



AY 2023-2024

# PSU Safety Manual



Quality Assurance Center

DQAD

AY 2023-2024



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# Safety Manual

Prince Sultan university

## Introduction

The most common expression used with regard to safety is “safety first”. Safety guidelines should be followed all the time to ensure the well-being of people. It should become a habit, not an obligation. Another important consideration for people who work with machines and equipment is their health. Long-term use of certain equipment without proper protection might adversely affect the user's health. It may be due to toxic substances or noise pollution.

Safety refers to specific hazards that might cause injury or even death. Such incidents are referred to as accidents. Examples of such accidents are the eruption of a fire in a building, inflicting burns, or the fall of a sharp tool on an unprotected foot, resulting in a bruise or cut.

# Emergency Information:

## 1. Emergency Phone Numbers

Male campus	0114948832
Female campus	0114948825
Off-campus phone	0114948832

## 2. Fire Emergencies

- a. Pull the fire alarm, then dial #0000 from a safe area

## 3. Medical Emergencies

Male campus	0557727374
Female campus	0533175713
Off-campus phone	0114948832

# Chapter 1: Responsibilities

## 1.1 Faculty, Staff, and Students:

The PSU Safety Manual encourages and requires that employees exercise judgment in the workplace. Disregarding prudent practices or the recommendations in this manual may be grounds for disciplinary action, per the discretion of supervisory personnel. The primary responsibility for safety rests with each individual engaged in research, education, and support activities at PSU. University faculty, staff, and students are responsible for:

- a. Attend applicable safety training programs.
- b. Comply with PSU safety rules.
- c. Report any workplace hazard, unsafe condition, or accident to their supervisor

## 1.2 Deans, Directors, and Department Chairpersons

Every dean, director, or department chairperson is responsible for implementing the safety program within their unit.

## 1.3 Vice President for Administrative and Financial Affairs (VPAFA):

VPAFA supports the university administration in developing and implementing a safety program and evaluating its effectiveness. **VPAFA** responsibilities include

- Acting as a University liaison with regulatory agencies (Ministry of Education, Civil Defense).
- Provides direction in all aspects of the environmental health and safety program.
- Assists University faculty, staff, and students in establishing and maintaining safe work environments
- Keeping those responsible for compliance informed of changes in safety regulations.
- Maintains the safety records necessary to document the University's programs and as required by specific regulations.

## 1.4 The General Supervisor of Maintenance:

The General Supervisor of Maintenance provides all support to assist the **VPAFA** and university administration in developing and implementing a safety program and evaluating its effectiveness. **The General Supervisor of Maintenance's** responsibilities include the following:

- Acting as a university liaison with regulatory agencies (Civil Defense).
- The Office of the University's President and the Office of the Vice President for Administrative and Financial Affairs are only those who receive official letters and official communication with the Civil Defense Directorate.
- Providing the resources, the University needs to protect the safety and health of students and employees. ok
- Maintaining the safety, health, and environmental records necessary to document the University's programs and as required by specific regulations. ok

## Chapter 2: Safe Work Habits

The behavior of a person determines how he or she carries out a certain task. It can easily be seen and analyzed. A task can be carried out differently by different people. One person might do it safely, while another person can do it in an unsafe manner. It should be noted that 80-95% of accidents are caused by unsafe behavior. Human behavior accounts for a large number of hazardous acts. An accident might be caused by unsafe behavior, unsafe physical conditions of machinery/equipment or a combination of both.

An accident can cause:

1. Injuries to faculty, students, and staff.
2. Damage to equipment/machinery or material.
3. Interruption in routine activities.

The occurrence of accidents is an indication that the safety management system is flawed. Elimination of these flaws and unsafe practices can eliminate accidents.

To control accidents, the following guidelines should be followed:

1. Safety policies should be established in writing and circulated for faculty, students, and staff and ensure that they are observed.
2. Regular safety training should be conducted, and it should be guaranteed that safe behavior becomes routine.
3. Accidents and hazards should be investigated.
4. Proper housekeeping should be maintained.
5. Unsafe behavior should be punished by providing instant feedback on such actions.



# Chapter 3: Emergency Action and Fire Prevention Plan

Emergency and Fire Protection Plan is divided into two parts

**First:** Preparing security and safety systems in the university's facilities used in the evacuation plan and the quality of its employees technically (the responsibility of the General Supervisor of Maintenance)

**Second,** because administrative committees made up of members pre-trained from various departments must be formed, implementing the evacuation plan is an administrative responsibility.

## 3.1 Building Evacuations

The General Services and Maintenance team conducts an annual fire drill. This ensures being equipped in case of a real emergency. The team meets regularly to distribute the tasks to all staff and provide them with necessary items such as flashlights, whistles, and vests. Each building floor has an assigned supervisor to ensure evacuation is executed efficiently. Signboards are placed behind the doors of all offices, rooms, and classes to direct them toward the closest exits.

## 3.2 Fire and emergency evacuation procedures

### ❖ Important guidelines in case of fire.

- Stop working immediately.
- Remain calm and do not panic.
- Do not use the elevators.
- Do not carry things when hearing the alarm bills.
- Organize students at the exit.
- In the event of heavy smoke, it is preferred to crawl on your knees instead of walking
- because there is less thick smoke near the ground.
- Alert the students not to run or exceed their colleagues to avoid injuries.
- Head to the assembly point through escape routes and emergency exits.
- Preparing equipment and extinguishing materials before opening a door or window is necessary, as the flames ignite quickly when oxygen is available.
- Make sure to be close to the wall when you take the stairs up or down.
- If you feel tired or have breathing difficulty, you must go out.

### ❖ Important guidelines in case of Rains and floods.

- In the event of heavy rain falls. The awareness campaign begins by sending a notification from the Operation and Maintenance Department and the Security Office to the Public Relations and Media Center (PRMC) to inform them about the emergency. The PRMC, in turn, makes a public announcement by sending text messages to all PSU stakeholders and announcing the situation through the plasma screens. They also use loudspeakers to calm the people, urging them to be cautious and avoid standing near the windows.
  - Provide umbrellas, anti-water plastic jackets, and electric lights in all university buildings.
  - After the emergency is declared, the university nurse and doctor shall take their positions.
- ❖ **Important guidelines in case of a sandstorm.**
- When a notice is given on a sandstorm or any adverse weather condition, the university contacts the civil defense after seeking the dean's approval.
  - All General Services, including maintenance, security, and medical staff, will follow up immediately with emergency cases by providing protective masks and oxygen tanks.
  - Specialized suits will be worn, and warning whistles will be used.
  - The technical maintenance team will sound the fire alarms and close all automatic doors and windows. They will immediately remove all items that tend to fall and evacuate all affected areas.
  - The doctor and nurse will follow up with all cases in the emergency rooms.
  - If an emergency is not handled at the campus, the ambulance is contacted.

