



LABORATORY SAFETY MANUAL IN CIVIL ENGINEERING

College of Engineering
Civil Engineering Department
Jazan University, Jazan
Kingdom of Saudi Arabia



LABORATORY SAFETY MANUAL IN CIVIL ENGINEERING

BY

CIVIL ENGINEERING DEPARTMENT

JAZAN UNIVERSITY

JAZAN
SAUDI ARABIA

Vision of College of Engineering

To be an emerging hub of reputable Engineering research and education, beyond the periphery of the region, where quality leadership matters.

Mission of College of Engineering

To produce a highly Sophisticated and qualified professional engineers through imparting specialized Engineering courses and conducting high-standard research towards a sustainable development of the community.

Vision of Civil Engineering Department

Empowering the civil engineering field by highly qualified graduates who serve the community, maintain sustainability, and acclimate to the challenges of rapidly developing urban mega-projects of the Kingdom 2030 vision.

Mission of Civil Engineering Department

The Civil Engineering program aims to prepare a generation of highly qualified civil engineers to withstand the nation's hopes and needs. Multi-disciplinary specialties of construction should be covered through well-designed educational and research programs.

Head of Department's Message

In the name of God, prayers and peace be upon our master Mohammad and all his family and companions. I am pleased to welcome you to the Civil Engineering Department at Jazan University. Technological development in many areas of life has hardly become devoid of reliance on what the civil Engineering specialization contributes to establishing a distinct imprint that achieves urban development in today's world, the civil engineering specialty is one of the most important scientific and applied disciplines that drive the growth of the economy based on knowledge. The Civil Engineering Department is one of the oldest and largest engineering departments, where graduates of the department can specialize in seven different fields:

- Structural Engineering.
- Water Engineering
- Environmental Engineering
- Surveying Engineering
- Transportation Engineering
- Geotechnical Engineering
- Construction Engineering

Since its inception, the Civil Engineering Department has been keen to raise the level of quality and preserve the scientific foundations of the civil engineering profession by working hard by providing the labor market with qualified civil engineers who can compete with graduates of prestigious universities inside or outside the Kingdom. The department was also keen on communicating with the department's graduates by establishing an association for them to exchange all kinds of knowledge and experiences and to give the department their opinions to develop the department's march. The department also works on developing the civil engineering profession by participating in research in conferences and periodicals within the Kingdom, as well as international conferences and international refereed and reputable periodicals.

The department seeks, with its available material capabilities, capabilities and human beings, to prepare a civil engineer in a modern scientific manner in accordance with international standards, in an effort to enhance the department's outputs, enrich scientific research and contribute to community service. Research, innovation and innovation in order to achieve success and a bright future for them, their families and their society.

Dr. Hassan M. Magbool
Head of Civil Engineering Department

Department Goals

Preparing advanced study programs that qualify the graduate of the department to plan, design, and implement various engineering projects and maintain the infrastructure of the community.

Providing students with knowledge and access to all that is new through the library, computer, and modern technology.

Continuity in the development of academic programs to keep pace with scientific progress around the world in building materials and methods and methods of design and construction.

Cooperating with other departments of the College of Engineering and its counterparts outside the university to work on solving strategic problems facing society that require diverse expertise and sound decision.

Providing engineering consultancy and technical expertise to solve problems facing the design and implementation of facilities in the community and its engineering sectors.

Participation in the modernization and development of engineering technologies to advance urban progress in the Kingdom to be among the major countries.

Opening the door for postgraduate studies for distinguished graduates and preparing research programs to serve and preserve the environment.

PREFACE

This booklet is the first edition of 'Laboratory Safety Manual in Civil Engineering' by Civil Engineering Department, working under the College of Engineering, Jazan University, Jazan, Saudi Arabia. This 'Laboratory Safety Manual in Civil Engineering' is prepared to introduce general and civil engineering laboratories specific work safety rules and guidelines to the students, faculty members, instructors and technical supporting staff. This is to be made available in all laboratories and anyone requiring work in laboratories has to understand and follow the instructions provided herewith. This manual enlists regular safety procedures as well as possible steps to be carried out in any emergency situation. This manual must be read and understood by anyone, including students or researchers intending to utilize the laboratory infrastructure.

