not following safe work practices, power to the research equipment will be removed, and the equipment will be locked out. The violator's lab access will be revoked, and re-training on both general and lab-specific policies must be demonstrated to the satisfaction of both the PI and the CAPS Safety Coordinator before lab access may be restored.

6 – TRAINING REQUIREMENTS

CAPS General Safety Training
All CAPS faculty, staff, students and visitors are required to take the CAPS General Safety Training prior to gaining access to any CAPS lab space.

EH&S Hazardous Waste Training
All CAPS faculty, staff, students, and visitors who are likely to handle hazardous chemical during their stay with CAPS are required to take the EH&S Hazardous Waste Training prior to gaining access to any CAPS lab space. All staff and students are required to attend a classroom Hazardous Waste Awareness training presented by EH&S no less than once during their stay at FSU. However, for immediate access, the Hazardous Waste Online Refresher course can be taken prior to the classroom training to expedite access to the lab space. Successful completion of the online refresher training does not, however, release the user from the requirement to take the classroom-based training.

Visitors to CAPS facilities who will not handle hazardous chemicals may sign the Visitor Hazardous Waste Training Refusal Form and gain access to CAPS labs without taking the EH&S Hazardous Waste Training.

Lab-Specific Training
All CAPS faculty, staff, students, and visitors are required to review the Lab-Specific Safety Protocol developed by the PI prior to gaining access to a particular CAPS lab space.

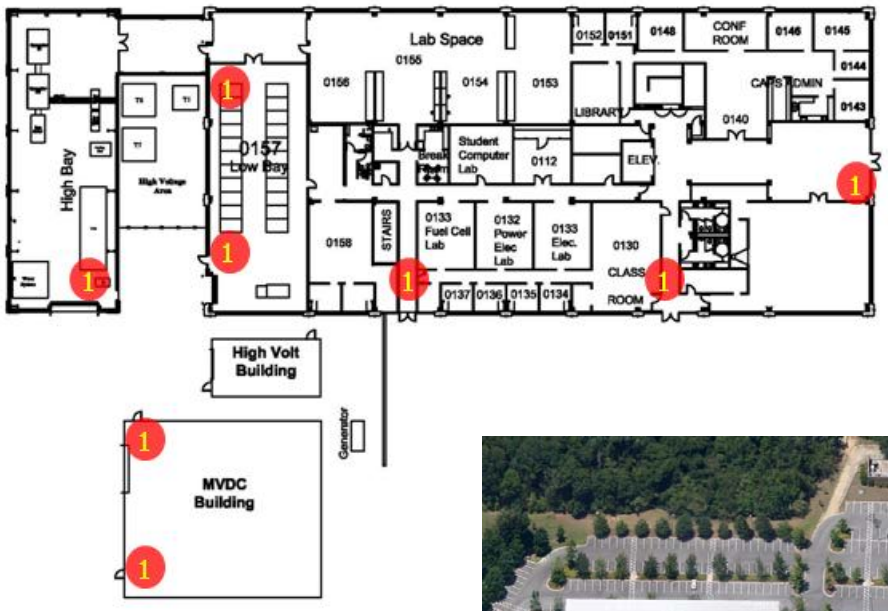
Frequency
Regardless of your level of training, all required trainings are required to be updated annually in order to maintain access to CAPS' laboratory facilities. Failure to comply will result in loss of access to all of CAPS labs, if either CAPS General Safety Training, or EH&S Hazardous Waste Training become delinquent, or specific labs if a Lab-Specific Training becomes delinquent.

7 - EMERGENCY RESPONSE TOOLS

CAPS building and research facilities include 8 Fire alarm pull stations, 18 Fire extinguishers, 2 Safety showers & eye wash stations, and 1 Automatic Electronic Defibrillator (AED). 11 First Aid Kits, 9 Emergency shunt trip buttons, to promote a safe workplace for personnel.

Fire Alarm Pull Stations

The first floor of CAPS' building, which includes the low bay and the high bay buildings has 6 fire alarm pull stations. There are 2 fire alarm pull stations in the MVDC building. The high voltage building (lab) does not contain any fire alarm pull stations. Refer to the lab specific instructions for that lab to determine the best options for accessing a fire alarm pull station in that area. Fire alarm pull stations in the upper floors of the building are located near the stairs. In the event of a building evacuation emergency, congregate at the rally point in the north east corner of the parking lot.



Fire Extinguishers

Only personnel who have been trained in the safe handling of fire extinguishers shall operate them in emergencies. 17 of the 18 fire extinguishers on the first floor, and out-buildings associated with CAPS' research facilities are ABC-type fire extinguishers. 1 CO_2 fire extinguisher has been placed in the low bay (157) because of the extent of electrical equipment in that area. The remainder of the building is outfitted with fire extinguishers, in compliance with the Florida Fire Prevention Code. The ABC-type fire extinguishers are serviced by the Fire Safety Section within FSU's Department of Environmental Health and Safety. CO_2 fire extinguishers must be serviced by a private company. The location of fire extinguishers throughout the first floor laboratories and the outbuildings is shown in the figure below.

