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وزارة التعليم
جامعة نجران
كلية العلوم والآداب
قسم الأحياء

جامعة نجران
NAJRAN UNIVERSITY

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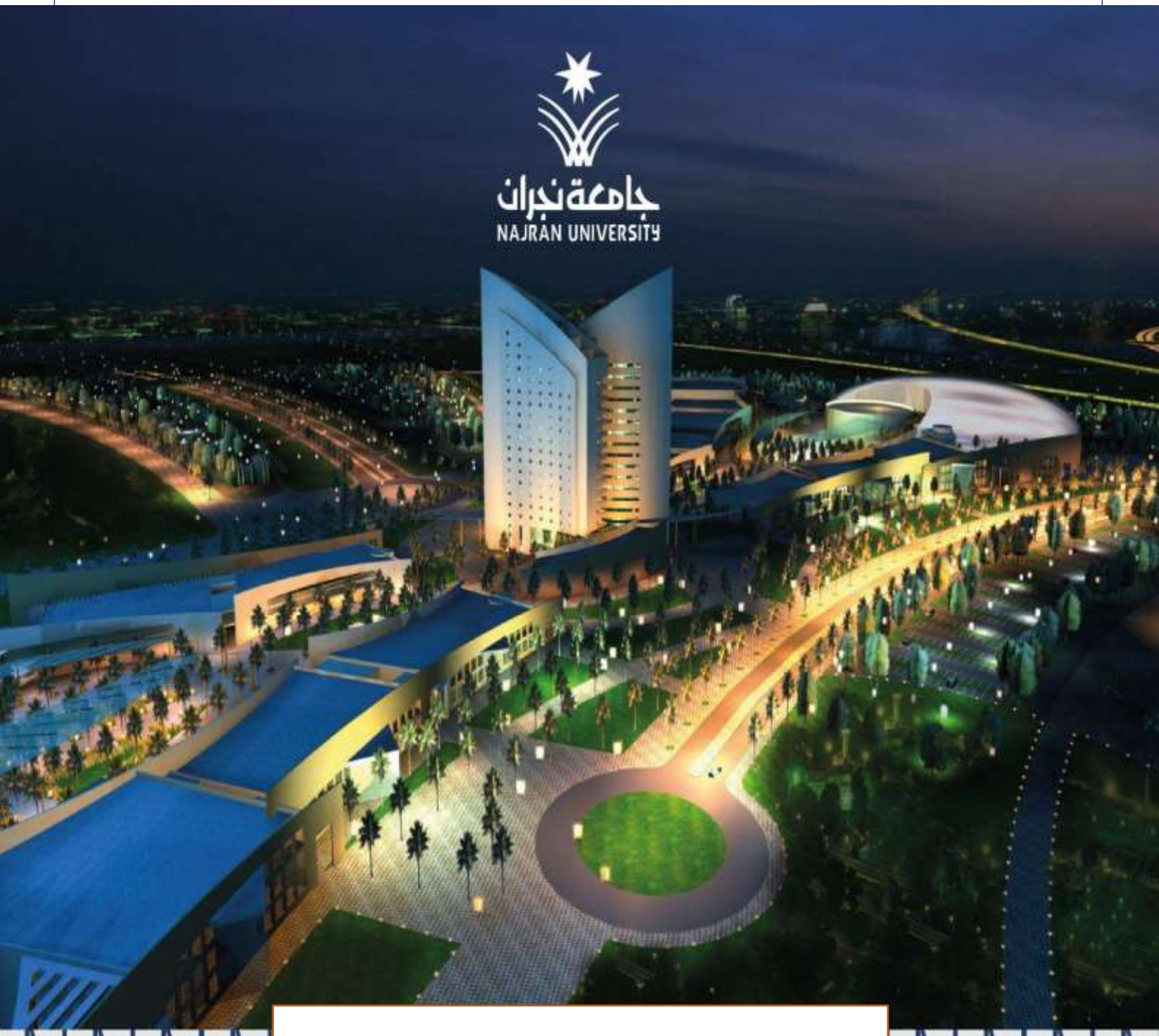


Security and Safety Guide in Biology Program

For the Academic Year 2022/2023

الفاكس: ٠١٧ - ٥٤١٧٦٦٤ تويتر: Najran_Univers الموقع الإلكتروني: www. nu.edu.sa

Introduction:

