



**University of Bahrain**

# **Laboratory Health and Safety Guidelines**

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# Laboratory Health and Safety Guidelines

## 1. Introduction

The University of Bahrain recognizes the importance of safety and health. It is committed to providing an environment in which recognized hazards in labs, workshops, classrooms, and each College premises are controlled or eliminated. The following laboratory health and safety (LHS) booklet was designed to meet the international and local standards in maintaining laboratory attendees' safety and minimize the risks of encountering incidents.

## 2. Objectives

The objectives of the following guidelines:

- To maintain the personal safety of students, technicians, and faculty.
- To apply standard procedures and protocols that mitigate any potential chemical, biological and radiation risks of working in the laboratories.
- To ensure the consistent application of LHS protocols when conducting tasks in the laboratories.

## 3. Contact Details

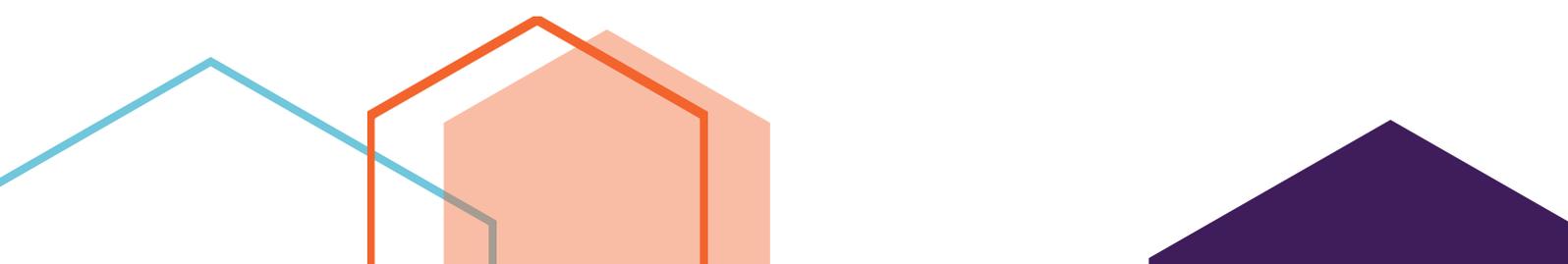
The following information should be ready when speaking to the security and safety dispatcher:

- Nature of emergency
- Location (building and room number)
- Number of people involved or injured

Emergency Contact Details (Security and safety):

- Sakhir Campus: 17 437 999
- Isa town Campus: 17 876 999 / 17 876 091
- Salmanya campus: 17 285 990

Non-Emergency Contact Details:

- Sakhir Campus: 17 438 000
  - Isa town Campus: 17 876 000
  - Salmanya campus: 17435 886
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## 4. University of Bahrain LHS Standards and Governance

The Occupational Health and Safety Committee sets the LHS guidelines and standards. The committee and four directorates related to occupational health and safety follow the Vice President for Information Technology, Administration and Finance (Figure 1). All related entities coordinate and co-operate to fulfil and apply occupational health and safety standards. Further details are available in this document ([click here](#)).

The related entities set the standards and guidelines of the laboratory and occupational health and safety. The affiliated College sets specific guidelines and policies related to individual departments.