### 3.4 Medical Emergencies

- Evaluate the immediate area for potential safety hazards (fire, toxic or explosive gas vapors, etc.) or situations requiring moving the injured to a safer location. Otherwise, move the injured person only as much as is necessary.
- Dial 911 to notify Public Safety and request first aid assistance or an ambulance.
- Provide emergency first aid as needed if you have been trained to do so.
- If the injury involves exposure to a hazardous chemical, provide the Material Safety Data Sheet (MSDS) to the medical emergency responders. If the MSDS cannot be located in time, call the emergency room to offer the information as soon as possible.
- For more information, please read the [BLS and First Aid Course](#).

# Chapter 4: Safety, Health, and Environmental Policies

The necessity of making a training course in coordination with the General Directorate of Civil Defense by sending officers specialized in training a selection of individuals working at the university to use fire extinguishers and safety conditions during any fires or natural disasters

1. Sustainable Waste Management, Prevention, and Disposal Policy ([link](#))
2. Safety Training Policy

# Chapter 5: General Safety

All university buildings possess features that ensure occupant safety in emergencies.

All occupants of University buildings should observe the following guidelines for

Identifying and reducing hazards:

1. **Conduct a hazard assessment:** Begin by conducting a comprehensive hazard assessment of the building. The assessment should include a review of the building's physical structure, mechanical systems, and emergency systems. This will help identify potential hazards and areas that need improvement.
2. **Establish a hazard prevention program:** Develop a hazard prevention program that outlines the steps necessary to reduce identified hazards. The program should include procedures for regularly inspecting and maintaining the building, as well as emergency response plans.
3. **Educate occupants:** Educate all occupants of the building about potential hazards and what to do in an emergency. This includes providing training on evacuation procedures, fire safety, and other emergency response protocols.
4. **Install safety equipment:** Install safety equipment such as smoke detectors, fire extinguishers, and emergency lighting throughout the building. This equipment should be regularly inspected and maintained to ensure it is functioning properly.
5. **Ensure accessibility:** Ensure that the building is accessible to all occupants, including those with disabilities. This includes providing accessible entrances, elevators, and restrooms.
6. **Maintain clear exit routes:** Ensure that exit routes are clearly marked and free of obstructions. This includes keeping hallways, stairwells, and other exit routes free from clutter and debris.

7. Regularly test emergency systems: Regularly test emergency systems such as fire alarms, sprinklers, and emergency lighting to ensure they are functioning properly.
8. Implement a hazard reporting system: Establish a hazard reporting system that allows occupants to report potential hazards or safety concerns. This system should be easily accessible and provide a clear process for addressing reported hazards.
9. Conduct regular safety audits: Conduct regular safety audits of the building to ensure that hazard prevention measures are being followed and that the building remains safe for occupants.
10. Continuously improve safety measures: Continuously review and improve safety measures to ensure that they remain effective and up-to-date. This includes staying informed on new technologies and best practices for hazard prevention.

By following these guidelines, university buildings can ensure the safety of all occupants during emergencies and reduce the risk of potential hazards.

# Chapter 6: Storage and Handling of Hazardous Materials:

## 6.1 Security and safety in the chemistry laboratory

1. Beware of storing rapidly flammable materials such as ethyl and carbon disulfide, petroleum, coloring, alcohol, and anesthetic so that:

- Store in a place far from the laboratory.
- There is an amount not exceeding half a liter.
- Clarify the sample that it is for.

2. Avoid transporting chemicals in crowded areas (such as corridors).

3. Preserving and classifying chemicals properly and relying on certain foundations during the classification process, including

- Dependence on collecting metal compounds in material classification (copper, zinc, iron, ...).
- Sodium, ...).
- Classification of chemicals according to their effect (acids, bases, ...).
- Classification of chemical compounds by associated groups.
- Use the warning signal as a basis for the classification process (toxic, burning).
- Other foundations, such as dividing chemicals into groups based on chemical determinants (oxidizing materials, sulfates, oxides ...).

4. Use the adhesive cards that illustrate the name, chemical code, and classification indicator if possible.

5. Securing a list of used materials to treat dangerous materials and ways to remove them.

6. Providing the distilled water needed for laboratory work

7. The solutions are used in many bottles showing the solution's name, its focus, the date of its preparation, and the preservation of them in places where the sun's rays do not fall.

8. Use chemical warning signals and paste them on glass bottles if they are not present.

# Chapter 7: Environmental Protection

Environmental protection is an essential component of any university's safety manual. It is crucial to ensure that the university community, including students, faculty, and staff, is aware of the environmental hazards that may exist on campus and how to mitigate them. It is the responsibility of the university to create and enforce policies that promote environmental protection and sustainability. **These policies cover areas such as waste management, energy conservation, water conservation, and pollution prevention.**

One of the key aspects of environmental protection in a university setting is waste management. The university has clear policies in place for the proper disposal of hazardous waste, electronic waste, and other types of waste generated on campus.

**Three categories of waste are used in universities.**

**First:** solid waste (such as old furniture and old electronic devices) is collected in stores and then communicated with social centers to be recycled.

**Second:** paper and plastic waste that is collected in recycling boxes and delivered to specialized centers.

**Third:** Non-solid waste that cannot be recycled in municipal funds and removed outside the university

Recycling programs are implemented to reduce the amount of waste sent to landfills. Energy conservation is another important area of focus. The university encourages energy-efficient practices such as turning off lights and electronics when not in use, using natural light whenever possible, and investing in energy-efficient appliances and systems. Water conservation is also critical, and the university promotes water-saving practices such as low-flow faucets and toilets as well as rainwater harvesting.

In conclusion, environmental protection is an integral part of the PSU safety manual. The university creates and enforces policies that promote environmental sustainability and protect the health and well-being of the campus community. By implementing waste management, energy conservation, and water conservation practices, the university can reduce its environmental impact and promote a sustainable future.



# Chapter 8: Electrical Safety:

Electrical safety is divided into two parts.

**The first:** is "protecting facilities from the risks of electricity. All electrical rooms in university buildings are covered with fire extinguishing systems and an accredited fire alarm.

High voltage rooms are isolated from the buildings and the devices' specifications with an explosion resistance and are closed; they are not allowed to be entered by ordinary individuals.