Students admitted to the Civil Engineering Department and who are supposed to work in departmental laboratories must sign the declaration statement, a sample of which is provided as a part of this manual.

Wishing a safe working environment for all!

All Staff of Civil Engineering Department

Jazan University,

Jazan, Saudi Arabia

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1. INTRODUCTION

Every scientific and technological laboratory, either educational or commercial requires safety guidelines and rules as almost all procedures and experiments carried out include certain factors of danger. A successful experimentation essentially includes safety from beginning to end. So, safety guidelines are essential during every kind of experimental work. Safety operations include but are not limited to the following aspects for safe as well as convenient operational procedures.

- (i) Clearing the clutter and obstructions by housekeeping,
- (ii) Availability and use of the appropriate tools for the jobs,
- (iii) Avoiding hazards

Every minor and minute accident must be reported/informed immediately to the responsible faculty member or instructor. Emergency service contact numbers operating within the institute premise and that of the government are to be displayed prominently and updated periodically.

Four major stages are identified for managing an emergency occurring in a laboratory setting:

- (A) Mitigation, (B) Preparedness, (C) Response, and (D) Recovery.

These stages include the following elements.

(A) Mitigation stage:

Incorporates preventive strategies such as-

- (i) Concerned efforts to confine the possibility that an accidental incident will occur and
- (ii) To limit the effects of an incident that does/may occur.

The common guidelines provided here to enter the laboratory premises (e.g., No eating, drinking or smoking in the laboratory) are all part of this stage.

(B) Preparedness stage:

- (i) Includes developing plans for managing an emergency
- (ii) Taking action to ensure that the laboratory is ready to handle an emergency.

Generating awareness in the students admitted to the department (who are prospective users of the laboratory) to use facilities with utmost care and cautiousness and receiving declaration of the same is part of the preparedness stage in laboratory safety.

(C) Response stage:

- (i) It involves efforts to manage the emergency as it occurs
- (ii) May include outside responders in addition to laboratory staff.

The response is more effective and efficient when those involved understand their roles, have the training to perform their duties, and have the supplies they need.

This Laboratory safety manual in Civil Engineering Department includes steps that should be followed in an emergency.

(D) Recovery stage:

Includes actions taken to restore the laboratory and affected areas to a point where the functions of the laboratory can be carried out safely. However, this part is not covered by this manual as it is not scope of this document.

This laboratory safety manual in Civil Engineering Department intends to provide information about the first three stages.

2. OBJECTIVE

The objective of this 'Laboratory Safety Manual in Civil Engineering' is to provide practical Work and Safety instructions, guidelines, and rules for all the staff, students and visitors during their work, teaching-learning activities or visit in any Laboratory that comes under the control of the Civil Engineering Department working under College of Engineering, Jazan University, Jazan, Saudi Arabia.

3. SCOPE

This 'Laboratory Safety Manual in Civil Engineering' is prepared to introduce general and specific (civil engineering laboratories) work safety rules and guidelines to the students, faculty members, instructors and technical supporting staff working in the following laboratories operating for educational purposes under the Civil Engineering Department.

List of laboratories

Sr. No.	Name of the Laboratory	Number
1.	Soil Lab	
2.	Fluid Lab	
3.	Concrete Lab	
4.	Surveying Lab	
5.	Transportation Lab	
6.	Material Lab	

Any visitor visiting the laboratory premises is obliged to follow the safety guidelines, rules and regulations at all times, which this manual includes.

Laboratories

The laboratories used by the civil engineering department (CED) are located in the Campus of Jazan University. The laboratories are well-installed with adequate instruments for conducting experimental work for courses, final year projects, research projects, consultancy, and community services. The laboratories are maintained and upgraded time to time. They can deliver the course curriculum and develop students' soft skills and CLOs by applying approaches that facilitate students to communicate effectively and to develop and conduct appropriate experimentations. Some of the centralized centers and laboratories in JU which can be used by the CED students' are as follows:

- All laboratories in the College of Sciences and the College of Computer Sciences and Information Technology.
- Center of Innovation & Entrepreneurship (it has a well-installed Fab Lab in the building of the COE).
- Center of Excellence in Teaching and Learning.
- English Language Institute.
- Center for Research and Environmental Studies.
- Research and Consulting Services Institute.