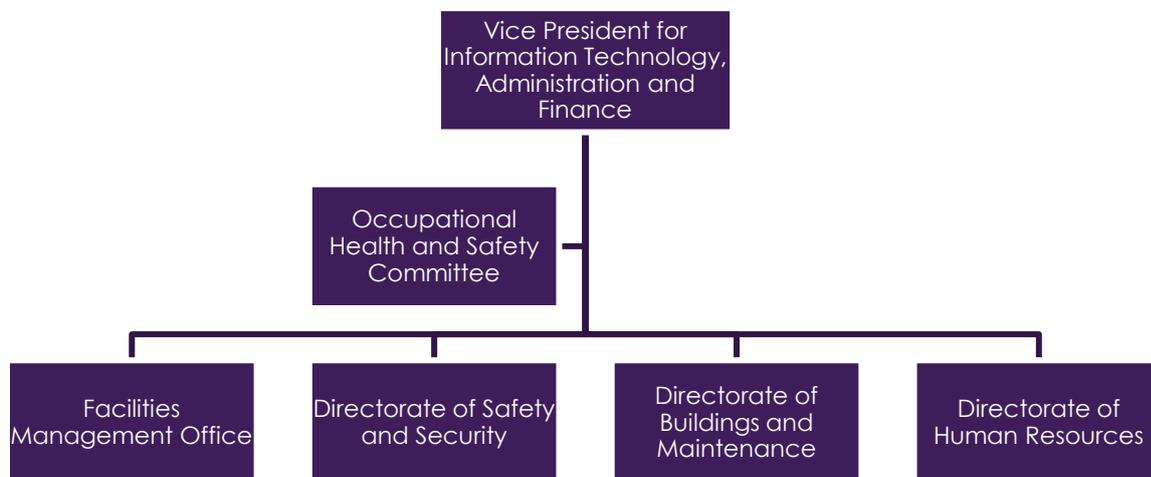


Figure 1 - University of Bahrain Occupational Health and Safety Structure

## 5. Laboratory Guidelines

### Identification

- A photo identification badge or ID, provided by the University of Bahrain, should always be worn in the laboratory setting. The photo and student name shall not be hidden or obscured in any manner. No other badges or logos are considered appropriate.

### Laboratory fire safety

- Different fire extinguishers are installed where possible to handle hazardous processes or flammable liquids. Be familiar with the extinguisher types, locations, and uses by reading the instructions labels.

### Dress code and safety equipment

- All laboratory users must wear appropriate safety equipment (e.g., safety goggles and gloves) during any laboratory experiment involving chemical, biological, health or ionizing hazards. Additional safety equipment must be utilized based on the requirements of any experiment or task.
- Lab coats or aprons must always be worn while in the laboratory to protect skin and prevent soiling of clothing during activities. It acts as a safeguard to protect clothes and oneself from microbial contamination and/or spillages of chemicals and stains. Also, the clothes should be appropriate for the laboratory activity.
- A short-sleeved top and trousers are acceptable with a unified navy blue (mid-night \blue) colour while in the radiation laboratory or rooms.
- Shoes must completely cover the foot. Heels more than 2" in height are not allowed. No sandals are allowed while in the laboratory.
- Dangling jewellery, loose or baggy clothing, long hair, a ghutra or ties other loose clothing around machines are a hazard in the laboratory and must be secured. Do not wear long loose ties or scarves, or hairy coverings.
- Females are not allowed to leave their hair open. Hair must be tied into a neat bun, plait, or pony.
- The hijab must be neatly wrapped and must be intact, and not allowed to flow loose.

### Workspace rules

- Only those materials pertinent to the laboratory work, such as laboratory manual, laboratory notebook, and other related materials, should be brought to the laboratory workspace. All other items such as books, laptops, clothing, and bags should be stored away from the work area.
- Upon entering the lab, follow the safety signs and not touch any equipment, chemicals, or other materials in the laboratory area until you are instructed to do so.
- Unauthorized or unsupervised laboratory experimenting is not allowed. No student may work in the laboratory without the presence of the instructor/technician. Have at least one partner so that one can call for help in the event of an emergency.
- Instructors and students should be on time. During the first few minutes of the laboratory session, the instructor may provide verbal instructions. Students should listen carefully to information concerning special techniques and precautions to be taken during the lab exercise.