**Second:** protecting individuals, students, and employees by training and alerting the technical staff of the following:

- Check the equipment wires before each use, and replace damaged or worn-out electrical wires immediately.
- Commitment to safe work practices every time the electrical equipment is used.
- Knowing the location and how to operate the closure keys and circuit cutting plates, these devices are used to turn off the equipment in case of a fire or electric shock.
- Reducing the use of extension wires and using them only in temporary processes and for a short period of time. In other cases, installing a new electrical socket is best.
- Multi-plugs must have cutters or valves.
- The isolated electrical conductors (such as the conductors that are sometimes used with electrical devices) should be placed in special places.

## Chapter 9: Equipment and Facilities Safety

Periodic maintenance contracts are an essential aspect of ensuring the safe and reliable operation of service devices and equipment at universities. These contracts are designed to maintain the quality of equipment, lengthen its lifespan, and ensure continuous operation without any disruption. By regularly inspecting and maintaining service devices and equipment, universities can prevent unexpected breakdowns, reduce downtime, and minimize the risk of accidents.

The procedure for implementing periodic maintenance contracts involves several steps. Firstly, the university should identify the service devices and equipment that require maintenance and prioritize them based on their criticality. Next, the university should select a reputable maintenance service provider who can provide comprehensive maintenance services. The service provider should be able to perform routine inspections, identify defects early, and perform necessary repairs. Once the service provider is selected, the university should negotiate and finalize the contract terms and conditions, including the scope of work, the frequency of maintenance, and the cost of services. Finally, the university should monitor the maintenance activities of the service provider to ensure that the work is performed according to the agreed-upon terms and that the equipment remains in good condition. By following this procedure, universities can ensure that their service devices and equipment remain safe and reliable, reducing the risk of accidents and ensuring the continuity of their operations.

# Chapter 10: Basic First Aid Procedures

First aid is the immediate care of an injured or suddenly sick person. It is the care a person applies as soon as possible after an accident or sudden illness.

This prompt care and attention prior to the arrival of the ambulance can sometimes mean the difference between life and death, or between full recovery and partial recovery.

The principal aims of first aid are:

1. Preserve Life: This includes the life of the casualty, bystander, and rescuer.
2. Protect the casualty from further harm.
3. Ensure the scene is safe.
4. Provide pain relief. This could include the use of ice packs.
5. Prevent the injury or illness from becoming worse
6. Ensure the treatment you provide does not make the condition worse.
7. Provide reassurance.

It is also important to understand that first aid has its limitations and does not take the place of professional medical treatment.

## **Immediate Action:**

Taking immediate action is the most essential principle in first aid. If the basic symptoms of injury or illness are not recognized, the individual may not receive the necessary medical care quickly. Some people are also concerned about "doing the wrong thing," so they avoid performing any first aid at all. When someone is sick or injured, they require immediate assistance.

A casualty who is not breathing effectively or is bleeding heavily requires immediate assistance. Prompt and effective first aid gives the casualty a much better chance of a good recovery.

It is important that prompt action does not lead to panic, and the first aider should form a plan of action. Careful and deliberate action, undertaken without too much delay, is most beneficial to the casualty.

Each emergency is different, so it is impossible to provide a precise list of things that need to be done in an emergency. However, if the principles of first aid as outlined are followed, appropriate care can be delivered, even if the first aider is not sure of what the underlying problem is.

## 10.1 Shock

Shock may result from severe trauma, heatstroke, blood loss, an allergic reaction, a severe infection, poisoning, severe burns, or other causes. When a person is in shock, his or her organs aren't getting enough blood or oxygen. If untreated, this can lead to permanent organ damage or death.

Signs and symptoms of shock vary depending on circumstances and may include:

- a. Cool, clammy skin
- b. Pale skin
- c. Rapid pulse
- d. Rapid breathing
- e. Nausea or vomiting
- f. Enlarged pupils
- g. Weakness or fatigue
- h. Dizziness or fainting
- i. Changes in mental status or behaviour, such as anxiousness or agitation

If a person is in shock, the following steps should be taken:

- He should be laid down, and the legs and feet should be elevated slightly, unless it is seen that this might cause pain or further injury.
- The person should be kept still and shouldn't be moved unless necessary.
- CPR should be given if the person shows no signs of life, such as breathing, coughing, or movement.

- Tight clothing should be loosened, and if needed, the person should be covered with a blanket to prevent chilling.
- The person shouldn't be allowed to eat or drink anything.
- If the person is bleeding, pressure should be put over the bleeding area, using a towel or sheet.
- If the person vomits or begins bleeding from the mouth, he should be turned onto a side to prevent choking unless you suspect a spinal injury.

## 10.2 Bleeding and Wounds

A wound is a break in the continuity of skin in the body. Bleeding will occur because of the wound, and it also provides an opening for germs to enter the body. The depth of a wound is often more important than its area.

### Types of Wounds

**Abrasions (graze):** A superficial wound is one in which the top layers of skin are scraped off by a sliding fall or friction. It can contain embedded foreign particles.

**Incised wounds:** These are caused by sharp instruments like razors, knives, etc. Because of the clean cutting of blood vessels, these wounds bleed a lot.

**Punctured wounds:** These are caused by sharp instruments. They have small openings, but they may be very deep.

### Complications of wounds:

Wounds can cause two main complications:

- a. **Bleeding**
- b. **Infection**

**Bleeding:** The coming out of blood from a blood vessel is termed bleeding. It is the immediate complication of a wound that must be treated promptly.

**Infection:** It is caused by germs getting into the body through broken skin. The germs can multiply and make the wound septic. They may also get into the bloodstream and cause blood poisoning.

**Management:**

Bleeding should be stopped first. Direct pressure should be applied to the wound with a sterile dressing or a clean cloth piece. If necessary, the relevant arterial pressure joint should be pressed.

The injured part should be handled as gently as possible. The patient should be laid down, and if the wound is in a limb and there are no broken bones, the limb should be raised. This will lessen the bleeding.

Any foreign objects like glass, stones, etc. should be removed if it is easy to do so. Care should be exercised to not open up the wound again, which can cause more bleeding. Blood clots that have already formed should not be disturbed. A clean dressing should be placed over the wound, and a bandage should be firmly put over it.

## 10.3 Burns

Burns are injuries that result from dry heat like fire, flame, a piece of hot metal, the sun, contact with a wire carrying high-tension electric current, lighting, or friction. Scalds are caused by moist heat due to boiling water, steam, oil, hot tar, etc.

**Helping a person whose clothes have caught fire:**

The person should not be allowed to run about since this will fan the fire and spread the flame.

A blanket, rug, coat, or table cover should be held in front of oneself while approaching a person whose clothing has caught fire.