Biological laboratories in which hazardous materials or infectious microorganisms are used require great attention to security and safety. Safety aims to prevent accidents, and it is often believed that accidents in laboratories are the result of a weakness or lack of a culture of safety and security, or both. This guide has been prepared to spread the culture of security and safety among those concerned in the laboratories and explain the planning mechanism for emergencies that are likely to occur in the laboratories. This guide will also review the principles of managing hazardous materials and their waste and the methods and mechanisms of working with them. Harmful microorganisms and accidental accidents, especially dangerous ones, in terms of safe and sound planning and implementation of experiments and ways to reduce exposure to their risks. We will also review the types of personal protective equipment and internal organization practices of laboratories.

Biohazards

Biohazards are biological materials that threaten the health of humans and other living organisms. They include outbreaks of infectious diseases, epidemics, zoonoses (plague of all kinds), and pests. Contamination can occur through natural exposure to a risk factor, or accidental release of microorganisms, as is the case in student laboratories and research laboratories are biological materials that threaten the health of humans and other living organisms. They include outbreaks of infectious diseases, epidemics, zoonoses (plague of all kinds), and pests. Contamination can occur through natural exposure to a risk factor, or accidental release of microorganisms, as is the case in student laboratories and research laboratories.

Safety rules in the biology laboratory

The biology laboratory is a controlled environment to prevent contamination, and students must adhere to basic biology laboratory safety rules as well as common sense when working in the laboratory. Understanding these precautionary steps will help avoid accidents and injuries while conducting experiments. Now we will present the most important biology laboratory safety rules:

- Make sure to wash your hands with antiseptic soap when you arrive at the laboratory and before leaving.
- Wash your hands before and after wearing disposable gloves.
- Keep the workspace clean, free of contamination and free of any unnecessary materials.
- Always wear personal laboratory protective equipment when handling any biological material such as gloves, safety glasses, closed shoes, and a lab coat to prevent hazardous biological materials from coming into contact with the eyes and skin.

- Disinfect the work area and sterilize all necessary equipment before starting any work.
- To avoid contamination of the bacterial culture medium (culture), make sure you...
- Do not open biological cultures in the laboratory (except in certain cases)
- Treat all human and animal fluids, cells, tissues, blood, and organs as infectious agents and should be handled with care.
- Dispose of any used tools such as needles, blades, or broken glass in sharps containers.
- In the case of biohazardous waste, make sure it is disposed of in accordance with security and safety standards.
- Eating, drinking, chewing gum, and smoking are prohibited in the laboratory.
- In case of accidents or exposure to infectious materials, they should be reported immediately.
- Ensure equipment is disinfected before removing it from the laboratory for service or repair.
- Ensure that the work area is sterilized and clean before starting work and upon completion.
- Plants and animals not associated with the projects should not be allowed in the laboratory.
- In case of any procedures such as manipulation of biological materials that can generate aerosols, these must be carried out inside a Biological Safety Cabinet (BSC).
- In a biosafety cabinet (BSC), do not use an open flame and any materials removed from inside the cabinet must be disinfected with 70% isopropyl alcohol.
- If infectious agents are used in the laboratory, a biohazard warning sign incorporating the Universal Biohazard Symbol must be placed in the work area.
- Experiments not authorized are absolutely prohibited
- Pranks and other acts of mischief are especially dangerous

Biology Department Emergency Procedures

1. Building Evacuation

If you hear the emergency alarm, walk quickly to the nearest stairway and exit the building. Take your personal belongings with you, as you may not be allowed to return immediately. Do not use the elevators. Handicapped persons should be safely positioned on the stairwell landings outside the hall fire doors, from where assigned emergency people will move them to safety.

Do not return to the building unless the Police or Emergency Coordinators announce that it is permissible.

2. Earthquake

Find cover even in a light earthquake. If doorways, desks, or lab benches are unavailable, face up against the inner hall walls and protect your head. Remain inside the building pending instructions from University Police or Emergency Coordinators.

3. Fire

Call a faculty or staff member immediately if nearby. Trained personnel may attempt to control the fire using a fire extinguisher. If the fire cannot be controlled, close all doors and confine the fire.

Stay calm. Do not open doors hot to the touch. Avoid breathing heated air. Use a towel or clothing to protect your lungs. Remember the air is clearer near the floor.

