



**BOGAZICI UNIVERSITY
INSTITUTE OF ENVIRONMENTAL SCIENCES**

LABORATORY SAFETY RULES AND GUIDELINES

All students must read and understand the information in the document entitled “General laboratory safety rules” prior to the first laboratory session. A petition containing the declaration of responsibility of the student and the lecturer responsible for the student who will be working in the laboratory must be communicated to the laboratory manager/officer before the laboratory work is started. In this petition, the student should briefly indicate the name of the project, the job description and the weekly working schedule.

General Laboratory Safety Rules

It should never be forgotten that the laboratory is a serious working environment. In this regard, every student who will work in the laboratories must attend the "Laboratory Safety" seminar to be given at the beginning of each semester. Students attending this seminar are awarded with a "Certificate of Education". Students who do not attend the seminar and do not have a Certificate of Education cannot work in the laboratories.

1. It is not possible to work in the laboratory without the Training Certificate and the written consent of the instructor responsible for the laboratories.
2. Students are prohibited from working in the laboratories outside the weekly working hours and on weekends without written permission of the instructor responsible for laboratories and without the required waiver petition.
3. All of the rules should be followed carefully and unclear issues should be asked to the laboratory technical staff.
4. Due to the inherent dangers present in a laboratory, all rules must be obeyed to minimize the risk.
5. Lab coats should be worn at all times. Personal belongings i.e. coats, jackets, bags should not be brought to the laboratory.
6. Approved eye protection and face shields must be worn at all times in the laboratory.
7. Contact lenses should not be used in the laboratory.
8. Closed shoes must be worn at all times – open-toed shoes, backless shoes, sling backs, clogs, and sandals are not permitted.
9. Long hair, accessories and loose clothing must be confined while in a laboratory.
10. Eating, drinking and smoking are prohibited in all laboratories.
11. Listening to music is not allowed, the use of distracting devices such as mobile phones should be avoided when doing an experiment.
12. Chemicals should not be smelled or tasted. They should not be touched without wearing gloves, they must be weighed and transferred with appropriate materials.
13. Experimental studies should only be carried out as instructed and demonstrated by laboratory technical personnel. A method other than that described and illustrated in the experiment should never be used.



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14. Laboratory technical personnel should be informed about the experimental studies to be carried out in the general laboratory. If the experimental study is to be carried out in a laboratory belonging to a faculty member, the faculty member should be informed. No experimental setup, chemicals or other materials should be used unless the required permission is given.
15. Working alone in the laboratory, especially in an isolated area, is strongly discouraged. If it is obliged, the researcher to work alone in the laboratory should inform the laboratory technical staff in advance.
16. Before leaving the laboratory, make sure your work area is clean.
17. Before leaving the laboratory, ensure that all gas, water, vacuum, and air valves and lights are completely turned off.
18. Hands must be washed and cleaned at the end of the experiments. If there is an open wound in hands, they must be bandaged and appropriate gloves should be worn.
19. Any kind of action that may cause distraction must be avoided. It is forbidden to play games or making fun in the laboratory.
20. Waste containers should be kept closed with a lid.
21. The manuals of instruments that are going to be used in the laboratories must be read in advance and the necessary precautions should be taken.
22. Dangerous chemicals should be kept at minimum in the working area.



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General rules to be obeyed when working with a chemical substance

