METU ENVIRONMENTAL ENGINEERING DEPARTMENT LABORATORY SAFETY AND WORKING RULES

Laboratory Access and Use Procedure for Master's and PhD Students

1. The student who will work in the laboratory must get the approval of the Laboratory Manager and the Head of the Department within the knowledge of his / her Advisor.

2. Students who require access to laboratories or need a laboratory key must complete the "Laboratory Access and Use Form" and obtain the required approvals from the Laboratory Manager and the Head of the Department. Access card activation and laboratory key requests must be submitted using this form. The form must also be completed by the Laboratory Technical Staff and the Department Administrative Officer, as applicable, before access is granted and any keys are handed over. **The form can be obtained from the Department Administrative Office.**

3. Unauthorized reproduction of laboratory keys is strictly prohibited.

4. Students who plan to work in the laboratory should consult the Laboratory Technical Staff, read the "Laboratory Safety and Working Rules," and receive the necessary safety instructions and training before starting laboratory work.

5. During laboratory work, if there is a cabinet request to place the materials in the laboratory where the students are allowed to work, they should consult with the Laboratory Technical Staff.

6. During laboratory work, students should label the names of the cabinets and materials they use. The materials like unlabelled bottles etc. will be discarded during routine cleaning.

7. During laboratory work, permission must be taken from the Head of the Department for the instruments and laboratories that are not in general usage. If the device has been taken within the scope of a project and is not available for routine use, permission must be obtained from the relevant instructor.

8. After completion of the laboratory work, it is necessary to empty the cabinets and inform the Laboratory Technical Staff. These procedures must be completed within one week after the thesis defence. Students are required to obtain the **Discharge Certificate** from the Department Secretariat and submit it to the Secretariat after obtaining all the required signatures.

General Rules For Laboratories

1. It should be kept in mind that the laboratory is an environment where serious work is carried out, and it is forbidden to act in a way that could disrupt the order or cause danger in laboratories.

2. All verbal or written rules must be carefully followed, any unclear issues should be asked to laboratory technical personnel, and it is not allowed to work in the laboratory without permission.

3. Students are not allowed to work in laboratories except weekdays and weekends without authorization.

4. Laboratory users must wear a lab coat at all times. Lab coats should preferably be long and have a snap-button front. The front must be fully closed during laboratory work. Personal belongings, such as coats, jackets, and handbags, should be left outside the laboratory.

5. Eye and skin protective equipment such as glasses, face mask and gloves should be used according to the characteristics of the study during the period studied in the laboratory.

6. Contact lenses should not be used in the laboratory.

7. Closed-toe shoes must be worn in the laboratory to protect against chemical spills and broken glass.

8. Since long hair, shaky jewellery and loose dresses in the laboratory environment can cause danger, long hair should be collected at the back, shaky jewellery should be removed and loose dresses should not be worn.

9. Eating, drinking, and keeping food materials in the laboratory equipment are forbidden.

10. Avoid touching your face, door handles, or other surfaces with contaminated gloves. Do not eat, drink, or touch your mouth while wearing laboratory gloves.

11. Experiments must be performed according to the established procedures and safety instructions. Equipment and chemicals must be used only as instructed.

12. Working alone in the laboratory, especially in a locked or isolated area, should be avoided. If working alone is unavoidable, inform a colleague in advance about the planned work and maintain regular communication throughout the work period.

13. The cleaning of the materials, the test setup and the test bench should be done with care before leaving the laboratory.

14. Before leaving the laboratory, ensure that gas valves and water taps are closed, ventilation systems and air conditioners are turned off where appropriate, and lights are switched off.

15. After completing laboratory work, wash your hands thoroughly with soap and water. Use an antiseptic if necessary.

General Rules for Working with Chemicals

1. All chemicals in the laboratory are to be considered dangerous. For this reason, never taste or smell any chemicals. Never touch any chemical with your bare hands.

2. Always use a clean spatula to remove the solids from the bottles. Do not use the same spatula for different solids without cleaning.

3. Never place bottle caps with the inner surface facing down on the laboratory bench. This can contaminate the cap and transfer contaminants into the bottle, compromising the purity of its contents.

4. Do not heat containers that are sealed with lids or stoppers. Only use containers specifically designed for heating; do not heat or boil substances in containers that are not suitable for heating.