If you become trapped, place clothing or other marker outside window, stay near the floor, and shout at regular intervals. Stairwells are the most fire resistant areas.

4. Spills of microbiological cultures in the laboratory

The supervisor must be notified as soon as any spill occurs and he will assess the severity of the situation and act accordingly. Do not attempt to clean up the spill yourself, unless you have been trained to do so. First aid should be initiated immediately to anyone exposed to contamination due to the spill, taking care that the first aid treatments provided are appropriate for the spilled material and that the contamination does not spread.

5. Injuries

In the event of a serious injury or life threatening situation, try to obtain help and to provide first aid. All injuries must be reported to the instructor. You must complete an accident report.

Ingestion Hazard

1. No pipetting by mouth! Use a pipet bulb
2. No eating, drinking.
3. Never use tissue culture equipment as containers for food or drink
4. Smoking in the laboratory is prohibited.
5. Normally, never taste, or deliberately inhale any biological substance. (Special experiments may involve odors of non-hazardous substances.)

Contact Hazards

1. Learn the location of the eyewash fountain and the safety shower.
2. If tissue culture spacemen are spilled on the injured skin immediately wash with copious amounts of water for 15 minutes.
3. Clothing should be appropriate to the laboratory. There should be minimum skin exposure.

4- Gloves are recommended

Inhalation Hazards

1. Experiments which generate airborne contaminants such as dusts, mists, fumes or vapors shall be performed in the hoods.

2. Do not inhale fumes.

3. So that hoods draw properly, laboratory windows and doors should be kept closed. Large objects should not occupy hoods. The hood sashes should be at the appropriate location to ensure proper hood action and should be closed when the hood is not in use. Hoods should not be used as storage areas.

Flammable Hazards

1. Learn the location of the fire extinguisher and fire blanket. Learn how to use them.
2. Learn what substances are flammable. Never use an open flame to heat a flammable liquid.
3. When volatile flammable materials may be present, use only non-sparking electrical equipment.
5. Confine long hair and loose clothing.
6. Only permitted materials should be stored in teaching lab lockers. Such materials should be clearly labelled with the biological name and hazard class of the contents, your name and the date.

Waste and Clean-up

1. For each experiment, take only the minimum of what you actually need. Place them in labeled containers
2. As directed by the instructor, dispose of excess materials and waste in the appropriate labeled waste container. Please make sure to read the label and check if the bottle is the correct waste container before waste in it. Improper waste disposal has been the leading cause of serious accidents in laboratories! If in doubt, ask your teacher for help
3. Do not overfill waste containers
4. Place broken glass in the appropriate container

Glass wear

1. Use only boro-silicate (Pyrex, Kimax, etc.) containers for heating solutions.
2. Do not force glass tubing or thermometers into rubber stoppers. Lubricate fire-polished tubing and protect hands with a towel when inserting tubing/thermometers.
3. Vacuum-jacketed glass apparatus should be handled with extreme care to prevent implosions.
4. Hand protection should be used when picking up broken glass.
5. Broken glass should be disposed of in appropriate containers.

Work Outside Regular Laboratory Hours

1. Permission from your instructor is required for work outside regular laboratory hours. Working alone is extremely dangerous. No student can do experimental work in the laboratory unless under active supervision of an instructor.

General Safety

1. Do not handle materials until you know their toxicity.
2. Know the types of protective equipment available and the appropriate type for each job.
3. Know the location and use of safety equipment, such as fire blankets, eyewash, and safe showering.
4. Knowledge of safety rules and procedures that apply to the work to be performed.
5. Be aware of unsafe conditions and procedures and call attention to them so that corrections can be made as quickly as possible.
6. Ensure that all biological materials are properly and clearly labeled. Post warning signs when unusual risks exist.
7. Use equipment only for its intended purpose.
8. Heat the solutions in test tubes so that there is no danger to oneself or the neighbors.
9. Check glassware for cracks (especially “star cracks”) before use.
10. Construct and install the reaction device thoughtfully to allow manipulation without having to move the device until the entire reaction is complete.
11. No one other than class members is allowed to enter the laboratory without permission from the teacher.
13. All visitors must wear the specified personal protective equipment at the time of visit.
14. Wash your hands well before leaving the laboratory.
15. Think, act and encourage safety until it becomes a habit.

Accident Reporting

Any accident should be reported to your instructor.