- Be aware of the hazards of any materials or machinery currently being used. The laboratory manual and instructor will review specific safety issues on individual experiments before performing any experiments.
- Get familiar with the locations and operating procedures of all safety equipment in the lab and the building, including first aid kit(s), telephones, material safety data sheets, safety showers and eyewashes for use in an emergency, and electrical panels. Moreover, be aware of the fire alarm and the location of the exits. Also, aisles, exits locations, and access to emergency equipment must always be kept clear.
- Read and fully comprehend the laboratory procedure outlined in the lab manual before starting any experiment. Always seek assistance or further instructions if the written ones were not clear.
- Experiments must always be personally monitored and only performed by an authorized instructor/technician. Wandering around the room, distracting other students, startling other students, or interfering with others' laboratory experiments is not allowed.
- All the laboratory materials should be handled with care. These materials are often fragile and expensive to replace. Ask the instructor any questions about the proper treatment of equipment.
- Follow a responsible and behaved conduct in the laboratory and workplace.
- Patients or visitors may not enter the laboratory or clinic without authorization. Patients must be escorted into this venue by a student or faculty member.
- No contaminated items may be moved into any laboratory without first applying a standard disinfection protocol.

### **Hand hygiene**

- Hand washing (40–60 sec): wet hands and apply soap; rub all surfaces; rinse hands, and dry thoroughly with a single-use towel; use a towel to turn off the faucet.
- Hand rubbing (20–30 sec): apply enough product to cover all hands' areas; rub hands until dry.
- Hands are washed before and after any direct patient contact and between patients, whether gloves are worn or not, and immediately after gloves are removed. They should also be washed before handling an invasive device.
- Hands should be washed after touching blood, body fluids, secretions, excretions, non-intact skin, and contaminated items, even if gloves are worn.
- When moving from a contaminated to a clean body site of the patient, hands should also be washed. Also, hand hygiene practices should be followed when encountering inanimate objects in the patient's immediate vicinity.

### **Other**

- Contact lenses may not be worn in the laboratory.
- Pregnant students must report their pregnancy to the program supported by medical reports that prove the presence of pregnancy before going for clinical or laboratory practice or dealing with any ionizing radiations concerning the study requirements.

- Eating, drinking, chewing gum, and storing food in the lab fridge is strictly prohibited. Furthermore, objects such as pencils should never be placed in the mouth. Do not use laboratory glassware as containers for food or beverages to limit the risk of infections.

## 6. Chemical Hazards

### 6.1. Types of Chemical Hazards

- The chemical reagents that are used can be dangerous if not used properly. They include solid, liquid, or gaseous chemicals, which may be hazardous if transported, handled and stored. It may have toxic, flammable, corrosive or carcinogenic properties.
- Chemicals such as acids can cause severe burns and damage to tissues and organs.

### 6.2. Mitigating the Risks of Chemical Hazards

#### Labelling and signs

- All chemicals are potentially harmful and should be treated with care. Remember to read the labels before using chemicals.
- Warning labels on all chemical reagents should be observed. Manufacturers of chemicals provide information on the safe use of those chemicals and treat accidental spillages or contamination.
- All containers must be labelled with their chemical names, concentration, hazardous warning, and preparation date (if the solution was prepared in-house) (Figure 2).

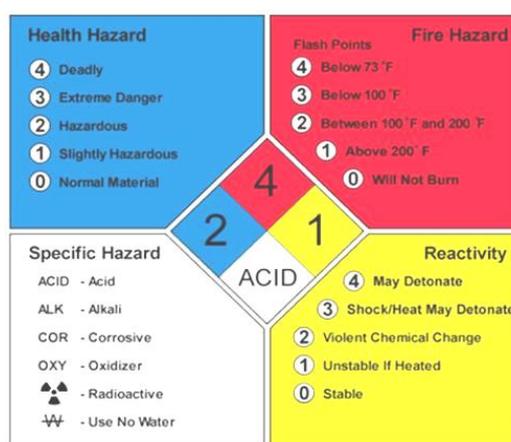


Figure 2 - The hazard diagram



Figure 3 - The hazards signs diagram

#### Chemicals preparation

- All chemical preparation must be conducted in a fume hood.
- Never taste laboratory materials and never look directly down into a container. View the contents from the side

- Pipetting by mouth should be avoided under all circumstances. Mechanical pipetting devices must be used.
- Eyes or nose should not be rubbed with contaminated hands. Hands need to be washed with soap and water after performing all experiments.
- Water should never be added to concentrated acid. The concentrated solution should be poured into the less concentrated (e.g., adding acid to water, proper ventilation, safety valves, and confinement).