5. Chemicals must not be mixed without first checking their compatibility and following the appropriate laboratory procedures, as hazardous reactions may occur.

6. Chemical containers must be clearly and properly labelled. Always read the label carefully before use. If a chemical is transferred to another container, the new container must also be labelled. Labels should include the full chemical name, the preparation date, the name of the person who prepared the solution, relevant hazards, and any other necessary safety information.

7. Never return chemicals to their original containers even if they are not used and to avoid contamination never insert pipets into reagent bottles.

8. Do not use same pipette for different solutions.

9. Never pipette liquids by mouth. Always use an appropriate pipette filler or pipetting device.

10. Flammable liquids should be stored in a closed container on the test bench and kept away from heat sources (burner, electric heater, etc.).

11. When heating a liquid in a test tube, heat it gently while keeping the tube moving. Always point the open end away from yourself and others, and never look directly into the tube.

12. Chemical wastes must be collected according to the instructions of laboratory technical personnel and chemicals should not be poured into the sinks and other places.

13. The laboratory ventilation system must be operating when working with volatile chemicals, odorous materials such as sludge, or when heating materials in a muffle furnace, as these processes may release fumes.

Chemicals that release toxic vapors or gases, such as sulfuric acid, nitric acid, hydrochloric acid, hydrofluoric acid, bromine, hydrogen sulfide, hydrogen cyanide, and chlorine, must be handled in a fume hood.

14. While diluting acids you should always add acid to water. Never pour water on acid.

15. If the mercury is poured in any way, it must be collected with a vacuum source or foam type synthetic sponges. If its amount is too small to be collected, powder sulfur should be sprinkled on it.

16. If a mercury thermometer breaks, mercury and thermometer pieces containing mercury should never be thrown into the trash or the sink.

17. Chemicals must be transported carefully and safely. Use both hands to carry chemical bottles, supporting the bottom with one hand and holding the bottle securely with the other.

18. Chemical or other materials should never be taken out of the laboratory.

Safety Data Sheets (SDS)

Many of the chemicals used in laboratories are harmful to health. Knowing the properties of the chemicals is important both for health effects and determination of what will be the first aid after an accident. Before using chemicals, Safety Data Sheet (SDS) should be carefully examined and experimental studies should be carried out according to these information.

SDS contains following information;