Hazard Warning

1. CAUTION – the solids, liquids and gaseous substances, and combinations thereof, used in experiments are potentially hazardous in one or more of the following ways:

a) They may be irritants to or have caustic action on the skin, mucous membranes, lungs, and eyes

b) They may be systemic poisons

c) They may be flammable or explosive

Origin of Hazards

Unexpected and possibly dangerous situations can result from one or more of the following:

1..Incorrect transfer and handling procedures

2. Incorrect reaction temperatures

3. Incorrect order of addition of two or more substances

5. Incorrect rate of addition of two or more substances

6. Using one or more incorrect substances

7. Incorrect disposal of biological substance

Compressed Gases

1. Secure all compressed gas tanks in upright position with chains positioned at 1/3 and 2/3 of the cylinder's height.

2. Use only the appropriate regulators. Never substitute.

3. When using a compressed gas tanks, never open the main valve more than one-half turn.

4. Shut off tanks when not in use.

5. Transport and store tanks properly. Use hand trucks for transportation.

Cold Traps and Cryogenic Hazards

Use appropriate gloves and eye protection with all cryogenic liquids; use gloves with dry ice.

Non-compliance with safety rules

Failure to comply with the proper procedures and prescribed safety precautions shall subject to disciplinary action

1. Any student who engages in unauthorized experimentation or who seriously disregards safety, thereby endangering self or others shall be withdrawn immediately from the class with a failing grade.

2. Any student who shows persistent disregard for safety may have his/her laboratory grade lowered and may eventually be withdrawn from the class with a failing grade.