Objectives of CED Laboratories:

1. Preparing the students to effectively link the theories with application and to demonstrate background of the theoretical aspects.
2. Prepare the students to generate data using experiments and analyses by using computer software.
3. Allowing the students to have hands on experience and to have exposure to equipment and machines.

4. Preparing the students to solve problems related to their course work including design elements and improves their communication skills through report writing and presentation.
5. Giving emphasis to the knowledge and application of safety regulations.

General Guidelines and instructions for laboratories:

The general guidelines and the laboratory instruction are displayed in each laboratory. Following are the guidelines and instructions:

1. Perform only those experiments authorized by the instructor; never do anything in the laboratory that is not called for in the laboratory procedure or by the instructor. Unauthorized actions playing with the experiments may be hazardous and hence are prohibited.
2. Wear the appropriate uniform and safety accessories (coat, gloves, etc.) before entering the lab.
3. Disconnect the power supply from the equipment at the end of the experiment and computers connected to the unit.

Specific experiments may cause severe injury when not performed as per instruction, so students are advised to follow the safety instructions strictly.

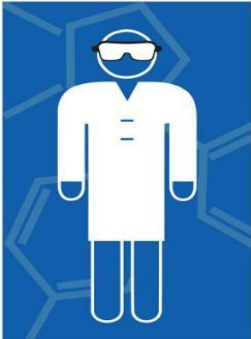




4. GENERAL SAFETY GUIDELINES


This is 'Mitigation stage' or important for preventing any possibility of accidental occurrence of any haphazard. Following are general safety guidelines to be followed in laboratories of civil engineering department for everyone present in laboratory premises at any time for academic or non-academic purposes. The purpose of these guidelines is

- (i) To enhance safety of everyone working in the laboratories at highest possible level
- (ii) To avoid any accidental hazard with the utmost care
- (iii) Minimizing danger and losses in case an accident occurs.

General Guidelines: EVERYONE entering in the laboratory premises either for work, education, training or visit purpose should follow the below guidelines.

1	 <p>A rectangular sign with a red border. At the top, it says "NO FOOD OR DRINK" in red. In the center, there is a red circle with a diagonal slash over a blue can and a sandwich. At the bottom, it says "IN LAB" in red.</p>	<p>Don't eat or drink in the laboratory area. Don't chew gum. Prohibit anyone doing so.</p>
2	 <p>A circular sign with a red border. In the center, there is a red circle with a diagonal slash over two lit cigarettes. The words "NO SMOKING" are written in red across the cigarettes. The words "NO SMOKING" are also written around the perimeter of the circle.</p>	<p>Don't smoke in the laboratory area. Prohibit anyone doing so.</p>

3.		<p>Dress appropriately for the work environment including proper non-disturbing attire, lab dress code, safety glasses and gloves wherever appropriate.</p>
4		<p>Conduct yourself in a responsible manner at all times in the laboratory. Don't talk aloud or crack jokes in lab.</p>
5		<p>Know the symbols of hazards, provided in detail on next page</p>
6		<p>Switch off electric and other equipments after operational procedures are completed.</p>
7		<p>Pay attention to clean the equipments and their used parts.</p>

8		Avoid littering and keep the laboratory area clean and neat.
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WHAT SHOULD I DO IN AN EMERGENCY?

IN ALL CASES, have one person immediately call 911 if necessary and other assistance Telephones are located in on the door or just outside laboratory.

For a minor cut, thoroughly rinse the cut. For serious injuries, get help.

If someone is being shocked, DO NOT TOUCH THEM. If possible, turn the power off. Use an insulating object, such as a wooden (not metal) chair, an article of clothing or cloth, to pull the person free.

If a spill occurs, restrict access to the spill area.

If chemicals come in contact with skin, immediately wash the area with a generous amount of water.