1. All chemicals have a potential hazard therefore, they should not be touched without wearing gloves.
2. Solid chemicals must be transferred with a clean spatula or a spoon. The same spatula or spoon should never be used for another substance before being thoroughly cleaned.
3. Securely replace lids, caps, and stoppers after removing reagents from containers. Lids, caps and stoppers should not be put downwards on the bench. Otherwise, they can be contaminated with other chemicals and purity of that chemical may be spoiled.
4. Substances in capped or plugged containers should never be heated or boiled.
5. Considering that mixing chemicals randomly can cause a potential danger, it should be avoided.
6. All chemicals and laboratory equipments containing chemicals must be labeled;
 - a. The labels should be carefully read before use.
 - b. When chemicals are transferred from one container to another, the labeling of the new container should not be forgotten.
 - c. The labels should contain information about the full name of the chemical, date received or date opened, name of the responsible party and any other information required.
 - d. No chemicals should be placed in unlabeled bottles or a containers.
 - e. Unlabeled chemicals should never be used.
7. Never return unused chemicals to stock bottles. Dispose properly. Do not insert pipette or dropper into the reagent bottles. Use the one that is designated (labeled) for that reagent.
8. Never use one pipette for different chemicals.
9. Never use your mouth pipetting a liquid. Use a rubber suction bulb, special pipette filler or pump.
10. The flammable liquids should be located on the bench in closed containers only in required amounts and kept away from heat sources (burner, electric heater, etc.).
11. When a liquid in a test tube is to be heated, the tube should be slowly heated downward from the top with continuous shaking. Make sure that the mouth of the test tube is pointed away from you and anyone else.
12. Chemical wastes should be treated in accordance with the directives of the laboratory technical personnel. Chemical substances must never be spilled into sinks or other places.
13. Inhalation of chemicals (toxic vapors and gases) should be avoided. With organic solvents, like sulfuric acid, nitric acid, hydrochloric acid, hydrofluoric acid and with toxic gases like bromide, hydrogen sulfide, hydrogen cyanide, and chloride one should work in the fume hood.
14. One must be very cautious when working with concentrated acids and bases. Water should never be poured on concentrated acids.



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15. If there is a mercury spill, it should be cleaned up immediately with a vacuum source or a foam type synthetic sponge. If the amount is too little to collect, elemental sulfur in powder form can be sprinkled on the spill site.
16. Broken thermometers containing mercury should never be disposed of as waste.
17. If chemical substances or specimens are spilled in the laboratory, the area should be cleaned and the laboratory technician should be informed.
18. Special care must be given when transporting chemical substances from one place to another in the laboratory.
19. Chemical substances should never be removed from the laboratory.



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Material Safety Data Sheets (MSDS)

Many of the chemical substances used in laboratory studies are hazardous to health. Knowing the properties of these chemicals is important in terms of health as well as in determining the first aid measures after any accident that may occur during work.

Before using any chemical, MSDS should be carefully examined and experimental work should be conducted under appropriate conditions.

Material Safety Data Sheets for every chemical should contain information such as:









1. Name of the chemical;
2. Manufacturer's information;
3. Hazardous ingredients/identity information;
4. Physical/chemical characteristics;
5. Fire and explosion hazard data;
6. Health hazard data;
7. First aid measures
8. Handling and storage











Note: The safety data sheets for chemicals are available online at <http://www.sigmaaldrich.com/safety-center.html>. Each person should have access to the MSDS for all chemicals he/she uses.



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Examples of some of the warning symbols that might appear on the labelling of a single chemical are given below:

OLD			NEW		
Symbols	Description	GHS-Symbols	Description	Hazard statement examples	
	E Explosive		GHS01 Exploding bomb	Explodes due to fire, shock, friction or heat, danger due to fire, blast and projectiles.	
	F+ Extremely flammable F Highly flammable		GHS02 Flame	Flammable; catches fire spontaneously if exposed to air; in contact with water releases flammable gases which may ignite spontaneously.	
	O Oxidizing		GHS03 Flame over circle	May cause fire or explosion; strong oxidizer.	
No equivalent			GHS04 Gas cylinder	Contains gas under pressure; may explode if heated; contains refrigerated gas; may cause cryogenic burns or injury.	
	C Corrosive		GHS05 Corrosion	May be corrosive to metals; causes severe skin burns and eye damage.	
	T+ Very toxic T Toxic		GHS06 Skull and crossbones	Small quantities are harmful or fatal.	
	Xn Harmful	No direct equivalent			
	Xi Irritant				
No equivalent			GHS07 Exclamation mark	Harmful, irritates eyes, skin or respiratory system, large quantities are fatal.	
No direct equivalent			GHS08 Health hazard	Causes allergic reactions; may cause cancer, may cause genetic defects; may damage fertility or the unborn child; causes damage to organs.	
	N Dangerous for the environment		GHS09 Environment	Harmful, toxic or very toxic to aquatic life with long lasting effects.	

