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MALAYSIA

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MDL LAB USERS HANDBOOK

LABORATORY SAFETY
AND THE PROPER USE OF EQUIPMENT IN THE MULTI-DISCIPLINARY LABORATORIES

Acknowledgements

This Handbook was written and produced by a group of academic and laboratory staff led by the MDL Lab Management Team

Suggestions for its improvement are always welcome; please contact the MDL Lab Manager.

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IMU UNIVERSITY EMERGENCY CONTACT

No	Department	Contact No
1.	IMU General Lines	03-8656 7228
2.	Emergency (Security/Control Room)	*1144
3.	Emergency (Security/Control Room) Direct lines 03-2731 7779	03-2731 7779
4.	Emergency (Medical)	*1155
5.	IMU Medical Clinics Direct Lines	03-2731 7661
6.	Occupational Safety and Health	*1177 /EXT 2808 /1288/6106/2301
7.	FMA	*1166/ EXT 6209
8.	Kuala Lumpur General Hospital	03-2615 5555

GENERAL EMERGENCY CONTACT INFORMATION

No	Department	Contact No
1.	General Emergency Lines (MERS) 999	999
2.	General Emergency Lines (HP)	112
3.	Balai Bomba Bukit Jalil	03-8996 7457
4.	IPD Cheras	03-9205 0222
5.	Balai Polis Bukit Jalil	03-8994 3284
6.	Kuala Lumpur General Hospital	03-2615 5555

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1. Introduction

WHEN WORKING IN A LABORATORY TOP PRIORITY MUST BE GIVEN TO SAFETY & HEALTH

It is the responsibility of all laboratory users including students, lecturers, lab staff, lab demonstrators and visitors to adhere to lab safety rules and appropriate Personal Protective Equipment (PPE) practices at all time in the lab. Although every effort is made to prevent accidents, you must take responsibility for your own safety and that of your colleagues. This handbook, therefore, emphasizes the importance of:

- wearing the appropriate attire and using appropriate Personal Protective Equipment (PPE).
- personal safety – report any medical conditions, epilepsy, allergies, color blindness and pregnancy.
- hygiene.
- good housekeeping.
- the proper handling of instruments and apparatus.
- safe systems of work.

It is in your interests to familiarize yourself with

- common laboratory hazards, including chemical, biological and microbiological hazards.
- the location of the lab safety equipment such as first aid box, emergency shower, emergency eyewash, fire extinguishers, fire blanket and fire alarm boxes.
- the proper disposal of hazardous material.
- how to deal with an emergency.

2. General Laboratory Safety Rules

You should pay particular attention to personal safety and the following general safety rules must be adhered to.

1. Only authorized staff, students and visitors with proper PPE are permitted to enter the laboratory areas including the preparation and instrument rooms.

2. Bags and other personal belongings must NOT be taken into laboratories. Leave bags outside and remember to secure your valuables.

3. Do not eat or drink in the laboratory. Do not smoke.

4. Wear a long-sleeve laboratory coat at all times. Laboratory coats should not be worn outside the laboratory, and particularly not in the cafeteria or places where food is served and eaten. Refer to Appendix II and the MDL Dress code poster posted outside of the laboratories.

5. Wear fully cover shoes and made from fluid-impermeable material to provide adequate protection on your entire feet. The open-toed sandals, high heels, slippers and sport shoes are not permitted in the laboratories. The height of the shoe not more than 1.5 inches for a better distribution of weight on foot.

6. Always use the appropriate personal protective equipment (PPE) to avoid exposure to hazards that cause serious injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other hazards

7. Safety goggles, face shields or other protective devices must be worn whenever it is necessary to protect the eyes and face from splashes, impacting objects and artificial ultraviolet radiation. Safety goggles are compulsory for all chemistry practical sessions.

8. Tie up long hair (below shoulder length) properly.

9. Do not apply cosmetics, lipstick or hair spray in the laboratories.

10. Do not run. Do not indulge in horseplay.

11. Switch off your cell phones during practical sessions. All electronic/digital devices such as tablets, smartphones, cameras and notebooks are prohibited in the laboratory unless otherwise permitted by lecturers.

12. Keep your workbench clear of clutter. Bring in only practical manuals, required stationery & writing equipment.

13. Keep your workbench clean and tidy. Make sure all items are returned to their original place at the end of the laboratory work.