Print Full Name: _____

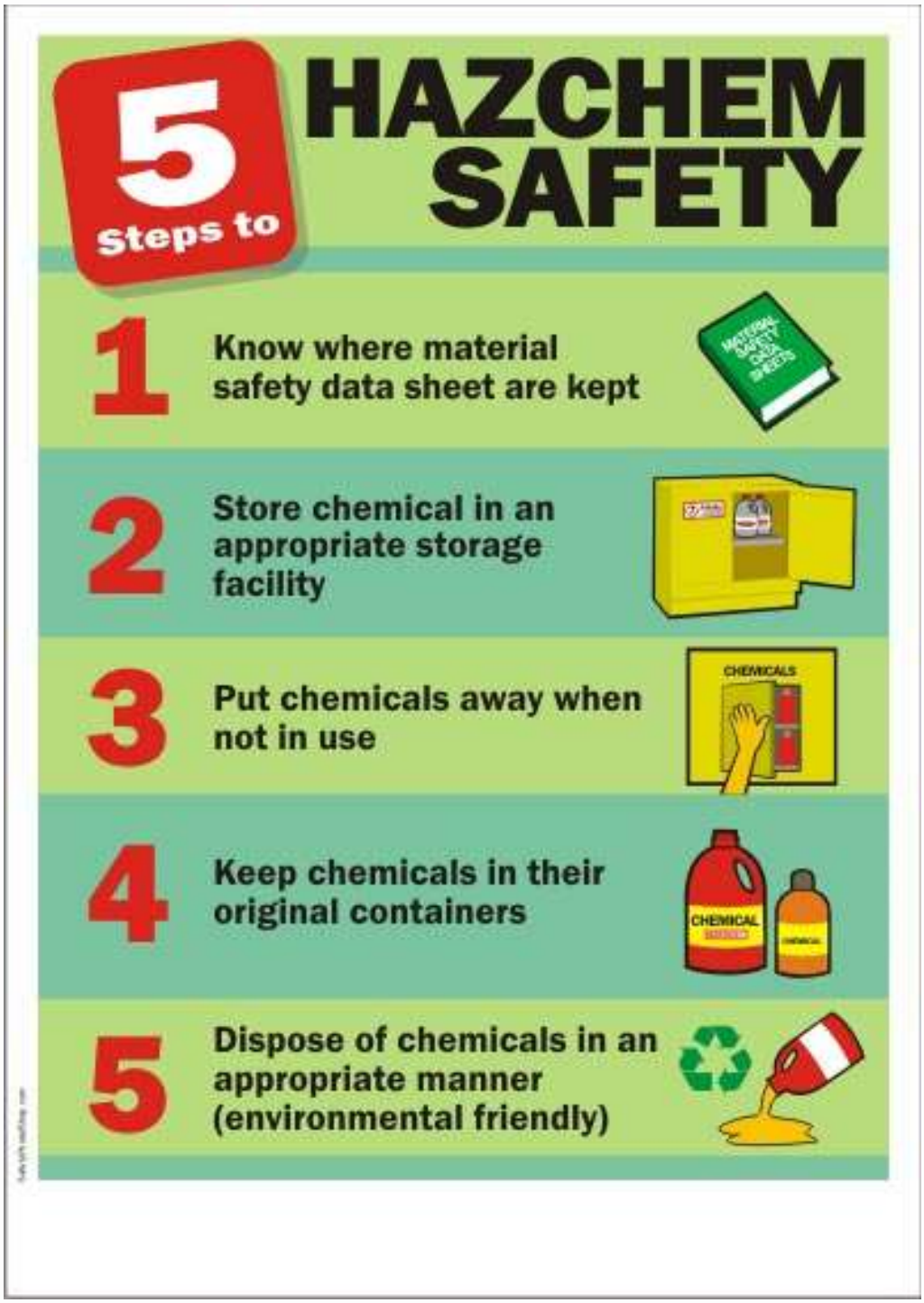
University ID: _____

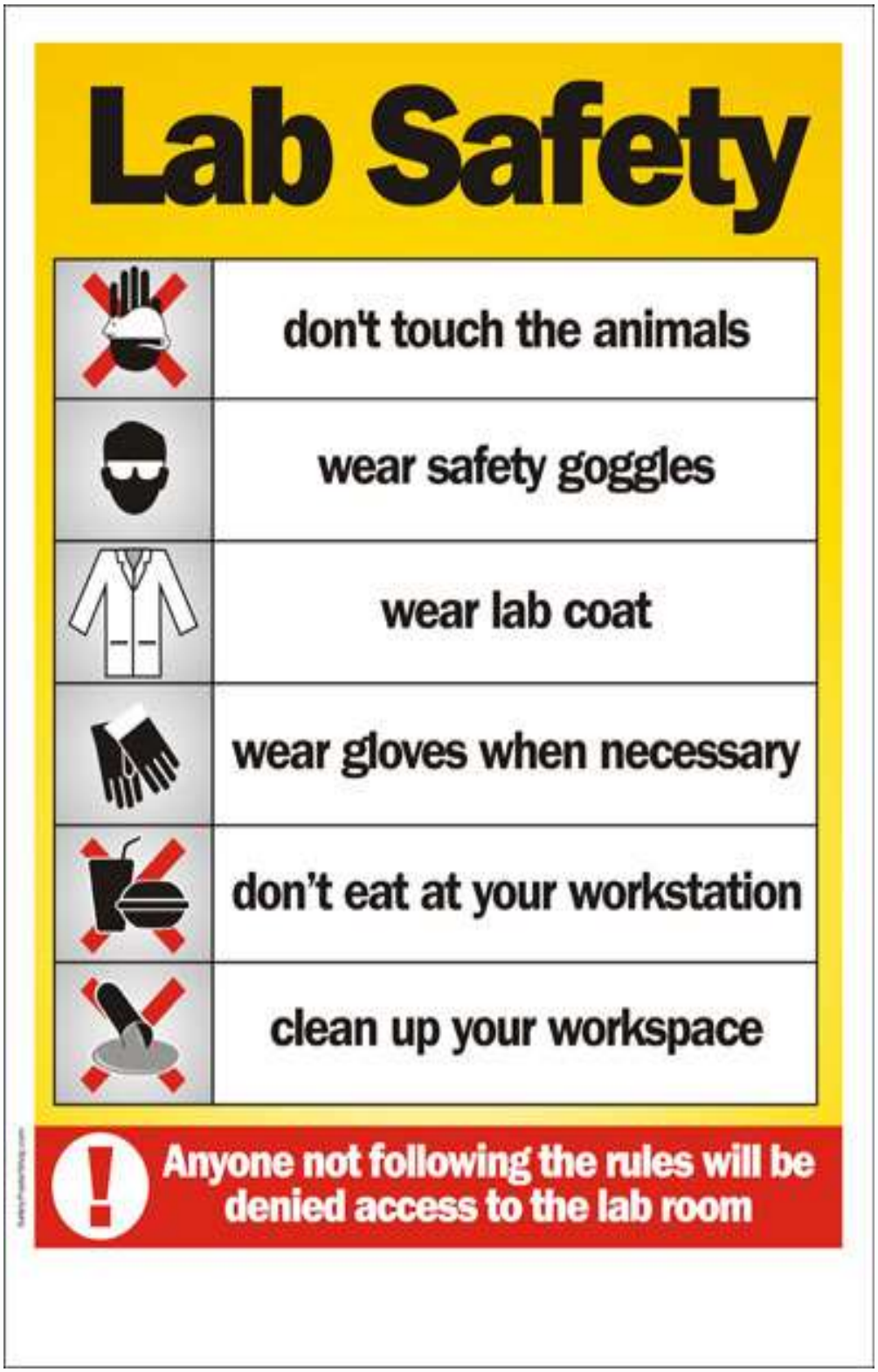
Signature: _____

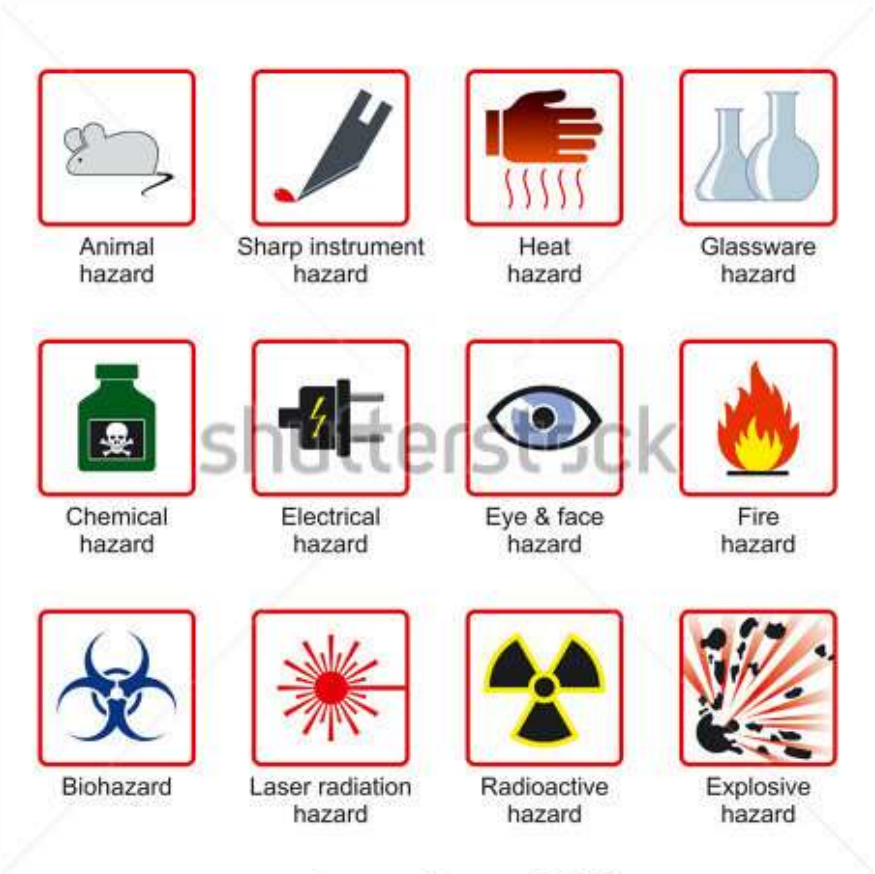
Date: _____

Course: _____

Section:_____


5 Steps to
HAZCHEM SAFETY
1
Know where material safety data sheet are kept
2
Store chemical in an appropriate storage facility
3
Put chemicals away when not in use
CHEMICALS
4
Keep chemicals in their original containers
CHEMICAL
5
Dispose of chemicals in an appropriate manner (environmental friendly)


Lab Safety
don't touch the animals
wear safety goggles
wear lab coat
wear gloves when necessary
don't eat at your workstation
clean up your workspace
Anyone not following the rules will be denied access to the lab room


Animal hazard
Sharp instrument hazard
Heat hazard
Glassware hazard
Chemical hazard
Electrical hazard
Eye & face hazard
Fire hazard
Biohazard
Laser radiation hazard
Radioactive hazard
Explosive hazard
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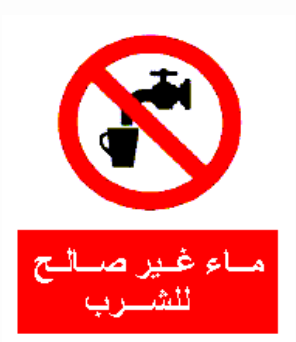