New symbol		Old symbol
	<p>F (Flammable), F+ (Extremely Flammable) Flammable and combustible (R10-R12). Liquids of Flash point below zero and boiling point maximum 35 degree. Causes poisoning through mouth, skin and respiratory tract. It shouldn't be contacted with the body and should be kept away from fire, sparks and heat.</p>	
	<p>C (Corrosive) Substances destroying living tissue or causes corrodes/corrosion of iron (R34, R35). They cause skin and eye damage. Special precautions should be taken to protect eyes and skin, vapor protective clothing should be worn and shouldn't be taken by inhalation. They should be kept away from metals.</p>	
	<p>Xi (Irritant), Xn (Sensitizing) They cause skin and eye damage (R20-R22, R36-R38). Their vapor shouldn't be breathed. They shouldn't be contacted with the body. Special precautions should be taken to protect eyes and skin. Protective clothing should be worn. They harm the ozone layer.</p>	
	<p>N (Toxic to environment) They harm to livings in water and nature. It shouldn't be spilled and released to nature.</p>	
	<p>H (Health effect) It reflects serious longer term health hazards such as carcinogenicity and respiratory sensitization. (R40, R45-R47). Avoid body/skin contact and, ingestion and inhalation of these substances should be avoided.</p>	
	<p>G (Gas) Contains gas under pressure. Evolving gas might be cold if heated, explosion might be occurred.</p>	

R (Risk) factors express the hazard levels of the chemicals.

In the Regulations for Hazardous Chemicals are given some R codes and their combinations, with clear descriptions of the dangers, to be used on the tags of hazardous materials and products.



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R factor	Description of the R factor
R1	Explosive in dry conditions
R2	Risk of explosion in case of impact, friction, fire or contact with other sources of
R3	High risk of explosion in case of impact, friction, fire or contact with other sources of ignition
R4	Forms very sensitive explosive metallic compounds
R5	Heating may cause explosion
R6	Explosive in contact with air
R7	May cause fire
R8	Contact with combustible materials may cause fire
R14/15	Severe reaction that led to the formation of highly flammable gas with water
R15/29	Forms toxic and flammable gases in contact with water
R20/21	Harmful by inhalation and in contact with skin
R20/22	Harmful by inhalation and if swallowed
R20/21/22	Harmful by inhalation and in contact with skin and if swallowed
R21/22	Harmful when in contact with skin and if swallowed
R23/24	Toxic by inhalation and skin contact
R23/25	Toxic by inhalation and if swallowed



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Rules for Using and Handling Glassware

1. Check your glassware for cracks and chips each time you use it. Broken glassware should never be used. Sharp edged glassware should be fire-polished.
2. When carrying long glassware, special care should be taken to keep it upright.
3. Any apparatus that can roll, such as thermometers, pipettes should be placed in appropriate holders.
4. When inserting glass tubing, thermometer etc. into rubber stoppers, corks or when placing rubber tubing on glass hose connections, the tubing and holes should be lubricated. Avoid exerting pressure on the glass and protect hands with a glove.
5. Never set hot glassware on cold or wet surfaces as it may break with temperature change. Use wooden tongs to hold the glassware until it cools.
6. Since cold and hot glass look the same, heated glassware should not be placed randomly without any warning.
7. After use, all glassware should be washed with distilled water.
8. When dealing with broken glassware, use a broom to sweep small pieces into a dustbin that is designated for broken glass.

