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1. Introduction of Safety at Labs

The goal of KFUPM Laboratory Safety Program is to minimize the risk of injury or illness to laboratory workers and students by ensuring that they have the training, information, support and equipment needed to work safely in the laboratory.

Pay close attention to the information in this presentation as our goals are:

1. To avoid accidents in the lab, and

2. To respond promptly and appropriately in case of any emergency.

What Does Lab Safety Really Mean?

- Teaching and performing science work safely
- Watching out for yourself and everyone else in the lab
- Anticipating problems in the lab and preventing them
- Being careful and aware of your surroundings

Labs Safety and You!

Learn and follow the guidelines presented in this training.This training will giveyou an overview of Basic Laboratory Safety Principles (for all types of Labs) and specific safety rules for different types of labs.

2. Emergency Situations

What to do in case of an Emergency?

In Case of an emergency, follow the basic rules as:

- In case of an emergency, call 999 from campus phone or 03-860-9999 from mobile phone. Clearly state the nature of emergency and exact location of your lab.

- You should be familiar with all the emergency exits in your building and locations of fire alarm systems in the building.

- You should know the location and use of all the safety and emergency equipment (i.e., safety shower, eyewash, first-aid kit, fire blanket and fire extinguishers etc.

- If there is a fire drill during your lab period, be sure that all gas valves and electrical equipment are turn off before leaving.

- Report any safety issues, safety violations or any incident that you are aware of as soon as possible to EHS Department.

Emergency Situation-Fire

In case of fire in the lab, follow these basic rules,

- Pull the fire alarm and call 999immediately, tell them the nature of fire and exact location of your lab.

- Use fire extinguisher if the fire is small to fight and out of danger. You should be trained about the use of fire extinguisher.

- If fire is large and dangerous then ask all students to evacuate the lab immediately.

- If safe, close your Lab door and window, but do not lock them.

- Use Staircase for exit only. Do not use Elevators.

- Once outside the building, go to the Assembly Area.

- Do not return inside the building until it is declared safe.

3. Basic Safety Rules for All the Labs

These Basic Safety Rules will be applicable for all the Laboratories in the University.
The laboratory instructor will review the following safety rules and regulations with all the students and will point out the location and operation of the fire extinguishers, safety shower, eye wash, and other laboratory safety equipment available in the lab.

- Instruct the students to conduct in a responsible manner at the all times in the laboratory. Horseplay, practical jokes, and pranks are not allowed.

- Follow all written and verbal instructions carefully. Ask questions if you do not understand the instructions.

- Do not touch any equipment, supplies, or other materials in lab without permission from the teacher/Instructor.

- Perform only authorized and approved experiments.No unauthorized experiments may be performed. Violators will be subject tosevere disciplinary action.

- Do not conduct any experiment when the teacher is out of the lab.

- Never eat, drink, chew gum, or taste anything in the lab.

- Wear appropriate Personal Protective Equipment (PPE) when required. Wear Protective clothing and do not wear open-toed

shoes, sandals, shorts or shirts with dangling sleeves. Tie back long hair and avoid dangling jewelry.

- Keep your work area and the lab room neat and clean. Bring only your laboratory instructions manuals, worksheets, and writing instruments to the Lab.

- Never leave an experiment unattended unless approved by the instructor. If you must leave the lab, have a classmate keep an eye on your experiment.

- Follow your teacher's/Instructor's instructions to dispose of any waste materials generated in an experiment.

- Clean all work areas and equipment at the end of the experiment. Return all equipment clean and in working order to the proper storage area.

- Dispose of sharps waste properly and place other waste materials in the designated container(s).

- Labels and equipment instructions must be read carefully before use. Set up and use the equipment as directed by your teacher.

- Be alert and proceed with caution at all times in the laboratory. Notify the teacher immediately of any unsafe conditions you observe.

- Notify your instructor immediately of all accidents even minor.

4. Safety Rules for Engineering Labs

I. Chemical Engineering Lab's Safety:

Including with the basic safety rules, the laboratory instructor will review the following safety rules and regulations with all the students.

- Wear a full-length, long-sleeved laboratory coat or chemical-resistant apron when you enter in the lab.

- Wear safety glasses or goggles when instructed. Never remove safety glasses or goggles during an experiment. There will be no exceptions to this rule!

- Always reads the instructions in the manual carefully and do not operate any equipment without the permission of your teacher.

- Always handle all chemicals with extensive care and keep them from coming into contact with your eyes, skin, clothing, or mouth.

- Always report chemical spills and broken equipment to the lab instructor immediately. He will advise the proper cleanup procedures.

- Do not directly touch any chemical with your hands and never handle bottles that are wet.

- Always handle toxic chemicals inside the fume hood and keep flammable solvents away from flame.

- Keep hands away from face, eyes, mouth, and body while using chemicals or lab equipment.

- Fume hoods should not be used for storage of chemicals.

➢ Turn off all heating apparatus when not in use.

➢ Keep hands away from face, eyes, and mouth when working with chemicals. Wash your hands with soap and water before leaving the lab.