5. Safety regulations:

ALL Laboratories

- (i) An appropriate fitting dress for the work must be worn while working inside LABORATORY.
- (ii) Appropriate safety shoes are to be worn while working inside LABORATORY.
This is to avoid any accidental injury to foot as well as convenient movement.
- (iii) While specific machines are running, suitable safety goggles or specially designed safety glasses must be worn for the protection of eyes.
- (iv) Before putting hands on any new machine, a permission and safety guidelines must be availed from LABORATORY supervisor.
- (v) Special care must be taken while using machines that utilize compressed air mechanisms.
- (vi) For protection of ear drum and ears in general, proper ear protection is to be followed while working on noisy machines.
- (vii) Working alone outside of the normal working hours is to be avoided at all times.

Lab Safety Guidelines



6. SAFETY PREPAREDNESS:

Part of safety preparedness begins with the training of the involved personnel and then periodic inspection of the premises to assess the performance of personnel and systems.

6.1 Training

In addition to laboratory safety issues, laboratory personnel should be familiar with what to do in an emergency. Topics may include; however may not be limited to this list.

- (i) Evacuation plans and procedures
- (ii) Emergency shutdown procedures— specifically equipment shutdown and if needed materials that should be stored safely
- (iii) Communications procedures during an emergency—what to expect, where to call or look for information
- (iv) How and when to use a fire extinguisher
- (v) Security issues
- (vi) Protocol for absences due to travel restrictions or illness
- (vii) Safe practices for power outage
- (viii) Assembly points
- (ix) Laboratory-specific protocols relating to emergency planning and response
- (x) Handling violent behavior in the workplace

Periodic drills to assist in training and evaluation of the emergency plan are recommended as part of the training program.

Safety preparedness is a continuous task. It cannot be done and over atonce. Its efficacy depends upon periodic inspection and training and drills whenever suitable. Given laboratory safety checklist should be utilized to assess the safety preparedness in each laboratory periodically.

6.2 Administrative Preparedness:

S. No.	Question	YES	NO	N/A
1	Does the laboratory staff have access to the most updated version of this manual?			
2	Has the laboratory specific information is updated in safety manual?			
3	Are personnel working in laboratory of where to report any incident			
4	Is safety self-inspection carried recently in last 6-12 months?			
5	Any potential hazards documented for further work?			

6.3 Displays and Sign Preparedness:

S. No.	Question	YES	NO	N/A
1.	Are emergency contact numbers for laboratory staff posted in lab?			
2.	Are hazard caution signs posted and updated?			
3	Laboratory floor plan posted and updated?			
4	Emergency evacuation plan is posted?			
5	Lab personnel have access to first aid kit?			

6.4 Housekeeping preparedness

S. No.	Question	YES	NO	N/A
1	Is the lab adequately organized, orderly and clean?			
2	Does the lab provide sufficient workspace for operation without collisions and accidents?			

6.5 Electric Safety preparedness

S. No.	Question	YES	NO	N/A
1.	Are building electrical panels accessible?			
2	Are extension cords or power strips not daisy-chained to each other?			

3.	Any exposed wiring in a poor condition present and not is use?			
4	Are ground fault circuit interrupters employed in wet locations?			
5	Are extension cords not used as temporary wiring? Do these runs through doors or wallsor ceilings?			
6	Instruments with motors, heaters and other high amperage needs plugged directly into a wall receptacle?			

6.6 Fire Safety Preparedness

S. No.	Question	YES	NO	N/A
1.	Are there 18 inches of clearance between stored items and fire sprinklers?			
2.	Are all laboratory doors kept closed when laboratory not in use?			
3.	Are fire extinguishers available easily as well as accessible and free of obstructions?			

6.7 Evacuation plan preparedness

S. No.	Question	YES	NO	N/A
1	Are aisles and exits within the laboratory space are free from obstructions and clutters?			

6.8 Machine safety preparedness

S. No.	Question	YES	NO	N/A
1	Are all hazardous pieces of machinery mounted or secured to prevent movement or tipping?			
2	Are all points of operation, rotating components and other moving parts of machinery properly guarded to prevent injury?			
3	Is laboratory equipment with potential hazards routinely inspected and maintained or serviced as recommended?			