Rules for Using and Handling Equipment

1. When an instrument is to be used for the first time, the laboratory technician should be informed; researcher must be trained on the proper use of the equipment. Manuals and standard operating procedures should be carefully reviewed.
2. Special attention should be paid when working with an open flame. Hair and clothes should be kept away from the flame.
3. When you are working with an open flame always use wooden tongs.
4. Never leave an open flame unattended. When a burner or an electrical heater is not in use, turn it off.
5. Do not heat a closed container. Pressure build up may cause the container to explode.
6. The temperature of the heating devices must not be controlled by hands.
7. When using an oven or a muffle furnace, temperature settings must not be changed. If required, laboratory technicians should be informed.
8. Plastic gloves should not be used when working with an oven or a muffle furnace. Tongs should be used when operating at high temperatures.
9. Equipment washed with solvents should not be placed in a drying oven due to possible explosion risk.
10. Sample containers and tongs should not touch the oven wall.
11. An analytical balance should be kept close when it is not in use.
12. In a calibrated analytical balance, it is important to check that the air bubble is in the center of the level indicator. The balance should be leveled with foot screws until the air bubble of the water balance is in the prescribed circle.
13. Do not spill chemicals inside the balance enclosure. If a spill occurs, clean it up immediately with a brush.
14. Before using the fume hood, ventilation system should be operated.
15. All operations should be performed at least 15 cm inside the fume hood and the panel of the fume hood should be kept closed as much as possible.



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16. Electrical connection of all devices must be made prior to working in a hood with explosive or flammable chemicals.
17. Care must be taken to ensure that the hands are completely dry when working with an electrical apparatus.
18. Never work with instruments the proper use of which are not known.

FIRST AID IN LABORATORY

Burns and Cuts

1. For eye exposures and significant skin exposure, rinsing the skin and eyes with large quantities of water and immediate transport to a medical center is advised.
2. Chemicals may cause burns when they contact with human skin. In such cases, chemicals should be removed immediately by washing with water to minimize the risk. An ice pack could be applied to relieve the pain however immediate transport to a medical center is advised in case of a serious burn.
3. In case of acid spill on the skin, the affected area should be washed with plenty of water. If clothing is stuck to skin, do not try to remove it. Do not apply ointments, sprays on severe burns. Don't touch the affected area. Immediate transport to a medical center is advised.
4. In the event of a fire, notify the authorized personnel or the fire department immediately. Close all doors and windows on the way out. Larger fires can be fought using fire extinguishers.
5. If your clothes catch on fire, the best thing to do is to find a safety shower. If there isn't a safety shower nearby, then stop where you are, drop and roll on the floor, roll back and forth to extinguish the flames. Burning clothes may be extinguished using a fire blanket thrown over the person.
6. In case of small cuts and scratches, clean the wound, place sterile pad over it and apply gentle pressure. Immediate transport to a medical center is advised in case of a serious cut.

Eye Irritation

1. Immediately flush your eyes with running water for at least 15 minutes.
2. Care must be taken to ensure that the washing process is done in the direction of the ears from the top of the nose so that the other eye is not affected and the chemically contaminated water does not come back into the mouth.
3. Immediate transport to a medical center is advised.

Chemical Ingestion

Immediate transport of the patient to a medical center is required.



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Inhalation of Gases and Vapors

1. The affected area should be evacuated and patient should be removed to fresh air.
2. If breathing has stopped, begin appropriate resuscitation at once.
3. Immediate transport to a medical center is required.

Emergency Procedures		
OCCASION	STUDENT	LABORATORY TECHNICAL PERSONNEL
FIRE	<ul style="list-style-type: none"> - Notify the laboratory technical personnel and the other people working in the laboratory. - Keep away flammable and explosive materials. - If a person’s clothing catches on fire, lay him/her down and cover with a fire blanket. 	<ul style="list-style-type: none"> - Call 1100. - Small fires can be put out with fire extinguishers, turn off gas and electricity and evacuate the laboratory immediately. - Notify the authorized personnel (Director of the Institute, Campus Coordinator).
CHEMICAL SPILL	<ul style="list-style-type: none"> - Notify the laboratory technical personnel and the other people working in the laboratory. - Do not touch or inhale the chemical. - Evacuate the room immediately. 	<ul style="list-style-type: none"> - Call 1100. - Identify the chemical/s and hazards involved – check Material Safety Data sheet. - Wash the area with plenty of water or vacuum clean. - Wear protective gloves, goggles and a mask during cleaning. - If a volatile hazardous chemical is spilled, evacuate the room and ventilate the area for one day.
GAS LEAK ELECTRIC CONTACT	<ul style="list-style-type: none"> - Notify the laboratory technical personnel and the other people working in the laboratory. 	<ul style="list-style-type: none"> - Call 1100. - Identify the source of gas/electricity leak. - Notify the authorized personnel (Secretary and Campus Coordinator). - Turn off electrical power. - If there is a gas leak, turn it off at the source.
EARTHQUAKE	<ul style="list-style-type: none"> -Do not panic. - Step away from hazardous chemicals. - Drop to the ground, quickly move to one of your pre-identified safe locations (i.e. under the lab bench, the ends of the bench). 	<ul style="list-style-type: none"> - After the earthquake help people to evacuate the laboratory.