The casualty must be laid down on the ground and wrapped tightly with a thick piece of rug, cloth, or coat. The flame should be put out by making gentle pats over the covering. The casualty, however, should not be rolled.

## 10.4 Electric Shock

If any part of the body comes in contact with a 'live' wire, a person experiences an electric shock. Blowing out switches or fuses from faulty electrical connections can cause injury. The injury may be mild or so severe as to cause immediate death. Electrical shock is produced only when an electric current passes through the human body, which is in contact with the earth. It passes even more quickly if the part is wet.

In wet conditions, even a lower voltage may be dangerous. A very strong current passing to the earth through the lower limbs may be less dangerous than a weaker current passing through the chest, especially when it enters the hands and arms.

### **Effects of Electric Shock:**

- a. Can cause fatal paralysis of the heart.
- b. Sudden stoppage of breathing due to paralysis of muscles used in breathing.
- c. The breathing might stop, but the heart may continue to beat. In this condition, the face appears blue.
- d. There may be superficial or deep burns.

### **Management:**

Intelligent and prompt action is required, but with caution. If the first aider is not careful, he may also end up receiving a severe electric shock or even die with the casualty.

If the casualty is still in contact with the source, the current should be switched off first. If the switch is not found, the plug should be removed or the wire cut off by standing on a dry piece of wood. Scissors or knives should never be used.

CPR should be given if the person shows no signs of circulation, such as breathing, coughing, or movement.

The person should be prevented from becoming chilled. Burned areas should be covered with a sterile gauze bandage, if available, or with a clean cloth. A blanket or towel should not be used because the loose fibers can stick to the burns.

## 10.5 Eye Injury

Any kind of injury or trauma to the eyes has to be taken seriously. Prompt medical care for eye injuries can save vision and prevent further complications.

### **Foreign Object:**

The eye often cleans itself of debris by tearing, so no treatment is needed until it is certain that the eye cannot remove the object by itself.

First aid care for foreign objects in the eyes:

- No rubbing of the eyes
- The upper eyelid should be lifted up and out over the lower lid, and then the eyes should be rolled around.
- The eyes should be generously flushed with water while keeping them open.
- A follow-up with a doctor should be made to ensure all debris has gone and the eyes have not been scratched or damaged.

### **Blows to the eye:**



Impact on the eye is another form of eye trauma. Minor blows do not cause serious damage. But eye injuries should be monitored for signs of serious damage or a potential infection.

First aid care for a blow to the eyes:

- A cold compress should be gently placed over the eye in 5 to 10-minute intervals. Ice should not be placed directly, but a cloth should be used in between the ice and the skin.
- The person should be taken to a doctor to examine if there is potential eye damage.

#### **Cut or puncture wounds on the eye or lid:**

Immediate medical care should be sought if this type of injury has occurred. However, basic first aid steps should be followed to ensure safety.

- The eye/lid should not be washed.
- If there is an embedded object, it should not be removed since this can cause further damage.
- The eye should be covered with an eye shield. If that is not available, the bottom half of a paper cup should be put over the eye and taped gently to secure it to the face.
- Prompt medical attention should be sought.

## **10.6 Fainting**

Fainting occurs when the brain temporarily does not receive enough blood supply, causing it to lose consciousness. This loss of consciousness is usually brief.

Fainting might have no medical significance. Or the cause can be a serious disorder, often involving the heart.

#### **If you are alone:**

If you feel faint and you are alone: Lie down or sit down. Do not get up too quickly to reduce the chance of fainting again.

**If someone else faints:**

**Position the person on his or her back:** If there are no injuries and the person is breathing, the person's legs should be raised above the heart level. Belts, collars, or other constrictive clothing should be loosened.

**Check for breathing:**

If the person isn't breathing, CPR should be given. Medical care should be sought immediately. CPR should be continued until help arrives or the person begins to breathe.

# Chapter 11: Health and Physical Equipment

The following are the guidelines for using the health and physical Facilities and Equipment.

## 11.1 Swimming Pool:

Firstly, it is important to listen carefully to your instructor and lifeguard. They are there to guide you and ensure your safety. When entering the swimming pool area, be sure to remove your shoes and change in the cubicle as instructed. Wear an appropriate swimsuit and shower before entering the water and again after swimming. Report any issues with the water or inappropriate behavior of other swimmers to the lifeguard immediately. It is also important to know where the first aid kit and lifeguard are located in case of an emergency.

On the other hand, there are certain things that should not be done while using the facilities. Never enter the swimming pool without your teacher or if the lifeguard is not present. Do not swim alone, jump or dive close to other swimmers, or jump from the tower without permission. Swimming when you are tired, running along the poolside, pushing other swimmers into the pool, bringing any glass or sharp objects to the pool, bringing or chewing chewing gum, and eating anything in the pool area are also prohibited.

Additionally, never use lifesaving equipment for fun. If you are not a PSU student, faculty, or staff member, do not enter the facility without prior approval. Lastly, use the 911 Unified Emergency Number in case of an emergency.

## 11.2 Cardio Room, Weightlifting Room, Soccer Field and Outdoor Courts

Firstly, it is important to sign in to the log book before starting exercises and display your ID when entering the facilities. If there are any issues or damages to the equipment or facilities, report them to the gym supervisor immediately. Use the equipment and weights in a proper way. If you do not know how to, ask the gym supervisor or instructor. It is also important to take care of all equipment and keep it clean. Use your own bottles and towels, and sanitize your hands after exercises. Return weights, dumbbells, and other equipment to their proper place after using them. Wear proper sports attire and respect other athletes while exercising. Consult any medical

issues with the gym supervisor, and respect the priority of physical education PE classes. It is also important to know where the first aid kit and extinguisher are located in case of an emergency.

On the other hand, there are certain things that should not be done while using the facilities. Never enter the cardio and weight lifting room without registration, and do not do exercises alone. Offensive clothing or inappropriate attire and shoes are not allowed. Do not practice with a cold, flu, COVID, or any other infectious disease. Do not work out if you are tired, and do not run around the gym. Perform exercises with a proper warm-up and cool down, and do not bring any glass or sharp objects to the gym. Additionally, do not bring or chew chewing gum, and do not eat anything in the gym. Lastly, if you start experiencing nausea, severe pain in the chest, shortness of breath, or any other discomfort, stop exercising immediately.