14. Discard used or contaminated items into the appropriate waste containers (refer to Picture 2.1, 2.2 and 2.3):

    a. Pedal bin with yellow biohazard bag - Gloves
    b. Sharp Bin - Broken glassware, contaminated slide, needles and sharps items
    c. Waste paper basket – Non-hazard waste, tissue and paper

15. Never shear, bend, break or recap the needle after use. Immediately discard into the sharp bin. If recapping is necessary, a one-handed scoop technique is used.

16. Do not use damaged glassware (chipped or cracked). Check before use.

17. Wash your hands thoroughly with hand-soap and water before leaving the laboratories.

18. No removing items belonging to the Laboratories without prior authorization from Laboratory staff or lecturer in charge.

19. Familiarize with the location of safety equipment (e.g. fire extinguisher, safety shower with eyewash station, fire blanket and First Aid box) in the laboratories and know how to use it. Refer Section 7 for the location of each safety equipment in the lab

20. Seek immediate help if you are exposed to any form of radiation, or if chemicals spill on eyes or skin.

21. Report all hazardous events to a member of staff.

22. Report all accidents immediately to a member of staff, whether or not they result in injury. “Accidents” include broken glassware and spillage of chemicals. For further information, see section 6.

23. Students who do not have the appropriate PPE are not allowed to enter the MDL laboratory.
    If staff notice any misconduct with regards to laboratory safety rules among students, they should inform the concerned students to rectify the mistake immediately. Staff should also fill up the MDL Misconduct Record Form and inform the respective Programme Directors for appropriate disciplinary action.

24. Staff who do not comply with the rules and regulations in MDL laboratory will be considered as misconduct which will be dealt with in accordance to the Standard Operating Policy and Procedures on Discipline and Standards of Performance.

Picture 2.1 Paddle Bin with yellow biohazard bag.

Picture 1.2 Sharp Bin.

Picture 2.3 Waste paper basket

3. Handling Hazardous Materials

3.1 Chemical

3.1.1 Chemical Hazards

All chemicals are potentially hazardous to health. Those which are especially toxic, or flammable, corrosive or irritating require special precautions in their handling and use. Besides being toxic, many chemicals are mutagenic or carcinogenic.

When working with chemicals observe the following additional precautions:

1. Any lab users not wearing a laboratory coat and safety goggles will be prohibited from entry into sessions in chemistry or sessions involving the use of hazardous chemicals.

2. Use gloves and/or masks when instructed.

3. Use a fume cupboard for tasks that produce toxic products or fumes, or reactions that are likely to be violent. Lab users will be instructed in the use of fume cupboards.

4. Never heat flammable liquids over an open flame. Do not use open flames (e.g. Bunsen burners) in any task involving the use of flammable chemicals such as organic solvents.

5. Be aware of the hazardous nature of the chemicals you are using. Hazard information is present on the container label or practical manual and further safety information is available on request as a Safety Data Sheet.

6. Never handle chemicals with your hands, even if wearing gloves. Always use a spatula or an appropriate container.

7. When diluting solutions of strong acids (e.g. sulfuric acid) always add acid to water, never vice versa.

8. Do not smell or taste chemicals unless otherwise instructed by lecturer

9. Do not point a test-tube which is being heated, or in which a reaction is occurring, at any person.

10. Do not peer into the mouth of a test-tube which is being heated or in which a reaction may be occurring.

11. Never pipette by mouth. Always use a pipetting device or automatic pipettor.

12. Used organic solvents are to be discarded into the designated waste containers, never down the sink.
    a. Non-halogenated organic solvents are generally flammable and include *acetone, methanol, ethanol, toluene, xylene,* and *petroleum ether.*
    b. Halogenated solvents include *dichloromethane* and *1,1,-trichloroethane.*

13. Dealing with spills
    a. In all cases inform a member of staff or ask a colleague to do so immediately, and alert others.
    b. Immediately wash off any spillage onto your hands or any other part of your body using plenty of water. Use the emergency shower and eye-wash if necessary, particularly for corrosive or caustic spills.
    c. If the spillage is small and you are unhurt, you may attend to it by using absorbent paper (tissue roll) but do not clean it with your bare hands. Clean the area with water and detergent or neutralize the substance. For example, neutralizing *sulfuric acid spillage with sodium carbonate*.
    d. Vermiculite is to be poured over large spills. Cleaning should be carried out as in (c) above.
    e. If spilled material is flammable, extinguish all open flame, turn off gas in lab and adjacent area and turn off electrical equipment that may spark.
    f. Avoid breathing vapor from spilled material.