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**GUIDELINES FOR LABORATORY USE DURING AND AFTER COMPLETION OF
MASTER AND PHD STUDIES**

1. The student who will work in the laboratory should get approval of the instructor responsible from the laboratory in addition to the consent of his /her advisor.
2. The students who will work in the laboratory should obtain the required forms and documents (i.e. Laboratory Safety Rules and Guidelines).
3. Taking the keys of the laboratories at the weekends or outside weekly working hours could be possible only after the evaluation and consent of the instructor in charge of the laboratories.
4. In case of a lab key request, the student should contact the Institute Secretary, fill in the necessary forms and have them signed by the relevant authority (i.e. advisor, instructor responsible for laboratory, laboratory technical personnel).
5. Unauthorized reproduction of laboratory keys is strictly prohibited.
6. If there is a cupboard request of a student working in the laboratory, he/she must contact the faculty member who is in charge of the laboratories.
7. Students using the cupboards in the laboratory should label the glassware therein. Unlabeled bottles of chemicals and glassware whose identity is not known will be discarded during routine cleaning.
8. Permission should be obtained from the Institute Directorate for instruments and laboratories that are not in general use. If the instrument has been purchased within the scope of a project and is not in routine use, permission must be obtained from the responsible faculty member.
9. After the laboratory work has been completed, the cupboards must be emptied and the laboratory technician must be informed. These actions should be completed at the latest within 1 week after the defense of thesis.



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Important telephone numbers:

Responsible Faculty Member:

Prof. Dr. Burak Demirel
HKC-210
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e-mail: burak.demirel@boun.edu.tr

Responsible for Lab. Safety

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e-mail: asu.ziylan@boun.edu.tr

Laboratory Secretary:

Hüsniye Kazar
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e-mail: husniye.kazar@boun.edu.tr



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Laboratory Technical Personnel:

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e-mail: filiz.ayilmaz@boun.edu.tr

Institute Directorate

Özlem Ulufer Oral
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Tel: 212 359 6692/7228
GSM: 0505 397 5038
e-mail: ozlem.ulufer@boun.edu.tr

Institute Secretary

Serap Albayrak
HKC-312
Tel: 212 359 6665
e-mail: sakyuz@boun.edu.tr

Emergency

Dahili: 1100
Harici: 0 212 911 6060

Ambulance: 112

Fire Department: 110

* This text was adapted from the document entitled “Occupational Health and Safety Regulations” of METU Environment Eng. & Marmara University.



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Date:

Institute of Environmental Sciences,

This is to certify that I have read and that I understand this paper entitled “General Chemistry Safety and Laboratory Rules”. I also certify that I will obey each and every rule stated here. I declare that if I do not obey the rules, I take full responsibility and accept that I can be removed from the laboratory

Name-Surname :

Mobile phone number:

E-mail address:

The name of the laboratory:

Project/Job description:

Signature :