### **11.3 General Guidelines for physical Facilities and Equipment**

1. The assembly point must be clearly marked.
2. Building plans must be available
3. Exit doors must not be blocked in any case
4. Regular fire-alarm drills should be performed on an annual basis
5. Faculty members should absolve CPR and First Aid Courses

# Chapter 12: Laboratory Safety

Laboratories contain different tools, equipment, machines, and materials, which might constitute a safety hazard, a health hazard, or both. It is essential for users to be aware of the different potential risks so that they can protect themselves. For more information regarding safety guidelines. ([Lab Safety Manual](#))

Laboratories contain different tools, equipment, machines, and materials, which might constitute a safety hazard, a health hazard, or both. It is very necessary for users to be aware of the different potential hazards so that they can protect themselves.

It is the primary duty of the laboratory instructors to educate the students in the very first lab session regarding safety principles and hazards. It is the duty of all the persons using the lab to abide by these principles for their safety and health, for the safety of others, and to protect the laboratory and equipment from damage.

## 12.1 Machine and Tools Hazard

Machines are an essential part of our lives today. And laboratories, more so, contain a lot of heavy machines and equipment. Machines contain moving parts that create hazards for workers working around them.

These hazards should be identified, and safety guidelines should be formulated to prevent accidents.

### **Assessment of Machine Hazards:**

Mechanical hazards can result mainly from the following:

1. Point of Operation
2. Power Transmission
3. Rotating machine parts
4. Flying chips and sparks.

**Point of Operation:** This is the place where materials are formed, shaped, cut, drilled, or ground.

**Power Transmission:** Flywheels, belts, pulleys, chains, couplings, gears, and cranks are the parts of power transmission.

**Rotating machine parts:** These include reciprocating, rotating, and transverse moving parts. Rotating parts, gears, moving belts, and cutting teeth can be dangerous.

**Rotating motion:** It includes collars, flywheels, couplings, and vertical or horizontal shafts. Nip points (where two adjacent parts move in opposite directions) can also be a hazard. Clothes, fingers, skin, hands, or hair can get pulled into a nip point.

**Reciprocating motion:** This can be an up-down or back-and-forth motion. This can be a likely hazard because a person can get caught between a stationary and a moving part.

**Cutting action:** These hazards are presented by drilling machines, saws, and milling machines. Injuries can be caused to the arms, body, and hands. Scrap material can also strike the face and eyes.

#### **Routine safety inspections:**

Inspections should be carried out in a routine manner to check the status of machines and if standard operating procedures are being followed.

The following points should be considered in any inspection:

1. Workers must be using mandatory protective clothing and equipment.
2. Machines must be grounded properly, and all electrical connections and cords must be in good condition.
3. All machines should be well-lubricated, clean, and in good working condition.
4. All guards and safety devices should be working properly.
5. Operators should be following approved standard operating procedures.
6. Work areas around the machines should be clean and free of debris and scrap material.
7. If any difficulty is experienced during a machine operation, it must immediately be reported.

**Protection and Safety of Workers:**

1. Awareness: Maintaining an atmosphere of awareness wherein faculty, students, and staff are alert to the dangers and hazards is necessary to prevent accidents.
2. Training: All those involved in working with machines must be taught about safety devices and machining guards, the use of proper uniforms and safety equipment, and safe operating procedures.
3. Observation: Persons working on the machines should be observed on a frequent basis. This can assist in identifying at-risk behavior.
4. Safety Devices: All machines must be equipped with safety devices and guards to keep body parts away from dangerous areas, especially where there is a possibility of contact with moving machine parts. These safety devices and guards should never be bypassed.

## 12.2 Fire Hazards

A fire hazard is something that encourages a fire to start and increases its intensity. It is a very dangerous type of hazard that can occur anywhere within closed or open structures. Every precaution should be taken to prevent the occurrence of a fire. This can be done by making the PSU community aware of the causes of fires, preventive measures, methods of subduing a fire, and the effects of fire on the human body.

There are fuel hazards such as flammable and combustible gases and liquids, chemicals, and combustible metals. Common hazardous fire conditions can result from poor housekeeping and improper storage of hazardous items.

**General Safety Measures:**

1. Containers and tanks which are approved for storage, handling, and transport of combustible and flammable liquid should be used.
2. Separation and disposal of combustible refuse should be done in approved containers.
3. Combustible debris and scrap must be regularly disposed of from the work area.

4. Evaluation procedures must always be performed before conducting operations that present fire hazards like welding.
5. Adequate fire suppression equipment should be kept in the work area to extinguish the fire before it goes out of control.
6. Firefighting equipment should be inspected and maintained regularly.
7. Employees should be provided with proper training in fire prevention and protection.
8. Smoking should be prohibited in or around work areas where fire hazards are present. “NO SMOKING” or “OPEN FLAMES” signs should be put up.
9. An alarm system that consists of both visual and audible signals (bells, sirens, blinking lights) should be configured.

### **Effects of Fire on Personnel:**

A fire in a closed area will result in the production of toxic gases and the depletion of oxygen in the air. This will cause difficulty breathing. Smoke also makes it difficult to see the exits and move to a safer environment. The majority of fatalities from fires are caused by suffocation or inhalation of smoke, not burns.

Skin burns are classified according to the depth of the burn into:

- A) First-degree burns: Only redness of the skin is caused.
- B) Second-degree burns: These are much more severe, wherein blisters of the skin will form, and in more severe cases, there will be a collection of fluid under the skin. The skin beneath the blisters is extremely sensitive, red in color, and releases considerable amounts of fluid. Second-degree burns are painful since the nerve endings might be exposed. Broken blisters can also expose the body to potential sources of infection.
- C) Third-degree burns: They cause more serious damage, although the destruction of the nerve endings can cause less pain than second-degree burns. The skin, red blood cells, subcutaneous tissue, capillaries, and sometimes muscles are destroyed.



## 12.3 First Aid

For first-degree burns, the affected part must be immersed in cool water until the pain decreases. For higher degrees, water should not be used. Since water increases the danger of infection in open burns. The burn should be covered with a dry, thick, sterile dressing bandage. If burned clothing is sticking to the burn, the dressing should be placed right over it. Dry, insulated cold packs can be used over a dressing on small areas such as the feet, hands, and face. Medical care should be sought immediately. Face burns may affect breathing since the airways may be swollen, and the victim might need mouth-to-mouth breathing. Care should be exercised to prevent shock. In the case of shock, the victim should be lying down with the legs elevated.

Medical care should be immediately sought for burns other than first-degree burns.

## 12.4 General Safety Principles

1. Food, beverages, substances, and related utensils should not be brought, stored, or consumed in the laboratory.
2. Smoking is strictly prohibited in the laboratory at all times.
3. Any problem with the equipment should be reported to the instructor immediately.
4. All written and verbal instructions given by the lab instructor need to be followed carefully. If any part of a procedure or experiment is unclear, consult the instructor before continuing with the activity.
5. Horseplay, practical jokes, and pranks are dangerous and prohibited in all labs at all times.
6. Any accident (spill, breakage, etc.) or injury (cut, burn, etc.) must be reported to the instructor immediately, no matter how trivial it seems.
7. Wearing loose clothing which might become caught or entangled in the rotating part of machines must be avoided, and instead, suitable clothes must be worn.
8. Test equipment must be operated under the supervision of the lab instructor only.