7. General Precautionary Measures to be practiced in Laboratories

7.1 Instrument/Machine safety precaution

(i) Before using an instrument or machine, be sure to know how to turn it off in case of an emergency.

(ii) Check all electrical connections and mounting bolts before each use.

(iii) Check that all rotating parts are free to turn, and that there is no obstruction before job operation.

(iv) Attach an emergency shutdown card to any piece of equipment left operating unattended outside normal working hours. This card should contain your phone number and all information that would be required by anyone who might be faced with the need to shut down the equipment.

(v) Laboratory equipment is not to be placed in corridors.

7.2 ELECTRIC SAFETY PRECAUTIONARY MEASURES

Laboratory instructors, supervisors and all workers should be aware of the risks connected with electric equipment. All the personnel working regularly in laboratory should be trained in following aspects.

1. Inspect electric wiring of instruments before each use.
2. Replace all frayed or damaged electrical cords immediately.
3. Only equipment with three prongs (ground) should be used in the laboratory.
4. Limit the use of extension cords. Use only for temporary operations. In all other cases, request installation of a new electrical outlet.
5. Minimize the potential for water or chemical spills on or near electrical equipment.
6. Ensure that outlets are installed and used when water is present within 6 feet.
7. Know the location and how to operate shut-off switches and/or circuit breaker panels. Use these devices to shut off equipment in the event of a fire or electrocution.

The following are a list of rules for students and their instructors working with electrical equipment.

- Use only tools and equipment with non-conducting handles when working with electrical devices.
- All current transmitting parts of any electrical devices should be enclosed.

- When checking an operating circuit keep one hand either in pocket or behind back.
- Maintain a workspace clear of extraneous material such as books, papers, and clothes.
- Never change wiring with circuit plugged into power source.
- Never plug leads into power source unless they are connected to an established circuit.
- Avoid contacting circuits with wet hands or wet materials.
- Check circuits for proper grounding with respect to the power source.
- Do not insert another fuse of larger capacity if an instrument keeps blowing fuses - this is a symptom requiring expert repairs.
- Keep the use of extension cords to a minimum and cords as short as possible. Tie off excess cords out of pathways.
- Do not use or store highly flammable solvents near electrical equipment.
- Keep access to electrical panels and disconnect switches clear and unobstructed.
- Make certain that all electrical equipment is properly grounded.
- Be aware and alert of the dangers inherent in high voltage equipment. (Any system operating at voltages above 480 volts shall be considered a high voltage system and shall be serviced only by specially trained employees.)

The rules listed below are intended to reduce the risk of the more common hazards. Please observe these rules. Other hazards can be avoided by thinking of the consequences before you act. If you are not sure of the safety aspects of your assignments, always consult an instructor.

8. RESPONSE PROCEDURES IN EMERGENCY SITUATIONS

Stepwise appropriate response is the key to minimize losses that may occur due to accidents. Following are some common emergency situations that can occur in a laboratory in which proper response procedures must be initiated by those who are present inside. For initiating an appropriate response, proper awareness of the situation and a prior training session helps. Hence each laboratory should have standardized response procedures that should be followed during emergency situations.

For following the response procedures in emergency situations, all staff and students working in laboratory must be aware of placement of the following things:

- a. Fire extinguishers
- b. Emergency showers/eyewash
- c. Fire blanket if available
- d. First aid medical kit
- e. Exit routes for emergency evacuations
- f. Assembly point or meeting point outside the building area

Remaining calm and quiet, understanding and gathering information about the incident and continuous assessment of the situation are highly required to confine any further damage and loss that the emergency situation may incur.

Following are some emergency situations, and standard response procedures to be followed, however it should be noted that-

“A given planned procedure cannot always be a substitute for “thinking” during emergency situation”

8.1 Emergency Alarm sounds:

1. If an emergency alarm sounds, for any unknown reason, all must move quickly but carefully towards the nearest emergency exits. If this happens during laboratory training session is ongoing, the instructor should guide the students towards safety.
2. Students should follow all the guidelines in any case, listen to the instructor, follow the safety regulations, and leave the building as quickly as possible.
3. Nobody except the trained security personnel and responsible members should try to find or go near the place of origin of danger. It may turn risky and life-threatening.
4. In such situations, all should move quickly towards the opposite side from the location of danger. Nobody – except for the security personnel and firefighters should return until and unless an “all clear” message is given by security.
5. When an alarming situation is confirmed, a quick call should be given to building/college security and fire brigade.
 - a. Building/College security number –
 - b. Fire brigade number – 998
6. Similarly, any nearby buildings having potential danger from the ongoing situation must be informed and asked to begin evacuation as required.