➢ Be sure you know the location and method of operation of the following:

- Eye Wash
- Safety Shower
- Fire Extinguisher
- First Aid and Spill Kit
- Fire Alarm Pull Station

II. Mechanical and Aerospace Engineering Labs Safety

Including with the basic safety rules, the laboratory instructor will review the following safety rules and regulations with all the students.

➢ Wear eye protection (i.e. goggle) at all the times in Mechanical lab and shoes must completely cover the foot. No sandals are allowed.

➢ Dress properly during all laboratory activities. Loose clothing is a hazard in the Mechanical Lab because loose cloth may stuck into moving parts of equipment.

➢ Do not use any equipment unless you are trained and approved as a user by your instructor or staff. Ask questions if you are unsure of how to operate something.

➢ If any laboratory equipment is malfunctioning, making strange noises, sparking, smoking, or Smelling, inform your instructor or staff immediately.

➢ Exercise care when working with or near hydraulically- or pneumatically-driven equipment. Sudden or unexpected motion can inflict serious injury.

- KEEP all power and machine tool guards in place and in working order. Loose objects can become flying projectiles.

- DO NOT wear gloves when operating power or machine tools. They are easily caught in moving parts.

- DO NOT use power tools in damp or wet locations.

- DO NOT get trapped. Avoid placing your fingers, hands, arms, legs in power and machine tool pinch points.

- USE the correct tool. Don't force a tool or attachment to do a job for which it was not designed.

- Be familiar with safety equipment in the lab i.e. Fire extinguisher etc.

- KEEP your work area clean. Cluttered areas and benches invite accidents.

- NEVER leave a power or machine tool running unattended. If you step away even for a minute, TURN POWER OFF.

- All accidents, no matter how minor, should be reported to the person supervising the laboratory immediately.

III. Electrical Engineering Labs Safety

Including with the basic safety rules, the laboratory instructor will review the following safety rules and regulations with all the students.

- Students are allowed to use only the equipment provided in the experiment manual.

- When operating with electric circuits and electronic devices other than just a computer, you must work in pairs or teams.

- Always turn off the power before working on any electric circuit or electronic device.

- Always obtain permission from your instructor or lab assistant before operating any high voltage equipment.

- You should keep a safety distance from the circuit breakers, electric circuits or any moving parts during the experiment.

- Avoid any part of your body to be connected to the energized circuit and ground.

- Wear the proper clothes and safety gloves or goggles required in the lab.

- Report any broken plugs to the lab instructor immediately. When unplugging a power cord, pull on the plug, not on the cable.

- Extension cords shall not be used as a substitute for permanent wiring.

- Be as neat as possible. Keep the work area and workbench clear of items not used in the experiment.Keep fluids, chemicals, and beat away from instruments and circuits.

- Switch off the equipment and disconnect the power supplies from the circuit before leaving the laboratory.

- Report any damages to equipment, hazards, and potential hazards to the laboratory instructor.

- Electric Shock:

When someone suffers serious electrical shock, he or she may be knocked unconscious. If the victim is still in contact with the electrical current, immediately turn off the electrical power source.Do not touch a victim that is still in contact with a live power source; you could be electrocuted.

- Electrical Fire:

If an electrical fire occurs, try to disconnect the electrical power

source, if possible. If the fire is small and you are not in immediate danger; and you have been properly trained in fighting fires, use the correct type of fire extinguisher to extinguish the fire.NEVER use water to extinguish an electrical fire.

IV. Civil and Arch. Engineering Labs Safety

Including with the basic safety rules, the laboratory instructor will review the following safety rules and regulations with all the students.

- Read carefully Instructions manual and safety guidelines before starting an experiment.

- Always use Personnel Protective Equipment (PPE's) especially filter mask, safety shoes and goggle when working with equipment.

- Do not wear ties, loose clothing, jewelry, gloves, etc. around moving or rotatingmachinery.

- Do not operate equipment you are not familiar with. Always receive proper training from your lab instructor for the equipment prior to use.

- Do not bypass guards or safeties when equipment in use.

- Never lift objects that are heavier than you can safely handle.

- Report any faulty equipment to the Lab assistant or the Instructor immediately. Do not use it until it is inspected and declared safe.

- Never use compressed air guns to clean clothing, hair, or aim atanother person.

- Make sure all electrical circuits, components and equipment are properly grounded BEFORE using them.

- Before using chemicals, check chemical labels twice to ensure accuracy.

- Use all the appropriate PPE's and take all the necessary precautions when working with experiments that involve Radiations. Always review Radiation safety before starting the experiment.

- Only authorized persons who have beenadequately trained shall operate overhead crane.Working load must never be exceeded.The operator shall ensure that hand signalsused during the lift are understood and followed by all involved.The operator shall not lift, travel or lower a load while someone is on the load orhook.

- All students should know the location of emergency equipment i.e. fire extinguishers, fire alarms, eye wash station, first aid box etc.