9. Emergency button should be used in the event of anything going wrong.
10. All power supplies of machines should be turned off after completion of the experiment.
11. Work area has to be kept neat and clean. Any tools or instruments used have to be returned to their designated place.
12. Gloves must be worn while handling materials like cement, soil, sand, etc.
13. The teacher's instructions have to be followed for disposing of the waste materials generated during the experiment.
14. An experiment should never be left unattended. If you have to need to leave the lab, have a classmate monitor the experiment until you return.
15. Location of the fire extinguisher and first aid kit should be known.

## 12.5 Personal Safety

In addition to the safety devices and guards, people operating the machines need to be provided with personal protective equipment (PPE).

1. Goggles and safety devices prevent injuries that can be caused by flying pieces e.g, wood chips, metal shavings, and concrete rubble.
2. Face shields can protect against sparks and dust.
3. Ear plugs should be used when there is high-decibel noise.
4. Safety shoes must be used to protect feet from falling objects and from slippery surfaces.

How to ensure workers wear the required PPE

1. Ensure adequate stock of PPE is present.
2. Reminders: Posters displaying messages of safety should be posted in working areas, near the start-up controls and entrance.
3. Training: Lectures should be arranged to teach the importance of using PPE.

## 12.6 LABORATORY EQUIPMENT SAFETY

To ensure the safety of laboratory users, the following precautions must be taken while working with equipment:

1. The operating manual/user manual should be referred to before starting the operation. The manual will contain details of hazards and safety precautions to be taken during installation, operation, and maintenance.
2. The operating manuals of equipment must be located at an easily accessible location in the laboratory.
3. Non-authorized personnel must not carry out the operation of the equipment.
4. New users must carry out operations under the guidance of senior users.
5. Unauthorized maintenance activity must not be carried out.
6. Equipment must be switched off and unplugged while making any adjustments.
7. Emergency stop switch must be prominently labeled.
8. Source of power must be easily accessible.

## 12.7 Use of Glassware

The proper use of laboratory equipment is critical for laboratory safety. Many accidents occur as a result of improper laboratory equipment maintenance or use.

### **Glassware:**

**Type:** The correct type of glass should be used.

- a. When heating glassware, it should be ensured that only glassware made of borosilicate glass is used. Common glass can explode, break or shatter very easily when subjected to heat shock.
- b. It is to be noted that not all test tubes are made of borosilicate glass. So, it must be checked always before heating.

**Proper use:**

Each type of glassware serves a specific purpose and should be used only for its intended purpose.

- a. For measuring volume: Pipettes, Burettes, graduated cylinders, volumetric flasks, and dropper pipettes must be used.
- b. For storing solids and liquids: Bottles and vials must be used.
- c. For containing reactive chemicals during experiments: Beakers, Test Tubes, Flasks, and Test Plates.
- d. For measuring temperature: Thermometers

**Cleaning:**

- a. Glassware should be cleaned immediately after use. The longer it sits unclean, the harder it is to clean.
- b. Laboratory-grade detergents should be used for cleaning glassware. Chromic Acid should never be used to clean glassware.
- c. Glassware should be rinsed well.
- d. When using brushes, it should be ensured that the metal part of the brush doesn't scratch the glass.

**General Cautions:**

- a. Glassware without defects and smooth edges should only be used.
- b. Glassware should not have cracks, scratches, or chips. In particular, care should be taken to check for "star cracks" that can form on the bottom of beakers and flasks. Glassware with such cracks should be disposed of immediately.
- c. All glass tubing should be fire-polished.
- d. Hot glassware should never be set on cold surfaces or in a way that changes its temperature suddenly. Glass beaker will break if cold water is poured into it.

**Frozen Glass:**

Glassware that has been "frozen" should be handled with caution. Only instructors should attempt to free the frozen glassware while wearing gloves and goggles. If this fails, it should be discarded. Some common causes of "frozen" glassware are:

- a. Stoppers that cannot be removed from bottles.
- b. Nested beakers that have been jammed together.
- c. Stopcocks that cannot be moved.

**Hot Glass:**

- a. Working with hot glass requires caution because it looks exactly like glass at room temperature.
- b. Hot glassware should not be left unattended. Ample time should be given for the glass to cool before touching.
- c. The temperature of the glassware can be checked by placing the hand near it, but not by touching potentially hot glass.
- d. Thick gloves, hot pads, or beaker tongs should be used for grasping hot glassware.

**Disposal:**

- a. A separate container should be used for disposing of glassware. Such container should be clearly labeled "BROKEN GLASSWARE ONLY".
- b. When handling broken glassware, a dustpan and broom and gloves should be used. Broken glass should never be picked with bare hands.

## 12.8 ITCS Computer Labs

Ensuring safety in computer labs is essential to prevent accidents and respond to emergencies effectively

**Working Hours:** The ITC operates 20 public computer labs. These are mostly used for teaching during the day, but when not reserved for courses, they are open to all students.

**Food and beverages** are not permitted in the computer labs. There will be no exceptions. This policy protects the equipment and promotes a cleaner environment.

**Modifying Hardware** Users are not permitted to do the following:

- 1- Disconnect cables from the computer equipment to plug into personal devices.
- 2- Dismantle equipment in an attempt to troubleshoot issues.
- 3- Remove equipment from the labs or take items such as a mouse from the lab supplies. Equipment and supplies are only meant to be used within the lab site.
- 4- Make changes to the hard drive configurations of the computers in the labs.

### Software and operating system

All commonly used applications are installed in all labs. Specialized software is made as widely available as licensing restrictions allow. Configurations of software are updated twice a year. To allow for proper installation and testing, all requests for new or additional software to be installed must reach the ITC - with proper approvals - at least a semester in advance.

It is not permitted for users to do the following:

- 1- Alter the system or the application software in any way. Attempting to damage or destroy information on the computers is not tolerated.
- 2- Download software from the Internet or install any software on any lab computer.
- 3- Save personal documents on computers. All documents should be saved in the user's network drive (Z: drive). Academic documents may be temporarily saved to Windows' "My Documents" folder. All files are deleted upon each restart of a lab computer.

### Printing

If a printer is available, users must be considerate of others by not monopolizing it. Printers should not be used as document copiers.