14. Dealing with chemical fires.
    a. Raise the alarm immediately.
    b. If you are unhurt and the fire is small you may attempt to extinguish it using the appropriate fire extinguisher, provided you are trained in its use.

3.1.2 Chemical Hazard Symbols

Be familiar with the symbols that denote that a chemical is:

	**Corrosives**: May cause skin burns and permanent eye damages. E.g. phenol; hydrochloric and sulfuric acids; sodium hydroxide; ammonium cerium nitrate.
	**Flammable**: If exposed to ignition sources, sparks, heat. Some substances may give off flammable gasses. E.g. organic solvents such as ethanol; diethyl ether; toluene.
	**Oxidizing**: Can burn without air. Or can intensify fire in combustible material. E.g. potassium permanganate; potassium dichromate
	**Explosive:** May explode if exposed to fire, heat, shock and friction. E.g. sodium
	**Toxic**: May cause life threatening effects even small amount with short exposure. E.g. aniline; dichloromethane; toluene.

	**Harmful/Irritant**: May cause irritation (redness, rash) or less serious toxicity. E.g. organic acids (benzoic and sulphamic acids); some indicator solutions
	**Health hazards:** may cause serious and prolonged health effects on short or long term exposure **(**Carcinogenic, mutagenic, respiratory sensitization) E.g. formaldehyde; lead acetate.
	**Compressed gas**: Gas released may be very cold. Gas container may explode if heated. E.g. Nitrogen; oxygen
	**Dangerous for environment:** Toxic to aquatic organisms and may cause long lasting effects in the environment. E.g. cyclohexane; silver nitrate

Table 3.1 Chemical hazard symbols and their examples.

HAZARDOUS CHEMICALS ARE STORED IN A SECURE LOCATION WITH RESTRICTED ACCESS.

3.2 Biological Hazards

All material of human or animal origin should be regarded as potentially infectious or capable of transmitting infection and therefore hazardous. Examples include blood, bone marrow, body fluid and tissue samples. Destruction is normally by incineration, or by autoclaving before disposal.

When handling biohazardous material observe the following additional precautions:

1. Wear latex gloves and if appropriate a disposable plastic apron over the normal laboratory coat.

2. Wherever possible use disposable plastic containers or equipment instead of glassware.

3. Discard all used disposable syringes, needles, used dressings and other soiled material promptly into the sharp bin.

4. Immediately decontaminate any spillage or breakage using Germisep solution (sodium dichloroisocyanurate (NaDCC), concentration of 5g/L).

5. Upon completion of your task:
    a. Disinfect the working area using methylated spirit.
    b. Soak used pipettes in Germisep (concentration of 2.5g/L) for at least 30 minutes.

6. Wash your hands thoroughly using disinfectant detergent such as Surgi Scrub (4% chlorhexidine gluconate-based disinfectant detergent) before leaving the laboratory.

3.3 Microbiological Hazards

Precautions should be taken while handling infectious agents or contaminated materials. Aseptic techniques are essential procedures that need to be constantly practiced in a microbiology laboratory. These procedures ensure that manipulations of microbiology specimens or cultures do not infect the lab users or contaminate the cultures or the laboratory environment.

When handling microbiologically hazardous material, observe the following additional precautions: -

1. Before starting work, put on protective equipment including long-sleeve laboratory coat and gloves.

2. Before lighting the Bunsen burner, make sure there are no flammable materials nearby (Eg: Methylated Spirit)

3. Use aseptic techniques in all microbiological manipulations.
    a. Swab benchtops using methylated spirit provided before and after work.
    b. Flame the inoculating wire red hot along its entire length before laying it down on a rack.
    c. Flame mouth of tubes and flasks before and after inoculation.
    d. Never pipette by mouth.
    e. Avoid spilling or splashing cultures, or allow them into contact with hands, face or clothing.
    f. Immediately disinfect any spill using disinfectant solution (eg: Germicep with concentration of 5 g/L)

4. Avoid producing aerosols while carrying out culture procedures. Use a short inoculating wire with a small loop to avoid the risk of droplet formation.