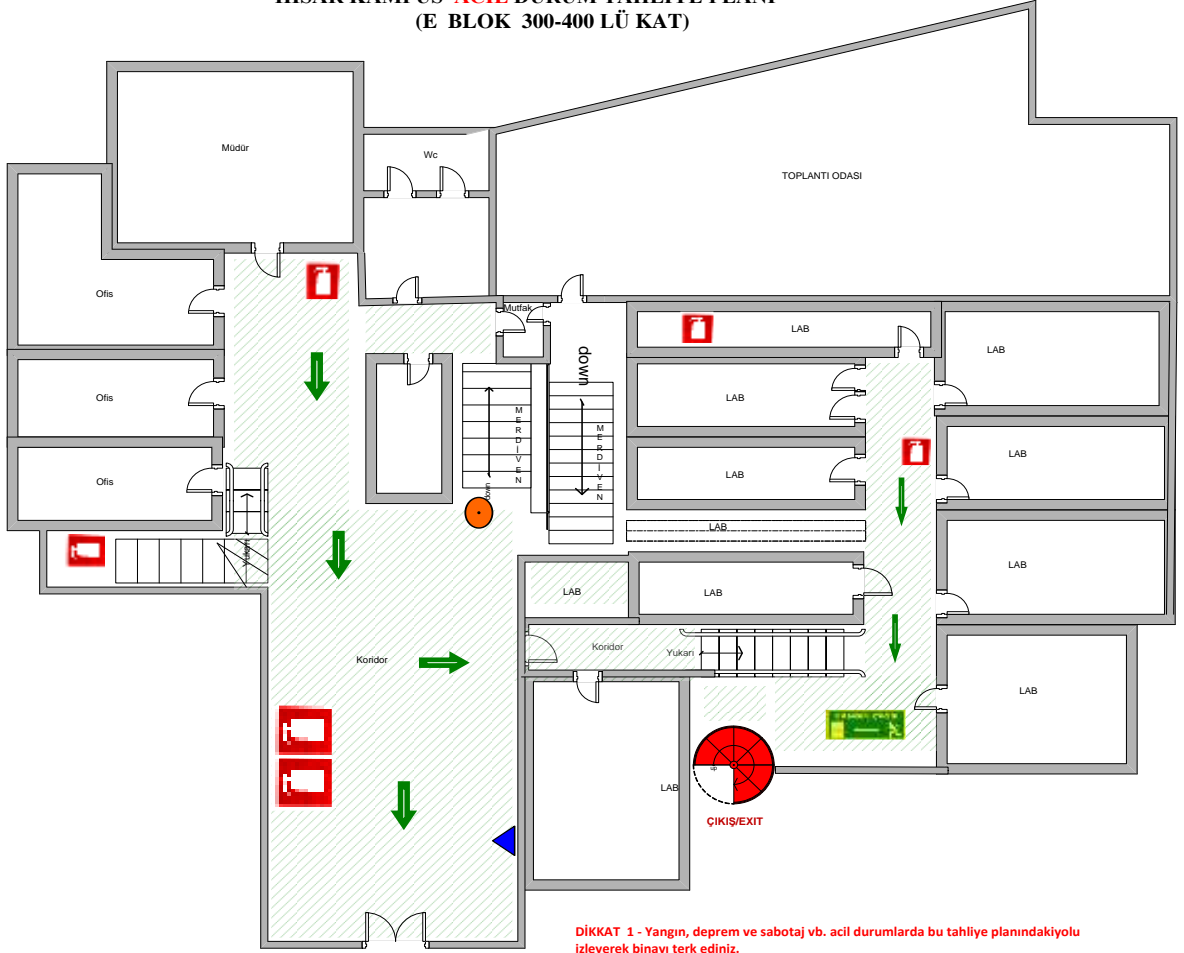
Name of Supervisor:





Signature of Supervisor:

Responsible Faculty Member
Date & Signature

EVACUATION PLAN

HİSAR KAMPÜS ACİL DURUM TAHLİYE PLANI
(E BLOK 300-400 LÜ KAT)