1. Identification of the Substance/Mixture and of the Company/Undertaking

2. Hazard Identification

3. Composition/Information on Ingredients

4. First-Aid Measures

5. Fire-Fighting Measures

6. Accidental Release Measures

7. Handling and Storage

8. Exposure Controls/Personal Protection

9. Physical and Chemical Properties

10. Stability and Reactivity

11. Toxicological Information

12. Ecological Information

13. Disposal Considerations

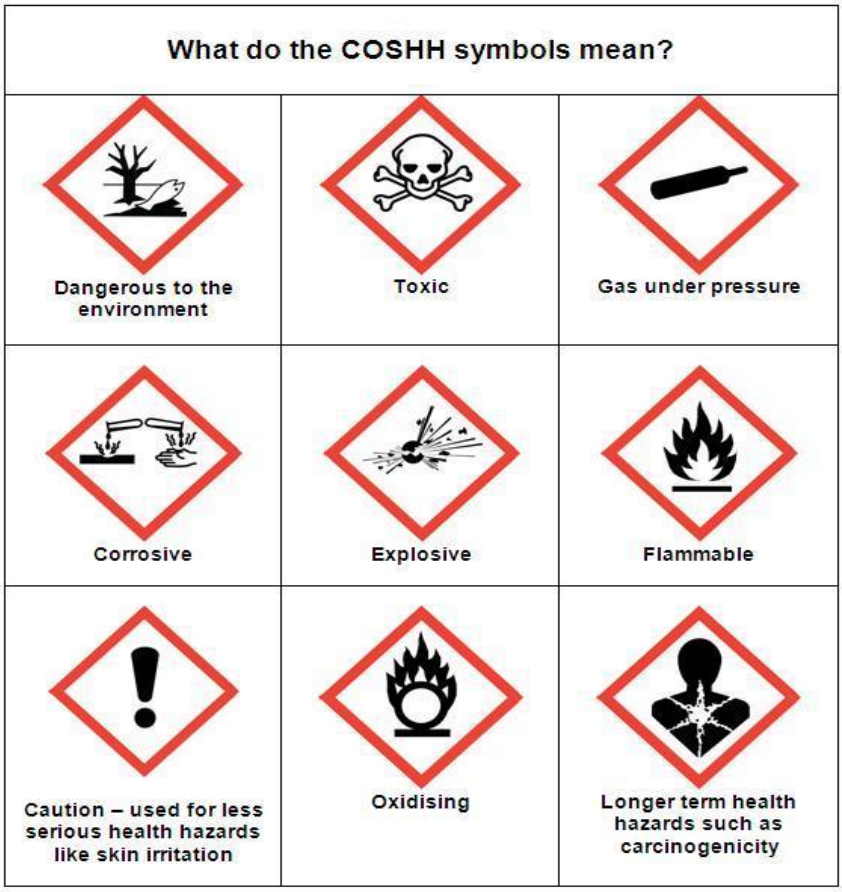
14. Transport Information

15. Regulatory Information

16. Other Information

Note: Safety Data Sheets are available from manufacturer's web sites.

Some of the most frequently seen warning symbols on chemical bottles are given below.



Rules To Be Followed While Working with Glass Material

1. Broken glass materials should never be used.

2. Do not use dirty or cracked glass.

3. Particular care should be taken to carry the long glass objects upright.

4. Glass objects such as thermometer, pipette etc. that can roll should be placed on the laboratory bench carefully to prevent them falling down.

5. Lubricate glass tubing, thermometers, and similar items before inserting them into cork or rubber stoppers. Wear protective gloves, avoid applying excessive force, and handle the glassware carefully to prevent breakage and injury.

6. Since it is not possible to differentiate the hot and cold glass from their appearance, the heated glass ware should not be placed in a random place without any warning.

7. Glassware should be washed with distilled water after use.

8. Broken glass must never be handled with bare hands. Carefully sweep it up using a brush and dustpan, then dispose of it in the designated broken-glass container in the laboratory, not in the regular waste bin.

Rules To Be Followed While Using A Device

1. Prior to the first usage of any device in the laboratory, laboratory technical personnel should be informed and necessary information should be obtained from them and the instructions of the device should be read. Do not use any laboratory equipment unless you are familiar with its proper operation and safety instructions.

2. Pay special attention when using the burner. Hair and clothing should be kept away from burner flame.

3. The burners or electric heaters should always be switched off when not in use.

4. Do not change the temperature settings of ovens or incubators without authorization. If an adjustment is needed, consult the laboratory technical staff.

5. Devices such as oven and incubator should not be used with plastic gloves. Tongs should be used when working at high temperatures.

6. Equipment cleaned with solvents must not be placed in an oven for drying, as residual solvents may pose a fire or explosion hazard.

7. Ensure that sample containers, such as crucibles and evaporating dishes, do not come into contact with the oven walls to prevent damage to the oven's electrical system.

8. When not in use, analytical balances must be left with the weighing pan clear of any materials and the draft shield closed.

9. Ensure that the analytical balance is properly leveled by checking that the bubble in the spirit level is centered.

10. Care should be taken to eliminate the spillage of chemicals on or around the precision scale. Spilled chemicals must be cleaned with a brush.

11. When working with fume hood, the chemical materials should be placed at least 15 cm inside from the front of the fume cupboard and the glass of the fume cupboard should be kept close as much as possible.

12. The electrical connection of all devices must be done in advance when working on the fume hood with explosive or flammable chemicals.

13. Make sure that the hands are completely dry when connecting electrical appliances.

Rules To Be Followed When Handling Gas Cylinders

1. Before using any gas or gas mixture, check its properties, intended use, and safety precautions.

2. Gas cylinders must not be dragged, dropped, or struck against each other.

3. Avoid mechanical impacts that may damage the cylinder valves.

4. The labels on gas cylinders must not be removed.

5. Gas cylinders should only be transported when necessary, using the gas cylinder transport cart available in the laboratory. Secure each cylinder with a chain and transport it carefully.

6. Gas cylinders must be secured to the wall with a chain during storage and use.

7. Before returning a cylinder to the supplier, close the cylinder valve, replace and secure the valve outlet seal, and fit the cylinder cap properly.