5. Keep culture tubes and plates open for minimal lengths of time.

6. Centrifuge viable cultures or body fluids in sealed tubes.

7. Discard all pipettes, infective cultures and contaminated equipment into a discard jar containing disinfectant. Never pour live cultures down the sink.

8. Discard petri dishes containing unwanted bacterial cultures into the appropriate autoclavable plastic bags for decontamination.

9. Wash your hands immediately after handling any infectious material and before leaving the laboratory, using disinfectant detergent such as Surgi Scrub.

10. No student should be allowed to bring in or out any microorganism from the lab without permission.

4. Good Housekeeping

Good laboratory practice includes good housekeeping and this is mainly a matter of being tidy, common sense and of being considerate.

Keep all aisles free from clutter (e.g. boxes, chairs) so as to maintain clear access to emergency equipment and the first aid boxes, and exit in case of emergency.

General housekeeping rules:

1. Keep the bench clear of all equipment other than that required for your immediate task.

2. Keep the working area with minimum glassware and apparatus.

3. Do not accumulate apparatus or equipment. Return the borrowed equipment or apparatus immediately for the next user.

4. Securely replace the cover on all stock containers immediately after use, and return the containers to their correct location.

5. Inform Lab Staff or lecturer to deal with spillage immediately.

6. Rinse or wash used glassware with provided soap and brush, remove label before placing in the appropriate basins

7. Dispose used items as follows:
    a. Gloves→Yellow Pedal bins.
    b. Tissue & paper towels→ Waste paper baskets.
    c. Broken glass, needles & sharps→ Yellow sharps bins.
    d. Pipette tips→ Discard jar

8. Switch off and unplug electrical equipment when you have finished using it.

9. Keep balances clean and free from spills.

10. Tidy up your bench at the end of the session.

5. Dealing with Emergencies

5.1 Fire and explosion

In the event of fire or suspicion of fire:

1. Raise the alarm by informing the nearest person of authority.

2. In the event when you are alone, raise the alarm by shouting “Fire, Fire, Fire”

3. If the fire is large or spreading; do not fight the fire alone; break the nearest fire alarm “break-glass” box.

4. Go to the nearest phone extension which is safe and call the IMU Emergency Line *1144 (SECURITY) or *1155 (MEDICAL) during office hour. If is after office hour, please call 999.

5. If possible, and without any risk to life, use a fire extinguisher to fight the fire, provided you are trained in its use.

6. Upon hearing the fire alarm: -
    a. Turn off equipment
    b. Close doors behind you
    c. Leave building through the nearest fire exit

7. Do not use the lifts or escalators.

8. Never fight a fire alone.

9. Make sure you always have an unobstructed escape route that is clear of fire.

10. Do not use the fire extinguisher if you are not trained for it. The type of fire extinguisher to be used depends on the class of fire: -
    a. Carbon dioxide – against flammable liquids, solvent and electrical fires.
    b. Dry powder - combustible solids, flammable liquids and gases
    c. When the fire has been extinguished, DO NOT return used extinguishers or hoses to where you got them from, as they will need to be checked and recharged.

11. Clothing on Fire. Use the Stop, Drop and Roll method.
    a. Stop. Do not run as this will feed the fire.
    b. Drop to the floor.
    c. Roll on the floor to smother the flames.
    d. Call for help.

5.2 Hazardous Material Emergencies

5.2.1 Chemical Spills

1. If a spill occurs on clothing or body, place the victim under the emergency shower.

2. Remove all contaminated clothing from the victim while he/she is under the shower. A laboratory coat should be available to cover the victim after the shower.

3. Obtain medical attention urgently by calling the IMU Emergency Line *1155 (MEDICAL).

5.2.2 Chemical Splashes on the Eyes

1. Immediately rinse the eyes using eye wash equipment and continue for 15 minutes.

2. Keep the victim's eyes open while rinsing and seek immediate assistance by obtaining medical attention urgently. Please call IMU Emergency Line *1155 (MEDICAL).