### **Burners and flames**

- Extreme care should be taken while working with Bunsen burners. Burners should be turned off when not in use to avoid injuries. When reaching for objects, care should be taken to prevent the flame from contacting one's hair, skin, or clothing. Long hair and loose clothing should be tied back or protected in some way.
- Extinguish burners when away from the desk. Make sure that all three valves are closed.
- When flaming an inoculating loop, always place the loop near the flame's base to incinerate any microorganisms on the loop. It is essential when there is a clump of microorganisms on the loop to minimize aerosols' formation that can disperse microorganisms through the air.

### **Disposal and storage**

- Chemicals, solids, or liquids should not be disposed of directly into sinks or drains. Follow the instructions listed on the bottle for proper chemical treatment before eventual disposal (Figure 3).
- Only small quantities of flammable chemicals and reagents should be kept on laboratory benches and shelves (the amount should not exceed 500 ml).
- Chemicals should not be stored in the fume hood or left resting on the lab floor. Appropriate cabinets compatible with/adapted to chemical's specific storage needs are used for such purpose.
- Broken glass should also be disposed of in specific containers meant for the purpose. Broken glass or other sharp objects should never be discarded in regular trash containers.
- Contaminated items that need to be washed and reused should be placed in a strong disinfectant solution as soon as the work is concluded. They should never be cleaned by students or faculty even if they are needed urgently.
- Compressed gas cylinders (CO<sub>2</sub>, anaerobic gas mixture) should be appropriately chained and stored in well-ventilated areas (Figure 4).
- Uncontaminated glassware should be rinsed with tap water & then immersed in a container of water, taking care not to allow air bubbles inside. These should be left in the designated area for proper washing.

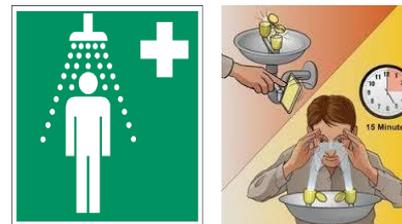


**Figure 4 - Compressed gas cylinders**

## **6.3. Exposure to Chemical Hazard Procedure and Hazard Communication Standard**

## Procedure

- Warning labels on all chemical reagents should be observed. Manufacturers of chemicals provide information on the safe use of those chemicals and treat accidental spillages or contamination.
- In case of an emergency, such as spillage of very corrosive chemical on one's person, or if one's clothing is on fire, the shower in the lab should be used to douse oneself with water. In case of fire, the fire extinguisher should be used. If chemicals were splashed on the eyes, they should be cleaned in the eye washer (Figure 5).
- Spillage of contaminated material or culture on the table should be saturated with disinfectant, covered with a paper towel, and reported immediately to the laboratory instructor. The area of spillage and the surrounding spaces should be disinfected with the appropriate chemical under the instructor/supervisor's guidance.



**Figure 5 - Showers and eye washers are available in the laboratories**

## Hazard communication standard

- Any accident, injury, or damage, however minor or major it may be, should be reported immediately to the laboratory instructor/supervisor so that prompt and proper action can be taken.
- If the instructor could not get a hold, the emergency numbers listed on page (2) should be contacted.
- Following the incident, the hazard exposure form should be filled and submitted to the course instructor (if the user was a student) or the department chairperson (if the user was an instructor).