## Lab Etiquette

The computers in the labs are primarily for academic purposes. All students are expected to use IT resources responsibly and with regard for others. To this end, the following rules apply:

- 1- Users must be courteous to all lab personnel and considerate of other users. Privacy and concentration are important in computer labs.
- 2- Leave the computer workstation in the same condition as it was found. This includes putting chairs back in place, exiting all open applications, and logging off any open accounts. Users will be held accountable for any abuse originating from their accounts.
- 3- Make sure the projector is off when not in use.

## Problems and Help

All lab-related questions should be directed to the Lab Technicians via email at [servicedesk@psu.edu.sa](mailto:servicedesk@psu.edu.sa).

- 1- If a computer is not in good working order or a printer jams, users must:
  - a. Notify the lab technician on duty if a lab assistant is available.
  - b. Submitting the form for reporting technical problems in computer labs to the Lab Technician.
- 2- Lab technicians are there to help users use the technology so that they may complete their work. Lab technicians are not permitted to debug user programs, interpret class assignments, or assist with homework.

## Physical Security Policy

This Physical Security Policy aims to establish guidelines for safeguarding and controlling physical access to the organization's information technology network to protect equipment and data from unauthorized use. The policy covers environmental safeguards such as air conditioning, fire extinguishers, surge protectors, and uninterrupted power supply. It also addresses physical access, including compliance with regulations and documentation of access privileges, granting access only to staff and affiliates who require it, and monitoring access through secured access devices, visitor logs, and access records. The policy requires all spaces housing information technology resources to be locked when not occupied and for all equipment in public access areas to be secured with theft-inhibiting devices.

# Chapter 13: Specialized Research Labs

Research laboratories are essential facilities for scientific discovery and innovation. However, they also present a range of safety hazards, which can pose significant risks to lab personnel, the environment, and the public. As such, it is essential to have a comprehensive safety manual in place to ensure that everyone in the lab is aware of the potential hazards and understands how to minimize the risks. This research lab safety manual provides guidelines and procedures for safe laboratory practices at Prince Sultan University

## 13.1 General Lab Safety Guidelines

1. All personnel must receive appropriate training before entering the laboratory. Before allowing anyone to work in the lab, they should receive the necessary training, including standard operating procedures (SOPs) for the specific experiments they will be conducting. The training should also cover safety protocols, emergency procedures, and how to use personal protective equipment (PPE) correctly.
2. The laboratory must be kept clean and organized at all times. The lab should be clutter-free and well-organized to reduce the risk of accidents or spills. All equipment, chemicals, and materials should have designated storage areas, and all personnel should be trained to maintain the lab's cleanliness properly.
3. Personal protective equipment (PPE) such as lab coats, gloves, and safety glasses must be worn at all times while in the laboratory. All personnel entering the lab must wear appropriate PPE to reduce the risk of injury or exposure to hazardous materials. The type of PPE required may vary depending on the experiment being conducted, and personnel should be trained on properly using each type of PPE.
4. Eating, drinking, or smoking is prohibited in the laboratory. Food, drinks, and tobacco products should never be consumed in the lab to prevent contamination or ingestion of hazardous materials.
5. The laboratory must have a designated area for storing chemicals, equipment, and materials.  
All chemicals, equipment, and materials should be stored in designated areas to prevent accidental exposure or spills.
6. Only authorized personnel should have access to the laboratory. Access to the lab should be restricted to authorized personnel only, and the lab should be secured when not in use to prevent unauthorized access.



## 13.2 Chemical Safety Guidelines

1. All chemicals must be properly labeled and stored in appropriate containers. All chemicals should be properly labeled with the appropriate warning signs and stored in appropriate containers to prevent exposure and contamination.
2. All personnel must be trained in the proper handling, storage, and disposal of chemicals. All personnel should receive training on properly handling, storing and disposing of chemicals, including proper PPE use, labeling, and storage protocols.
3. Training personnel must promptly report and clean up chemical spills. All personnel should know how to identify and report a chemical spill, and trained personnel should be available to clean up the spill according to established protocols.
4. All personnel must wear appropriate PPE when handling chemicals. All personnel entering the lab must wear appropriate PPE to reduce the risk of injury or exposure to hazardous materials.
5. Chemical waste must be disposed of according to established protocols. All chemical waste should be properly disposed of according to established protocols to prevent contamination and reduce the risk of exposure to hazardous materials.

## 13.5 Electrical Safety Guidelines

1. All electrical equipment must be properly grounded and maintained. All electrical equipment should be properly grounded and maintained to reduce the risk of electrical shock or fire.
2. Electrical equipment that is damaged or malfunctioning must be taken out of service immediately. All damaged or malfunctioning equipment should be taken out of service immediately to prevent further damage or injury.
3. Only qualified personnel should perform electrical repairs. Only qualified personnel should perform electrical repairs to prevent injury or damage to equipment.
4. All electrical equipment must be turned off when not in use. All electrical equipment should be turned off when not in use to conserve energy and reduce the risk of fire.

## 13.4 Fire Safety Guidelines

1. The laboratory must have a designated area for the storage of flammable materials. All flammable materials should be stored in designated areas, away from heat sources and ignition points.
2. All personnel must be trained on fire extinguishers and emergency evacuation procedures.  
All personnel should be trained on the location and use of fire extinguishers and emergency evacuation procedures in case of a fire.
3. The laboratory must have working smoke detectors, fire alarms, and sprinkler systems. All fire safety systems should be regularly maintained and tested to ensure they are in proper working order in case of an emergency.
4. All personnel should be familiar with the location of emergency exits and assembly points. All personnel should be familiar with the location of emergency exits and assembly points in case of a fire or other emergency.

## 13.5 Biological Safety Guidelines

1. All personnel working with biological materials must receive appropriate training. All personnel working with biological materials should receive training on proper handling, storage, and disposal protocols to prevent exposure to infectious agents.
2. All biological materials must be labeled and stored in appropriate containers. All biological materials should be properly labeled with the appropriate warning signs and stored in appropriate containers to prevent exposure and contamination.
3. All personnel must wear appropriate PPE when working with biological materials. All personnel entering the lab must wear appropriate PPE to reduce the risk of exposure to infectious agents.
4. All biological waste must be disposed of according to established protocols. All biological waste should be properly disposed of according to established protocols to prevent contamination and reduce the risk of exposure to infectious agents.

## 13.6 Radiation Safety Guidelines

1. All personnel working with radioactive materials must receive appropriate training. All personnel working with radioactive materials should receive training on proper handling, storage, and disposal protocols to prevent exposure to radiation.
2. All radioactive materials must be labeled and stored in appropriate containers. All radioactive materials should be properly labeled with the appropriate warning signs and stored in appropriate containers to prevent exposure and contamination.