5.2.3 Chemical Inhalation

1. Close chemical container.

2. Move to fresh air.

3. If symptoms persist, obtain medical attention immediately and call IMU Emergency Line *1155 (MEDICAL).

5.3 Medical Emergencies & Work Related Injuries

1. Quickly assess the situation and remove any continuing source of danger.

2. Do not attempt to move the casualty unless in danger.

3. Quickly assess the casualty's condition and apply resuscitation techniques BUT ONLY IF YOU ARE FAMILIAR WITH THEM.

4. Call for assistance.

5. Obtain medical attention urgently. Please call IMU Emergency Line *1155 (MEDICAL).

6. Reporting Accidents

All accidents which occur in the laboratories whether or not they result in injury are to be reported and recorded.
Accidents include-

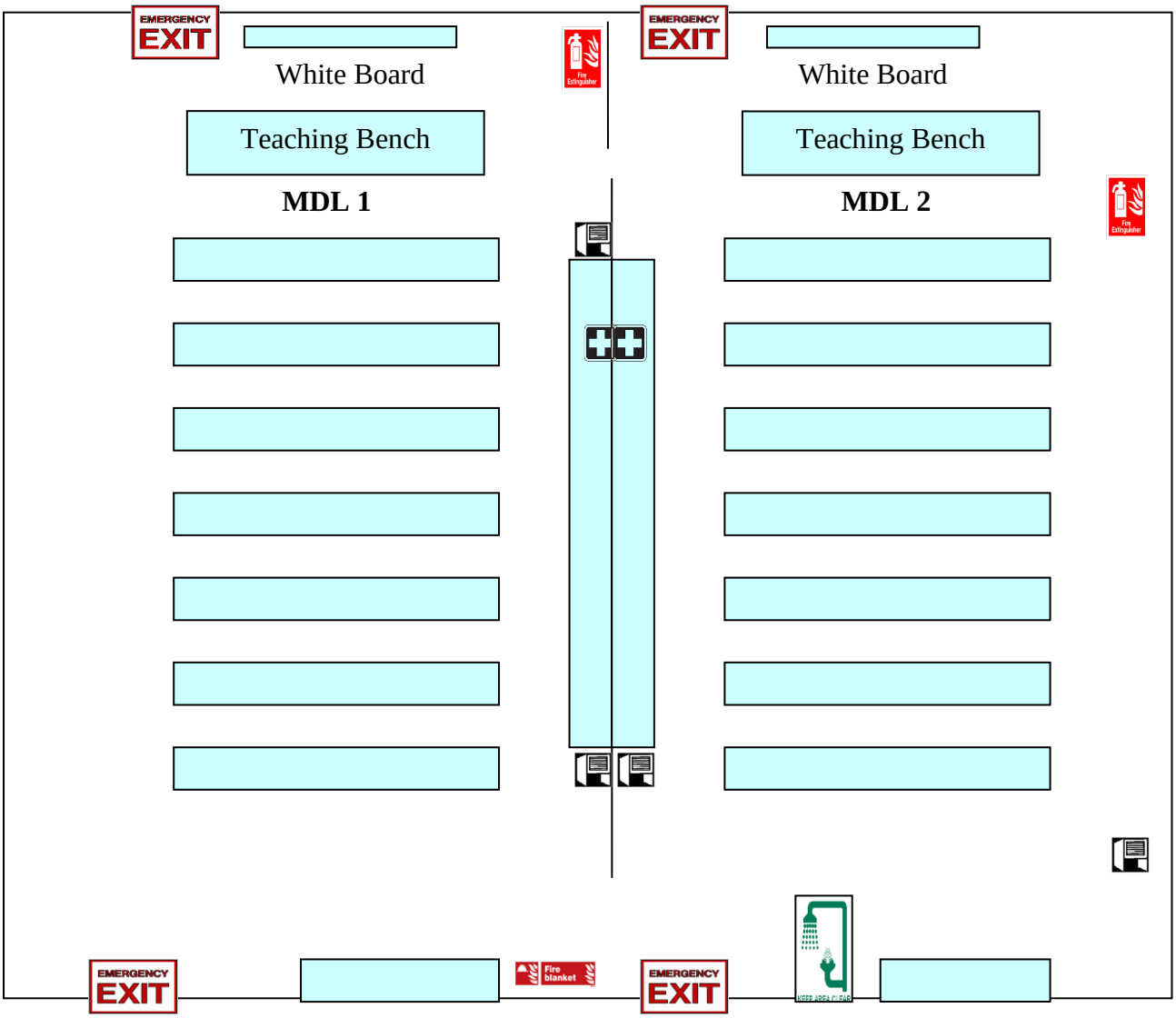
1. Personal accidents, including cuts, burns or scalds.
2. Fires.
3. Spills involving hazardous material.
4. Accidental damage to any equipment or breakage of glassware.
5. Chemical exposure – include inhalation, skin contamination.