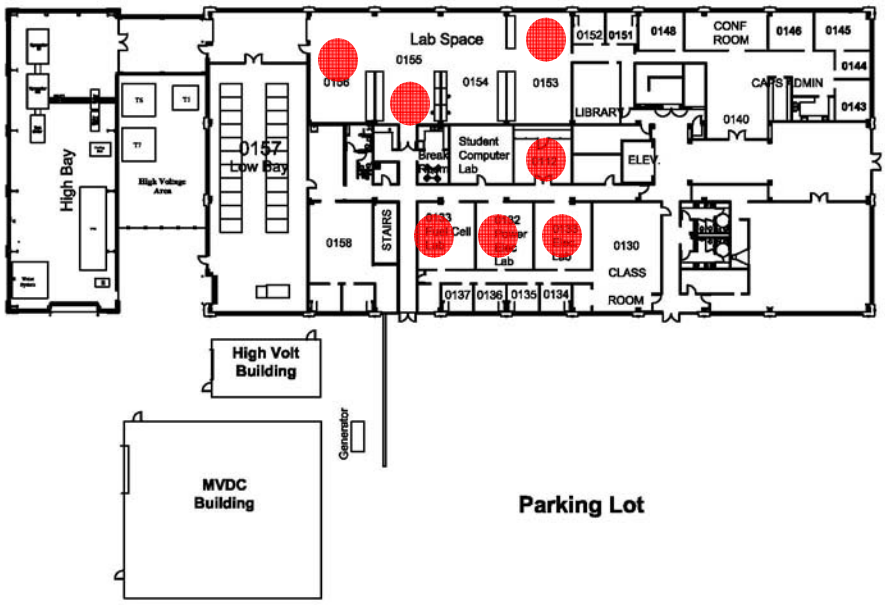
First Aid Kits

CAPS' laboratories are equipped with first aid kits that are stocked with materials for treating minor injuries. Each first aid kit contains a materials inventory sheet. If any first aid kit is found to be missing materials, notify the CAPS Safety Coordinator of the need. First aid kits are located in the areas shown in the figure below.

For personnel who suffer injuries that are in excess of what can be treated from the first aid kit, they, or a co-worker should engage the Emergency Response System by calling 911. Examples of such injuries are when a worker: is rendered unconscious, experiences electrical shock (not matter how "minor"), exhibits an altered mental state, exhibits excessive bleeding, or has suffered severe burns.

Emergency Shunt Trip Systems

CAPS' laboratories are equipped with emergency shunt trip systems, to which all electrical experiments should be connected. These systems are designed so that when an emergency shunt trip button is engaged, all devices connected to the system will lose power. The emergency shunt trip systems do not, however affect the lighting in the lab areas. It is the responsibility of PIs, lab supervisors, and research personnel to understand how the emergency shunt trip system in their area functions, and to verify that their experiment has been properly connected to the emergency shunt trip system by facilities personnel. The figure below shows the location and number of emergency shunt trip buttons installed at CAPS' facility. Details on the functionality of each system should be covered in Lab-specific training manuals. There is also a shunt trip system in room 229 that is not shown on the map below.