Rules for Laboratory Waste Disposal

1. Laboratory waste must be separated by type and collected in appropriate containers. Anyone generating laboratory waste should consult the Laboratory Technical Staff to obtain suitable containers and instructions for proper waste handling.

2. Chemical waste must be collected in clearly labelled waste containers. It must never be poured down the sink or disposed of in regular waste bins..

3. Absorbents, filter materials, wiping cloths, and protective clothing contaminated with hazardous substances must be collected separately.

4. Packaging containing hazardous chemical residues must be handled according to the instructions of laboratory technical personnel.

5. Never throw syringe needles into regular waste bins or leave them on laboratory benches or floors. Always place them directly into a sharps container.

6. After collecting the waste properly, contact laboratory technical personnel to arrange its transfer to the temporary waste collection area.

First Aid in Laboratory Accidents

Burns and Cutouts

1. In case of chemical splashes onto the skin or into the eyes, wash with plenty of water. The person exposed to the chemical should be delivered to the nearest health facility immediately.

2. In case of chemical contact with the skin, follow the first-aid instructions in the chemical's SDS. Rinse with plenty of running water when appropriate, and seek medical attention. Call 112 in serious cases.

3. In case of fire, raise the alarm, warn others, and evacuate the area. Close the door when leaving, provided it is safe to do so. Use a fire extinguisher only if you are trained and can do so safely. If a person's clothing catches fire, use a fire blanket if it is safe to do so and call for emergency assistance.

4. If clothing catches fire, stop, drop to the ground, and roll to smother the flames. Call for help immediately.

5. For minor cuts, rinse the wound with clean running water and cover it with a sterile dressing. If bleeding occurs, apply firm, direct pressure with clean gauze or a dressing. Seek medical attention for serious cuts or bleeding that does not stop.

Irritation in eyes

If a chemical splashes into the eye, rinse immediately at an eyewash station with plenty of water for at least 15 minutes. Remove contact lenses during rinsing if they can be removed easily. Seek prompt medical attention.

Swallowing a Chemical

The person exposed to the accident should be delivered to the nearest health facility immediately.

Breathing a Chemical

1. Move the affected person to fresh air only if it is safe to do so. Keep others away from the contaminated area.

2. Seek medical advice and call 112 immediately if the person has difficulty breathing, loses consciousness, or develops severe symptoms.

3. If the person is not breathing normally, call 112 immediately and follow the emergency operator's instructions. Perform CPR only if you are trained to do so.

EMERGENCY RESPONSE PLAN

Emergency	Laboratory Workers - Immediate Actions	Laboratory Technical Staff and Department Management - Support and Coordination
Fire	Press the fire alarm button, warn anyone nearby, and evacuate the laboratory. Use a fire extinguisher only if you are trained, the fire is small, and you can do so safely while keeping a clear escape route. A fire blanket may be used only when appropriate and safe, such as to smother flames on clothing.	Call 112, or make sure someone has called. If it is safe, support the evacuation and coordinate the shutdown of laboratory operations. Inform the department management.
Chemical Spill	Stop work, alert others, and move away from the spill. For hazardous or unidentified chemicals, leave the affected area and prevent others from entering.	Assess the chemical and its associated risks only if it is safe to do so. Cleanup should be carried out only by trained personnel with appropriate protective equipment and in accordance with the relevant procedures.
Gas Leak or Electrical Hazard	Leave the affected area and warn others. If a gas leak is suspected, do not operate electrical switches or do anything that could create a spark. Do not attempt to locate or stop the leak if doing so could put you at risk.	From a safe location, contact the appropriate emergency response personnel and inform the department management. Gas supplies and electrical systems must be handled only by authorized, trained personnel.
Earthquake	While the ground is shaking, Drop, Cover, and Hold On. Protect your head and neck, and stay away from windows, chemicals, and equipment that could fall. Once the shaking stops, leave the laboratory if it is safe to do so.	Support evacuation when safe and inform emergency responders about anyone who is injured or needs assistance. Do not allow anyone to re-enter the laboratory until it has been confirmed safe by the appropriate authorities.

Emergency Safety Equipment in Environmental Engineering Laboratories

Emergency Eyewash and Safety Showers

1. Emergency eyewash stations and safety showers are available in the Chemistry, Unit Operations, Microbiology (Z-16), Analysis (TURKAK), and Air Laboratories.