## 7. Biological and Health Hazards

### 7.1. Types of Biological Hazards

- Unprotected exposure to biological hazards includes blood, urine, faeces, cerebrospinal fluid, and other body fluids present biological safety hazards.
- It also includes animal and human tissues and samples, whether used for demonstration or laboratory practice.
- Lab cultures (e.g., bacteria petri dish) are also considered biological hazards.
- Handling patients with diagnosed or undiagnosed infectious diseases (e.g., chest infections, Coronavirus disease 2019 [COVID-19], skin infections) are classified as biological hazards.

### 7.2. Mitigating the Risks of Biological and Health Hazards

#### Hand hygiene

- Perform handwashing with soap and water if hands are visibly soiled or exposure to spore-forming organisms is proven or strongly suspected, or after using the restroom. Otherwise, if resources permit, perform hand rubbing with an alcohol-based preparation.
- Ensure availability of handwashing facilities with clean running water.
- Ensure availability of hand hygiene products (clean water, soap, single-use clean towels, alcohol-based hand rub). Alcohol-based hand rubs should ideally be available at the point of care.

### Personal protective equipment (PPE)

Select PPE based on the assessment of risk (Figure 6):

- Clean non-sterile gloves
- Clean, non-sterile fluid-resistant gown
- Mask and eye protection or a face shield.



Figure 6 - Personal protective equipment

### Respiratory hygiene and cough etiquette

- Cover the mouth and nose when coughing or sneezing.
- Follow hand hygiene practices after encountering respiratory secretions.
- Adhere to spatial separation of persons with acute febrile respiratory symptoms.

### Biological and health waste handling and disposal

- Solid material should never be thrown in the sink; waste bins are kept for this purpose. Two types of waste bins are available (Figure 7):
  - Bin with a red or yellow plastic bag for discarding infectious material.
  - Bin with a black bag for discarding non – infectious material.
  - Suppose the red/yellow bags are not available. In that case, infectious material should be taken to the health clinic at the Sakheer university campus or Salmaniya Medical Complex laboratory for proper disposal.
- Contaminated cotton wool, gauze, paper and other items should be disposed of in the bins with RED or YELLOW garbage bags.
- Contaminated material such as culture flasks, plates and bottles must be disinfected or autoclaved before disposal or reuse. Broth cultures should never be poured into sinks without autoclaving.
- All material to be autoclaved should be placed in the adequately assigned receptacle.
- Antimicrobial chemicals should be used to decontaminate materials such as used pipettes, slides, and small objects. Such materials should be placed in a container of strong disinfectant such as 20% Savlon.
- Under no circumstances should cultures be removed from the laboratory premises.
- These procedures should be strictly followed to minimize the spread of microorganisms.
- All infectious specimens where aerosols are expected to be produced must be opened and processed in the biological safety cabinet.
- Sterilize the reusable glassware before discarding the growth culture broths.
- Dissected specimens should be a double bag in non-transparent plastic bags along with the used gloves and tissues and seal each bag completely. Keep the bags outside the lab for standard garbage disposal. Disinfect the workstation, tools and tray.



Figure 7 - Colored waste bins

- Infectious specimens containing Biosafety level 3 (BSL3) and (BSL4) must not be processed to the College of Health and Sport Sciences clinical lab facilities. They should be disposed of safely to an authorized destination.
- Blood and bone marrow slides must be handled in the same way as blood samples until they are fixed in methanol, stained, and covered with a cover glass.
- Centrifugation must be performed in sealed centrifuge buckets.

### **Patient care equipment**

- Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment.
- Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient.
- Before commencing work with infectious materials, the work area should be disinfected with 5% Lysol, 5% Savlon, or 10% Clorox bleach. This procedure should be repeated at the end of the session to ensure that any material deposited on the work surface is appropriately disinfected.

### **Sharp objects disposal**

- All syringes and needles contaminated with human blood or human body fluids should immediately be placed in a puncture-proof, 'sharps disposal' container without recapping, cutting, or bending the needles (Figure 8). The full containers should be disposed of safely to an authorized destination..
- Syringes should not be recapped. They should be disposed of in an appropriate sharps container.
- If glass breaks, the area should be contained, and the glass should be cleared away using great care to avoid cuts. Protective gloves should be used.