- All accidents, no matter how minor, should be reported to the person supervising the laboratory immediately.

V. Petroleum Engineering Labs Safety

Including with the basic safety rules, the laboratory instructor will review the following safety rules and regulations with all the students.

- Wear a full-length, long-sleeved laboratory coat when you enter in the lab.

- Many of the experiments are hazardous if not handled properly. Ask your lab instructor about safe operating procedures.

- Drilling equipment must be used strictly in accordance with specifications. Wear appropriate goggles and use protective source when grinding.

- Mechanical vacuum pumps pose common hazards. Take extra care with moving parts of pump.

- Students must review the Material Safety Data Sheets (MSDS) before using any chemicals.

- Whenever a student observes a dangerous situation (i.e. a chemical spill, broken glass, someone who is not following safe procedures, etc.), the student is to report the hazard to the instructor.

- Students must operate all lab equipment in a safe manner. Use of safety goggles when core drilling, cutting, handling caustic soda or concentrated acids, or working with pressurized vessels. In general safety goggles should be worn at all time in the lab.

5. Safety Rules for ScienceLabs

I. Chemistry Labs Safety

Including with the basic safety rules, the laboratory instructor will review the following safety rules and regulations with all the students.

- Wear a full-length, long-sleeved laboratory coat or chemical-resistant apron when you enter in the lab.

- Wear safety glasses or goggles when instructed. Never remove safety glasses or goggles during an experiment. There will be no exceptions to this rule!

- Always reads the instructions in the manual carefully and do not operate any equipment without the permission of your teacher.

- Always handle all chemicals with extensive care and keep them from coming into contact with your eyes, skin, clothing, or mouth.

- Always report chemical spills and broken equipment to the lab instructor immediately. He will advise the proper cleanup procedures.

➢ Do not directly touch any chemical with your hands and never handle bottles that are wet.

➢ Always handle toxic chemicals inside the fume hood and keep flammable solvents away from flame.

➢ Keep hands away from face, eyes, mouth, and body while using chemicals or lab equipment.

➢ Fume hoods should not be used for storage of chemicals.

➢ Turn off all heating apparatus when not in use.

➢ Keep hands away from face, eyes, and mouth when working with chemicals. Wash your hands with soap and water before leaving the lab.

➢ Be sure you know the location and method of operation of the following:

- Eye Wash
- Safety Shower
- Fire Extinguisher
- First Aid and Spill Kit
- Fire Alarm Pull Station

II. Physics/Radiation Labs Safety

Including with the basic safety rules, the laboratory instructor will review the following safety rules and regulations with all the students.

➢ NEVER, EVER LOOK INTO ANY LASER/RADIATION BEAM, no matter how low power or "eye safe" you may think it is.

➢ Always wear safety goggles if instructed by the Lab Instructor.

➢ The most common injury using lasers is an eye injury. The best way to avoid these injuries is to always wear your goggles and

NEVER LOWER YOUR HEAD TO THE LEVEL OF THE LASER BEAM! The laser beam should always be at or below chest level.

- Extreme caution should be exercised when spark generators are in use. Do not touch any of the wires or the tape while the spark generator is operational.
- Caution should be exercised in the use of ultraviolet light sources, always use PPE's.
- If you elect to use any radiation emitting devices, be fully aware of their hazards and the cumulative effects. Proper shielding can reduce radiation effectively. Contact the instructor for detailed precautions.
- Proper shielding must be used when using an apparatus that generates X-rays.
- If a thermometer breaks, inform the instructor immediately. Do not touch either the broken glass or the mercury with your bare skin.
- Ask the instructor to check all electrical circuits before you turn on the power.
- When working with electrical circuits, be sure that the current is turned off before making adjustments in the circuit.
- Do not connect the terminals of a battery or power supply to each other with a wire. Such a wire will become dangerously hot.
- Return all equipment, clean and in good condition, to the designated location at the end of the lab period.
- Do not perform unauthorized experiments. Get the instructor's permission before you try something original.
- Report all accidents, injuries or breakage to the instructor immediately. Also, report any equipment that you suspect is malfunctioning.

III. Computer Labs Safety

Including with the basic safety rules, the laboratory instructor will review the following safety rules and regulations with all the students.

- Do not install any Software in any computer in the laboratory without the permission of Instructor.
- Computer games are strictly prohibited in the computer laboratory.
- Do not insert metal objects such as clips, pins and needles into the computer casings. They may cause fire.
- Do not touch, connect or disconnect any plug or cable without your Instructor's permission.
- You are not allowed to repair, open, tamper or interfere with any of the computer, printing, cabling, air conditioning or other equipment in the laboratory.
- You should be aware of office ergonomic guidelines for correct posture when using computer.
- Look away from the screen once in a while to give your eyes a rest.
- Do not spill water or any other liquid on the computer machine, in order to maintain electrical safety.
- Always maintain an extra copy of all your important data.
- All the students should know the location of the fire extinguisher and the first aid box in the lab and how to use them in case of an emergency.
- Report firesor accidents to your Instructor immediately.