8.2 In case of fire

- **Major Fire incident**

1. Alert all the people present in the laboratory where fire took place.
2. Activate the nearest fire alarm, if it does not work by default.
3. Close doors so as to confine the area fire may capture
4. Evacuate to safe place by following the emergency exit routes displayed on walls.
5. In any case of fire outbreak, lift should not be used by anyone for any reason. Everyone must use the emergency and/or regular staircase.
6. Nearby buildings should be cautiously alarmed of the situation and should begin evacuation as required.
7. Physically challenged persons should be assisted by those who are capable at times of evacuation.
8. Call the building/college security number or emergency number as well as the government fire brigade number (998).
9. Person who has prior awareness of incident should assist the personnel handling the fire situation.
10. The firefighters and security should provide keen and precise information about the incident, which may be helpful in preventing further outbreak.

- Minor Fire outbreak

1. Cautiously make people in laboratory alert of the situation.
2. Activate the alarm system.
3. Evacuate the place quickly as possible.
4. A trained or suitable person should reach the fire extinguisher.
5. Do not allow anyone to enter in a room which is filled with smoke.
6. Do not allow anyone to enter in the room that has caught fire without a back-up person.

PRACTICING THE USE OF FIRE EXTINGUISHERS

1. Everyone working inside the lab, including the teaching faculty and other non-teaching supporting personnel of all cadres, must be trained in using the fire extinguishers.
2. It is the laboratory supervisor's responsibility to ensure that anyone working in the laboratory must know how to use the fire extinguishers.
3. Fire extinguishers must be put in every laboratory and must be periodically inspected and replaced as needed. A record of the same must be maintained.
4. The placing of Fire extinguishers must be easy to locate, and every new batch of the students should be aware of their place and use.
5. Any new staff joining the laboratory and every new student/researcher joining the laboratory must know the placements and operation procedure of fire extinguishers for emergencies.
6. The operational manual of fire extinguishers must be placed besides it to be used in emergency.
7. In general the fire extinguishers can be used in fighting the fire outbreaks immediately by using the codeword PASS. See the figure.

Operation of Fire Extinguishers

○ PASS

- Pull ring pin
- Aim at the base of the fire
- Squeeze the handle to start flow
- Sweep side to side at the base of the fire



Steps in operation of fire extinguishers - PASS

1. Pull the ring pin
2. Aim at the base of the fire, not flame of fire
3. Squeeze the handle to start the flow
4. Sweep side to side at the base of fire (not up-down on the flame of fire)

Clothing catches fire

The short and easy to remember tip is 'stop, drop, and roll – cool and call'

1. Stop where you are, don't run around
2. Drop down on ground on an empty place
3. Roll over so that fire puts off
4. Cover with fire blanket if available
5. Immediately treat the area with cool running/tap water
6. Call the emergency medical services.

Electrical Fire outbreak

1. Turn off the power source and unplug
2. Use dry chemical extinguisher or sand to put out the fire. Never use water
3. When the fire is extinguished, check the circuit to determine the cause.
4. Do not turn on the circuit until the cause of the fire has been established and the fault corrected and an all clearance signal is given by a responsible person.

8.3 Electric shock to a person:

If someone around gets an electric shock-

1. Don't touch someone receiving an **electric** shock in any case. As this can be first reaction to offer help to the injured person.
2. Look for the hazard
3. Shut off power and then only try to rescue the person with non-conductive object.

4. Call emergency numbers.
5. Administer first aid to the person if trained.

9. RESPONSIBILITIES

9.1 Teaching faculty members

Teaching faculty members of all the laboratory courses are accountable and responsible to make sure that the standard safety procedures outlined in this manual are followed by the laboratory instructors.