**Figure 8 - Sharp disposal container**

## **7.3. Exposure to Biological and Health Hazard Procedure and Hazard Communication Standard**

### **Procedure**

- Hands should be washed with soap and water for a minimum of 40 seconds based on the recommended steps.
- PPE should be disposed of correctly as guided by the health authorities of the facility.
- Medical consultation should be sought in cases where the exposure occurred without wearing PPEs or ordinary protective mechanisms.

### **Communication standard**

- Any accident, injury, or exposure to biological and health hazards, however minor or major it may be, should be reported immediately to the laboratory instructor/supervisor to take prompt and proper action.
- If the instructor could not get a hold, the emergency numbers listed on page (2) should be contacted.

- Following the incident, the hazard exposure form should be filled and submitted to the course instructor (if the user was a student) or the department head (if the user was an instructor).

## 8. Radiation Hazards

### 8.1. Types of Radiation Hazards

- This type of hazard includes unprotected exposure to radiating and ionizing compounds, x-ray machines, laser producing machines and any related devices.

### 8.2. Mitigating the Risks of Radiation Hazards

#### Monitoring devices

- Personal dosimeters shall always be worn in the clinical environment. They shall be worn at the collar level outside the lead apron or thyroid shield. Failure to wear the dosimeter in the clinical setting will result in dismissal for the day, and an absence will be recorded (Figure 9).
- Radiation monitoring devices must be exchanged and returned to the Program coordinator as scheduled.
- All students should wear radiation monitoring devices on the body's trunk at the sternum or hip level.
- During fluoroscopy, the radiation monitoring device should remain at the sternum or hip level and always behind the protective lead apron to record exposures accurately.
- Radiation monitoring devices must be worn by all students when assigned to rotations at clinical education settings and during Lab sessions.
- The personal monitoring device must be worn with the front (label side) facing away from the body with nothing obstructing the front side.
- Radiation monitoring devices must not be kept in direct sunlight, microwave devices, TVs and other radiation-emitting devices.
- It is the student responsibility to protect the personal monitoring device from heat and humidity. Also, to secure the radiation-monitoring device safely, it will not be misappropriated or accidentally exposed to radiation.
- A radiation dosimetry report is regularly received and reviewed by the program coordinator to assure that results do not exceed the National Council on Radiation Protection and Measurements (NCRP) requirements with highlighting possible unusual exposures.



Figure 9 - Positions of the dosimeter

### **Protection from radiation**

- Apply gonadal shielding to all patients of childbearing age and as required.
- Collimate to limit the radiation beam to the area of interest and to achieve images of optimal quality
- Observe the patient from the control (protected) or from behind a lead protective screen.
- If a student must remain in the radiographic room, radiation protective wear must be used, and radiation protection policies must be respected.
- When using lead (or lead-free) aprons, the personal radiation monitoring device must be on the apron at collar level.
- Stand as far from patient and X-ray tube as is practical and specified (Inverse Square Law).
- Observe all regulations which apply to the area or facility.
- Protect self, patient and others whenever possible from direct or indirect radiation exposure.
- Only authorized users can be present and perform experiments in the radiology Lab.
- Radiation equipment must be operated according to the manufacturer's operations manual and authorized persons only.
- Female students must report pregnancies early on. The pregnant student will be required to sign a consent declares their full responsibility associated with working with ionizing radiations. Consequently, the student will be provided with two radiation monitoring devices: one will be worn at the collar area. The second is placed at the waist region to monitor the fetus's exposure to ionizing radiation.
- A radiation sign must be posted in each laboratory room.

### **8.3. Exposure to Radiation Hazard Procedure and Communication Standard**

#### **Procedure**

- Avoid being in the direct visual line of the radiographic tube or patient.
- Avoid being in the direct line of the x-ray beam even when wearing a lead apron.
- Avoid holding or supporting a patient or image receptor during the exposure.