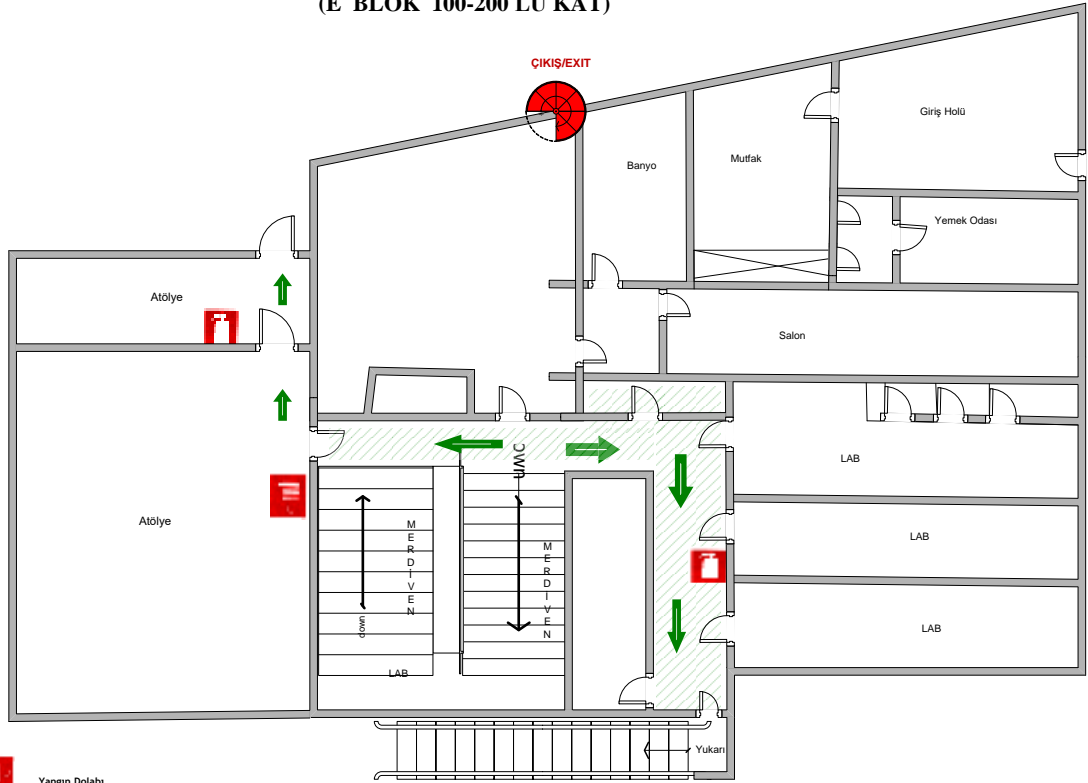


-  Yangın Dolabı
-  Yangın İhbar Bütünü
-  Yangın Tüp Yerleri ve Numaraları (55.56.57.58.59)
-  Elektrik Panosu

- DİKKAT 1 -** Yangın, deprem ve sabotaj vb. acil durumlarda bu tahliye planındakiyolu izleyerek binayı terk ediniz.
2 - Tahliye sırasında en önemli ve taşıyabileceğiniz bir eşyayı alarak,asla panik yapmadan mümkün olduğu kadar hızlı hareket ederek acil durum toplanma Merkezine gidiniz.
3 - Yaralı veya yardıma ihtiyacı olanlar var ise bunları görevlilerebildiriniz.
4 - Acil durumlarda öncelikli olanın insan hayatı olduğunu düşünerek hareket ediniz.

- ATTENTION 1 -** In emergency cases such as fire, earthquake, sabotage etc. leave the building following the path given in this evacuation plan.
2 - Take the most important portable stuff with you and without panicking go to emergency meeting center as fast as possible.
3 - If there are injured people or those who need help, inform the stuff in charge.
4 - Please keep in mind that human life is of utmost priority in emergency cases and act accordingly.

HİSAR KAMPÜS ACİL DURUM TAHLİYE PLANI
(E BLOK 100-200 LÜ KAT)



-  Yangın Dolabı
-  Yangın İhbar Bütünü
-  Yangın Tüpleri var
-  Elektrik Panosu

- DİKKAT 1 - Yangın, deprem ve sabotaj vb. acil durumlarda bu tahliye planındaki yolu izleyerek binayı terk ediniz.**
- 2 - Tahliye sırasında en önemli ve taşıyabileceğiniz bir eşyayı alarak, asla panik yapmadan mümkün olduğu kadar hızlı hareket ederek acil durum toplanma Merkezine gidiniz.
 - 3 - Yaralı veya yardıma ihtiyacı olanlar var ise bunları görevlilere bildirin.
 - 4 - Acil durumlarda öncelikli olanın insan hayatı olduğunu düşünerek hareket ediniz.

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