3. All personnel must wear appropriate PPE when working with radioactive materials. All personnel entering the lab must wear appropriate PPE to reduce the risk of exposure to radiation.
4. All radioactive waste must be disposed of according to established protocols. All radioactive waste should be properly disposed of according to established protocols to prevent contamination and reduce the risk of exposure to radiation.

### 13.7 Emergency Procedures

1. All personnel must know the location and proper use of emergency equipment, such as eyewash stations and safety showers. All personnel should be familiar with the location and proper use of emergency equipment, such as eyewash stations and safety showers, in case of an accident or exposure.
2. All personnel must know the emergency contact information for the laboratory and university. All personnel should know the emergency contact information for the laboratory and university, including phone numbers and locations, in case of an emergency.
3. All personnel must know the emergency evacuation procedures for the laboratory and university. All personnel should be familiar with the emergency evacuation procedures for the laboratory and university in case of a fire or other emergency.

In summary, the research lab safety manual should provide comprehensive guidelines for maintaining a safe and healthy environment in the laboratory. Following these guidelines and properly training personnel can minimize the risk of accidents and exposure to hazardous materials, ensuring a safe and productive research environment.

**Table 13.1: Electrical Safety Guidelines for Research Labs**

<b>#</b>	<b>Title</b>	<b>Guidelines Description</b>
1	Avoid contact with energized electrical circuits	Stay away from live wires and circuits, and never touch electrical equipment that is still powered.
2	Disconnect the power source before servicing or repairing electrical equipment	Make sure to turn off and unplug the equipment before performing any maintenance work on it.
3	Use nonconductive gloves and shoes with insulated soles	When handling plugged-in equipment, wear gloves and shoes made of nonconductive materials to prevent electric shock.
4	Work with one hand	Whenever possible, use only one hand when working with electrical equipment to reduce the risk of current passing through your chest.
5	Shut off the power and unplug equipment when spills occur	If water or chemicals are spilled onto equipment, turn off the power at the main switch or circuit breaker and unplug the equipment.
6	Do not touch live electrical conductors	If you encounter a live electrical conductor, avoid touching the equipment, cord, or person, and disconnect the power source immediately.
7	Do not make circuit changes when power is on	Avoid making any wiring or circuit changes when electrical power is on.
8	Do not wear loose-fitting clothing or jewelry	Loose-fitting clothing or jewelry can come into contact with live electrical equipment, increasing the risk of electric shock.
9	Wear appropriate clothing in electrical labs	Wear pants instead of shorts or skirts, and avoid wearing ties, which can be dangerous around electrical equipment.
10	Use caution when handling powered equipment	Powered equipment can become hot, so use caution when handling it after use.
11	Do wiring and circuit checkout before applying power	Ensure wiring, setup, and circuit checkout are complete before turning on the electrical power.

#	Title	Guidelines Description
12	Use wires of appropriate length and avoid splices	Use wires of appropriate length to avoid draping them over the equipment and avoid splices, which can create live surfaces.
13	Avoid touching anything with wet hands	Do not touch electrical equipment with wet hands and use the "one-hand" approach when possible.
14	Do not touch metal objects with a free hand	If you cannot keep your hand in your pocket, avoid touching metal objects with a free hand.
15	Ensure circuit is completely dead before pulling wires out	Do not pull wires out until you are sure that the circuit is completely dead.
16	Connect all electrical equipment to proper earth line	All electrical equipment must be connected to the proper earth line to prevent electric shock.
17	Properly mark high voltage equipment	All high voltage equipment must be properly marked, and danger signs must be displayed.
18	Do not depend on switches to de-energize a circuit	Pull the plug out from the socket/outlet to de-energize a circuit.
19	Have a co-worker with you when working on high voltage circuits	If you are working on high voltage circuits, have a co-worker with you who knows how to break the circuit to get you free and how to give you mouth-to-mouth resuscitation and closed chest heart massage.
20	Avoid working on energized circuits when mentally or physically tired	When you are mentally or physically tired, avoid working on energized circuits.
21	High voltage connections must have no sharp points	Ensure high voltage connections have no sharp points to avoid electrical arcing.
22	Use enclosures around high-voltage equipment	Use permanent or temporary enclosures around high voltage equipment to prevent electrical shock.

**Table 13.2: Potential Risks and their mitigations Plans**

#	Identified Risk	Risk Description	Mitigation Plan / Action	Severity / Frequency of occurrence
1	Electricity	During the testing or development of the prototype, the team member may be prone to the risk of electrical shock.	Team members are strictly instructed to follow the safety instructions before handling high-power equipment, such as the use of Shockproof gloves, Safety Glasses, and leather shoes.	High Severe /High
2	Exposure to toxic fume	While handling the soldering stations, a team member might be in exposure to the toxic fume due to the usage of lead and soldering paste, which leads to breathing difficulties and eye injuries.	Team members are advised to use the soldering equipment in well-ventilated places, and they are advised to use solder fume extractors to avoid inhalation of toxic fumes.	Hazardous / High
3	Injury / Sharp tools	During the prototype's fabrication, the team members might be in a situation to use heavy and sharp tools. Improper handling of such tools leads to injury.	Team members are strictly instructed to follow the safety instructions such as Shockproof gloves, Safety Glasses, and leather shoes.	Critical / Medium
4	Stress due to deadlines	High chance of getting mental stress as the deadlines approach for a team member to complete an assigned task.	Team members are advised to stick to the project plan and report to the Principal Investigator / Manager if they face any difficulties on time to avoid the 12-hour rush.	Marginal / Less
5	Physical Body pain / Eye comfortless due to prolonged use	This issue might happen regularly for those spending a long time in	Team members are always advised to take a short break once in an hour to	Marginal / Medium

#	Identified Risk	Risk Description	Mitigation Plan / Action	Severity / Frequency of occurrence
	of computers/ laptops	computers/laptops during project design, simulations, and documentation.	avoid these physical discomforts.	
6	Explosion of chemicals	Improper dealing with batteries will always lead to risk. Overcharging/charging with overcurrent or overvoltage will land in high fatal risk.	‘The laboratory is well equipped with fire safety, and the team members are advised to perform the battery-related task only if it is mandatory or confident in it.	High semi /Probable
7	Fire or Smoke	Team members might be exposed to Fire or Smoke during the testing of the prototype due to faulty connections or low connection terminals.	Ensure the correctness of the electrical circuit before beginning the test process. Follow the safety instructions and the rigidity of connection terminals can avoid this risk.	High Severe /Medium