An accident in categories 1-3 must additionally be reported on an IMU Accident/ Dangerous Occurrence/ Occupational Poisoning or Disease Reporting Form which available in IMU staff portal and sent to the University Administration Department and a copy of the Accident Report is to be sent to the University Safety and Health Committee.

Note:
Student insurance claims arising from the incidents/accidents are handled by the Students Affairs Department.

7. MDL Layout Plan & Location of Safety Equipment

Location of Safety Equipment
MDL 1 & 2

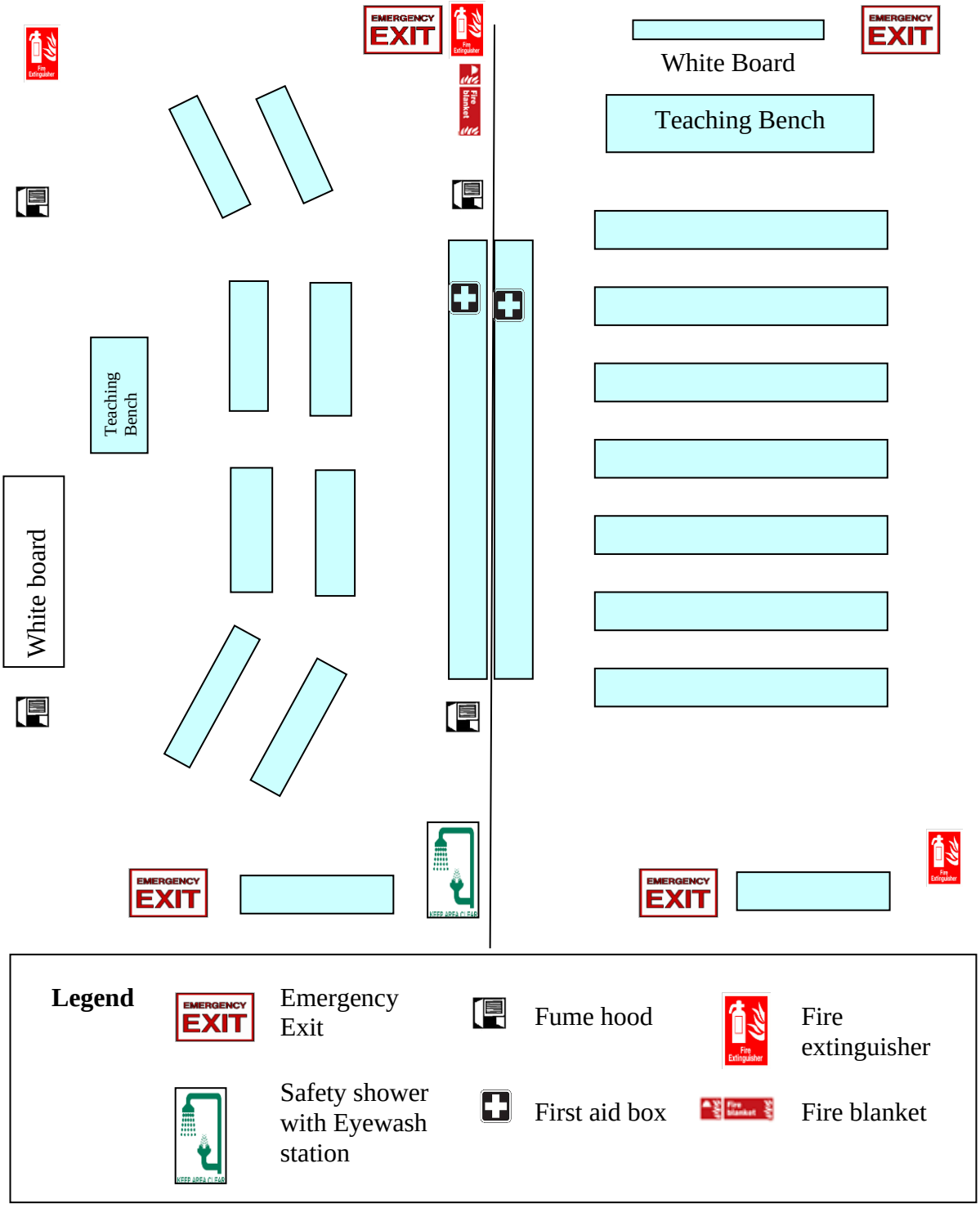


Legend

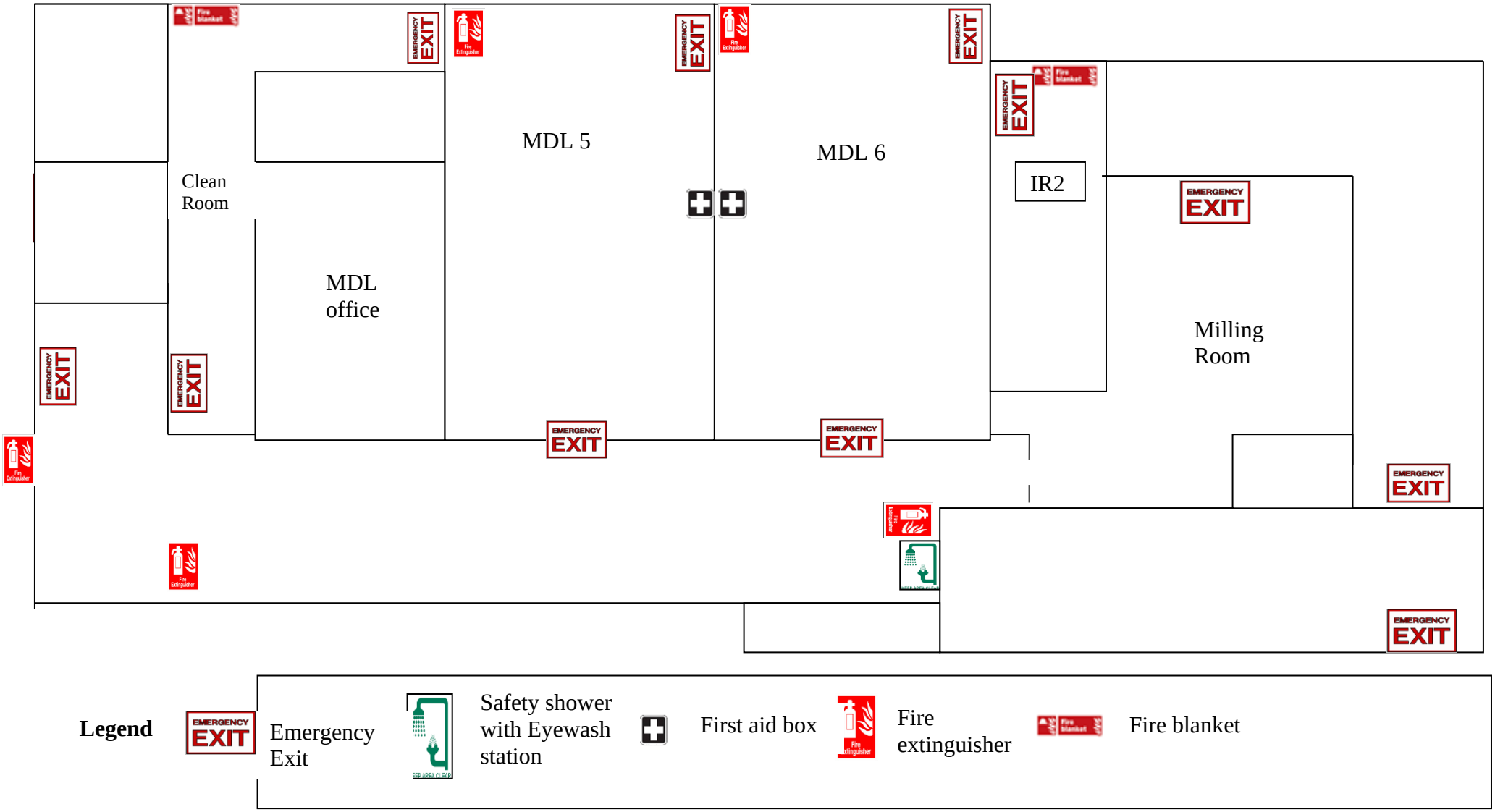
- Emergency Exit
- Fume hood
- Fire extinguisher
- Safety shower with Eyewash station
- First aid box
- Fire blanket