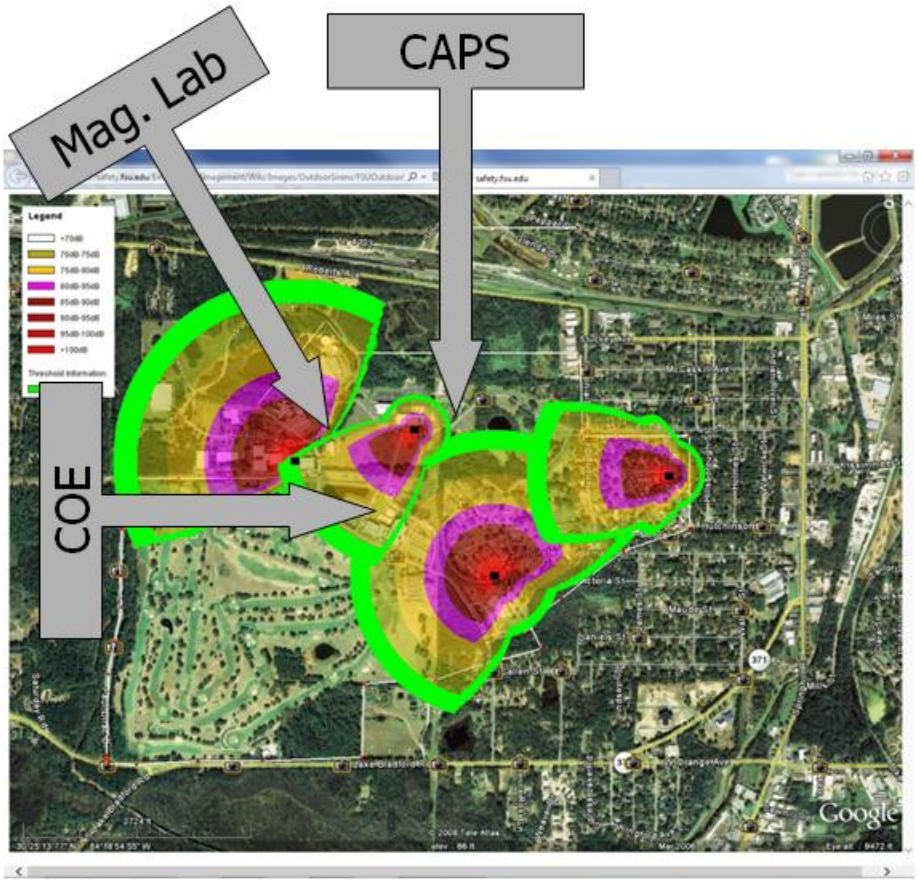


AED

CAPS maintains one AED (automated external defibrillator). The device is located just outside of CAPS' control room, on the main first floor hallway. It is the responsibility of CAPS' Security Officer to maintain this device in proper working condition. It is strongly recommended that personnel receive training on the proper use of an AED, but in the case of sudden cardiac arrest, anyone is encouraged utilize this device, and follow the verbal prompts in an effort to save a life. Any time the AED is used, the emergency response system (911) should be engaged. The location of CAPS' AED is shown in the image below.

8 - EMERGENCY ACTIONS

The Florida State University has installed a emergency siren system throughout its campus. CAPS is located in FSU's Southwest Campus, which is served by a portion of this system. The figure below shows the areas for which the audible alerts are design to be heard while outside. The siren system is not intended to be audible while inside of buildings.



Information regarding criminal activity, weather alerts, hazardous conditions, and a once-per-semester tests are broadcast through this system. In the event of the Southwest Campus Siren System sounding, CAPS personnel can acquire information regarding university-related safety information by tuning into AM radio station 530, or by calling the FSU information hotline at 850-644-4636.

ACCIDENTS INVOLVING INJURY

In the event of an accident, incidents involving faculty, staff, or students must be documented, using the EH&S 11-2 Accident investigation Report, which can be found at https://www.safety.fsu.edu/form/index.php. For injuries requiring medical attention, of any kind, injured faculty and staff must call Amerysis at 800-455-2079; injured students should seek medical care (at Thagard Student Health Center if feasible) or personal physician. Students must use his/her health insurance.

FIRE

In case of a fire, required actions are:

- call 911 or campus police at 644-1234 immediately
- if fire alarm has not sounded pull manual pull station
- if safe, remove power from burning equipment or area

Personnel who have received appropriate training are not required to, but may:

- Help injured personnel if safe to do so (DON'T BECOME A VICTIM)
- Extinguish with appropriate fire extinguisher

9 - DEFINITIONS

Approach Boundary	**Designated area established around exposed energized parts. The approach boundary shall be accessible only to qualified personnel**
CAPS' personnel	Employees, students, and visitors
Energized Parts	Equipment that is electrically connected to or having a source of voltage
Exposed Parts	Equipment or components that are not suitably guarded by engineering controls (i.e. by covers, fencing, etc…). These parts have the potential of being inadvertently touched or approached nearer than a safe distance by a person
Lockout/Tag Out	A procedure designed to minimize the hazard to qualified personnel working on equipment
NFPA 70E	National Fire Protection Association standards that address the electrical safety requirements necessary for the practical safeguarding of employees
Personal Protective Equipment (PPE)	The equipment provided to shield or protect a person from chemical, physical, electrical, thermal or other hazards
Principal Investigator (PI)	The researcher principally responsible for conducting research in a particular lab area
Qualified Personnel*	Qualified personnel are trained and knowledgeable of the construction and operation of equipment or a specific work method and are trained to recognize and avoid the hazards that might be present with respect to stored energy for the equipment or work method under consideration. Personnel, students or visitors must receive general AND task-specific safety training for a particular lab
Supervisor	A person designated by the PI to oversee laboratory activity in a specific lab
Unqualified Personnel*	Personnel, students or visitors that have NOT received general AND task-specific safety training for a particular lab
Visitor	A person performing research for CAPS who will not receive an FSU ID during their stay. A visitor will not perform research at CAPS for more than a single semester per visit
Working Near Parts	Approaching an exposed energized part closer than the approach boundary. This includes operating energized equipment

* A person could be qualified to work in lab A, but not lab B because he or she did not receive job specific safety training for lab B