9.1.1 Laboratory instructors:

1. Should know beforehand the work that may be carried in laboratories
2. Should provide sufficient written and visible instructions in laboratory considering the situation and persons/groups involved for working.
3. Should be able to address possible dangers, identify and clarify the risks involved.
4. Should explain the standard suitable procedures that should be followed in a laboratory.
5. Should report about laboratory condition and conduction to appropriate authorities for further action as and when needed.
6. Should report status of equipments and instruments to maintenance personnel.
7. Any misbehavior by students should be addressed quickly and effectively.

9.1.2 Laboratory supervisors

1. Should supervise the extent to which the guidelines are followed.
2. Should supervise the conditions with understanding of student's age and experience.

3. Should never let the students unattended unless highly exceptional situation.
4. No misbehavior should be tolerated from students.
5. The responsibility of supervising should be transferred to another suitable person if situation arises.

9.2 Maintenance personnel

1. Make sure of providing safe environment for teaching-learning process and persons involved.
2. Make sure that non-functional or faulty machines are not used.
3. Appropriate guidance instructions should be put wherever the instruments/machines are under maintenance purpose.
4. Establish a regular inspection schedule and procedure for all machines/instruments/equipments, electricity, water etc.
5. Recording of all possible harmful notifications.

9.3 Students

1. Students are required to follow all etiquettes.
2. Students in any case are not allowed to work without supervision of competent person
3. Must always pay attention to each and every instruction.
4. Must read and understand the given experimental work procedure before beginning the experimentation. Any doubts should be cleared prior.
5. Must carry the work in a responsible way, carrying every step precisely as being taught.
6. Must be ready for any emergency situation, must be aware of Dos and Don'ts and standard procedures to be followed in an emergency situation.
7. Must use the machines and instruments as per the manuals and instructions by instructor or supervisor.

8. Must leave the class only when permitted. Even a casual break must be with permission.
9. Any unsafe situation arrived suddenly must be reported to the instructor and supervisor.
10. Any potentially dangerous object or substance must not be carried inside the laboratory.
11. Must place the bags and stationary in a responsible way considering the safety of student's material as well as laboratory set-up.
12. Maintain discipline and order.

10. Obligatory Declarations

Instructor's Responsibility

When students join to work in laboratory as part of their course, the instructor of laboratory must provide the students copy of this laboratory manual and make them aware of the safety procedures. This step is obliged to be carried out at the beginning of the academic year/semester. Laboratory instructor is obliged to make students understand the safety precautions and get the signature of students on the safety statement of the department. These documents should be maintained throughout the semester.

Student's Responsibility

1. Students are obliged to fully read and understand 'Laboratory Safety Manual in Civil Engineering' before commencing or involving in any laboratory activities.
2. If student has any doubts, should ask the instructor and get it clarified.
3. Students must sign on the declaration by filling in all the necessary information correctly.

11. Declarations Statement

Declaration Statement

I undersigned student Mr. ID number :.....

Hereby declare that I have carefully read and understood the content of 'Laboratory Safety Manual in Civil Engineering'. The laboratory instructor/s has cleared all outlined procedures. I am made aware of safety concerns and that all the guidelines are for my personal safety as well as for the safety of lab and other occupants. By signing this document, I agree to comply with the procedures listed in this document throughout my working tenure in this department. I understand that I am obliged to follow all the instructions and behave responsibly.

Student name in Full – Mr.....

University Identity Number-

Course name:..... Course Code:.....

Signature- Date

Name of Instructor:

Civil Engineering Department Jazan University, Jazan

12. References

1. Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards: Updated Version. National Research Council (US) Committee on Prudent Practices in the Laboratory. Washington (DC): National Academies Press (US); 2011.
2. <https://ehs.stonybrook.edu/programs/laboratory-safety/general-laboratory-safety/lab-safety-inspection-checklist.php>
3. <http://www.me.unm.edu/html/labsafety.html>
4. https://mie.njit.edu/students/lab_safety.php
5. <https://me.queensu.ca/People/Notash/SafetyRulesandProcedures.html>
6. <https://www.siue.edu/engineering/civil-engineering/safety/civil-engineering-lab-safety-rules>