#### **Hazard communication standard**

- Any accident, injury, or unprotected exposure to ionizing hazards, however minor or major it may be, should be reported immediately to the laboratory instructor/supervisor to take prompt and proper action.
- If the instructor could not get a hold, the emergency numbers listed on page (2) should be contacted.
- Following the incident, the hazard exposure form should be filled and submitted to the course instructor (if the user was a student) or the department head (if the user was an instructor).

## 9. Safety Hazards

### 9.1. Types of Safety Hazards

- Spills on floors or tripping hazards, such as blocked aisles or cords running across the floor.
- Working from heights, including ladders, scaffolds, roofs, or any raised work area.
- Unguarded machinery and moving machinery parts; guards removed or moving parts that a worker can accidentally touch.
- Electrical hazards like frayed cords, missing ground pins, improper wiring.
- Confined spaces.
- Machinery-related hazards (boiler safety, forklifts..etc.)

### 9.2. Mitigating the Risks of Safety Hazards

- Think safety is the highest priority.
- Eliminate or control all safety hazards if possible.
- Develop long-term solutions to minimize the effects of safety hazards.
- Arrange for regular maintenance of equipment in coordination with the authorized dealers.
- Review and control such hazards in coordination with heads of departments, units, deanships, or the administration.
- Review the rooms, corridors, offices, lecture halls and common areas for any hazards that threaten the attendees' safety.
- Implement electrical and mechanical safety guidelines.
- Get familiar with safety signs and assembly points on the campus.

### 9.3. Exposure to Safety Hazards Procedure and Hazard Communication Standard

- Report any faulty items or equipment, or machines to the building or the laboratory's concerned maintenance person.
- Hazard exposure form should be filled and submitted to the course instructor (if the user was a student) or the department head (if the user was an instructor).

## 10. References

1. College of Health and Sport Sciences. (2019). *Laboratory Safety Booklet for the CHSS Students*. College of Health and Sport Sciences.
2. CS. (2019). *Laboratory Safety Booklet for Students*. Retrieved January 121, 2021, from University of Bahrain: <http://www.uob.edu.bh/images/Advvs/2019/April/HealthBooklet.pdf>
3. OSHA. (2020). *Hazard Prevention and Control*. Retrieved December 28, 2020, from Recommended Practices for Safety and Health Programs: <https://www.osha.gov/shpguidelines/hazard-prevention.html>



**University of Bahrain  
Hazard Exposure Form**

The completed form must be submitted within 24 hours to the directorate of safety and security. E-mail the completed form to [areports@uob.edu.bh](mailto:areports@uob.edu.bh)

Select one: Teaching Laboratory  Research Lab  Field Activity  Other  : \_\_\_\_\_

Date of Incident: \_\_\_\_\_ Time of Incident: \_\_\_\_\_ Location of Incident: \_\_\_\_\_

Your name: \_\_\_\_\_ Department/Deanship: \_\_\_\_\_

**(1) Incident Description**

Hazard type: Chemical  Biological  Health  Radiation  Safety  Other  : \_\_\_\_\_

Describe the circumstances of the incident.

**(2) Injury/Illness/Damage to Equipment, Building, Environment**

Describe the extent of injuries and damage to self or the equipment, building or environment.

**(3) Actions Taken: Response/Treatment/Cleanup**

a. Describe the nature of the emergency action taken.

b. Did you or the affected person seek medical treatment? Yes or no, explain.

c. Was the course instructor or direct supervisor contacted? Yes  No

d. Were safety and security personnel at the University contacted? Yes  No

e. Were the emergency services contacted? Ambulance  Police  Fire

**(4) Corrective Action Taken**

\_\_\_\_\_  
Date Reviewed by OHS Committee

\_\_\_\_\_  
Name of Reviewer

\_\_\_\_\_  
Date