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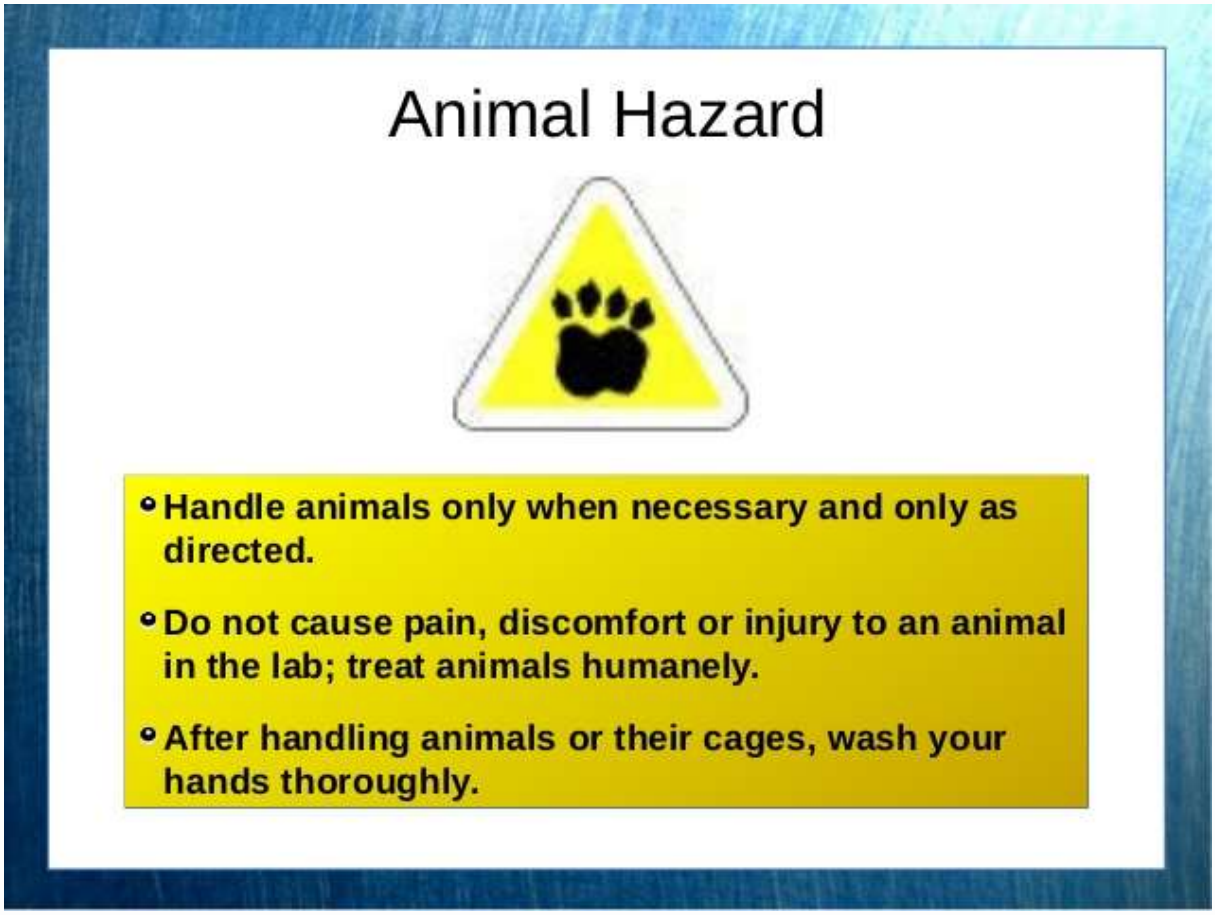
Physical Dangers

- **Animal handling**
  - Animals are **unpredictable**
  - Anticipate bites and scratches
    - Don't put yourself in a position to be bitten.
  - Use your safety equipment
    - Muzzles – for cats and dogs
    - Leashes – or towels to pick up
    - Gloves – for raptors & exotics
    - Bondage – cat bag or tape for feet

Animal Safety

- Handle animals only when teacher directs you to do so
- Always treat animals carefully and with respect
- Wash hands thoroughly after handling any animal.



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