2. In case of chemical exposure to the eyes or skin, begin rinsing immediately with plenty of water and continue for at least 15 minutes, or as specified in the chemical's Safety Data Sheet (SDS).

3. Seek medical attention after chemical exposure.

Fire Blanket

1. Fire blankets are available in the Chemistry, Unit Operations, Microbiology (Z-16), Analysis (TURKAK), and Air Laboratories.

2. A fire blanket may be used to extinguish a small fire or smother flames on a person's clothing, provided it is safe to do so.

3. Do not attempt to use a fire blanket if the fire is large, spreading, or producing heavy smoke. Raise the alarm and evacuate the laboratory if necessary.

Chemical Spill Cleanup Materials

1. Chemical spill cleanup materials can be obtained by contacting laboratory technical staff.

2. Do not attempt to clean up a chemical spill without appropriate instructions and protective equipment.

Laboratory Contacts and Emergency Phone Numbers

Laboratory Managers:

Air Lab. (Z-15) - Assoc. Prof. Dr. Yasemin Dilşad Yılmazel Tokel

Anaerobic Lab. (B-02) - Prof. Dr. Tuba Hande Bayramoğlu

Analysis Lab. (TURKAK; Z-22) - Department Head

Chemistry Lab. (Z-19) - Prof. Dr. Dilek Sanin

Clean Room (B-11) - Department Head

Contaminant Hydrology Lab. (Z-26) - Prof. Dr. İpek İmamoğlu

Hot Room (Z-18) - Prof. Dr. Bülent İçgen

Hot Room (B-09) - Prof. Dr. Tuba Hande Bayramoğlu

Microbiology Lab. (Z-16 and Z-18) - Prof. Dr. Bülent İçgen

Unit Lab. (Z-20) - Prof. Dr. Filiz B. Dilek

Important Phone Numbers

Laboratory Technical Staff (Office: Z-35): Melek Özdemir, Mehmet Hamgül, Esra Gül

Office phone: 0312 210 2640

Head of Department phone number: 0312 210 2641

Duty Officer's Phone (*Available outside working hours, on weekends, and on public holidays*):

(0312) 210 21 13 and (0312) 210 21 14

Calling an Ambulance : 112 (for METU internal ambulance calling).

First Aid Consulting: 0312 210 4960 (This phone number is used for counseling and information about first aid.)

METU DEPARTMENT OF ENVIRONMENTAL ENGINEERING
LABORATORY SAFETY TRAINING AND ACKNOWLEDGEMENT

1. PERSONAL INFORMATION

Full Name:		**Date:**	
Email Address:		**Mobile Phone:**	
Academic Advisor:		**Signature:**	

2. LABORATORIES TO BE USED

☐ Air Laboratory (Z-15)	☐ Chemistry Laboratory (Z-19)	☐ Contaminant Hydrology Laboratory (Z-26)
☐ Microbiology Laboratory (Z-16)	☐ Microbiology Laboratory (Z-18)	☐ Hot Room (Z-18)
☐ Unit Operations Laboratory (Z-20)	☐ Anaerobic Laboratory (B-02)	☐ Analysis Laboratory (TURKAK, Z-22)
☐ Chromatography Room (Z-29)	☐ Analytical Instruments Room (Z-28)	☐ Clean Room (B-11)
☐ Hot Room (B-09)		

3. DECLARATION OF COMPLIANCE

I confirm that I have read and understood the *Laboratory Safety and Working Rules* and agree to comply with all applicable laboratory safety requirements. I will follow the instructions provided by laboratory technical staff, use appropriate personal protective equipment, review the relevant Safety Data Sheets (SDS) before handling chemicals, operate laboratory equipment only after obtaining the necessary authorization and training, and dispose of laboratory waste in accordance with departmental procedures. I will promptly report any accident, chemical spill, equipment malfunction, or other unsafe condition to laboratory technical staff. I understand that failure to comply with laboratory safety requirements may result in the suspension or withdrawal of my authorization to work in the laboratory.

4. APPROVAL

Name / Signature:	Date: ……/……/…….

5. TRAINING RECORD

Training	**Completion Date**	**Trainer's Name / Signature**
Laboratory Safety Training		
Autoclave Training (if applicable)		

Note: Autoclave must not be operated unless the user has received appropriate training