White Board

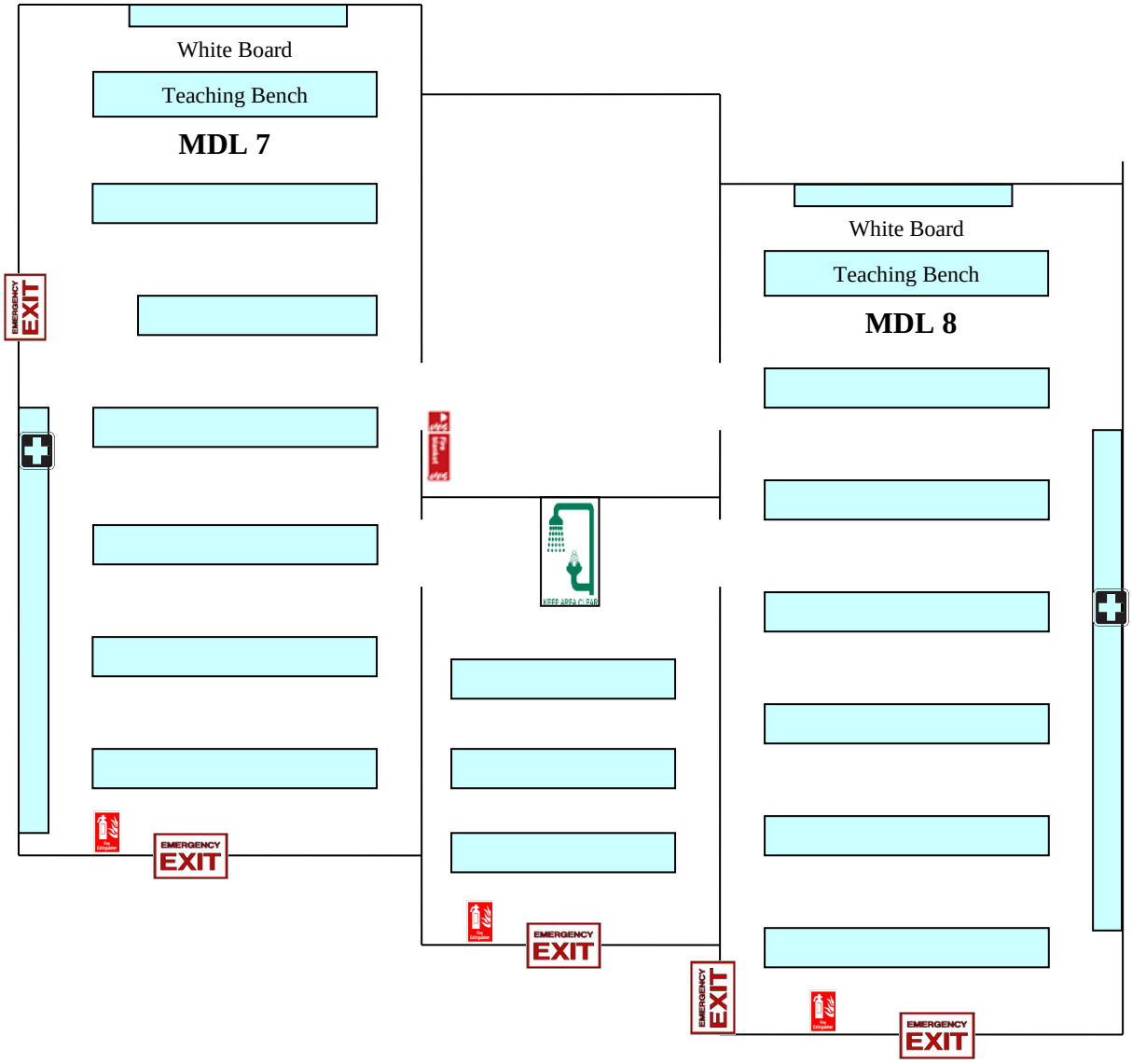
Location of Safety Equipment
MDL 3 & 4



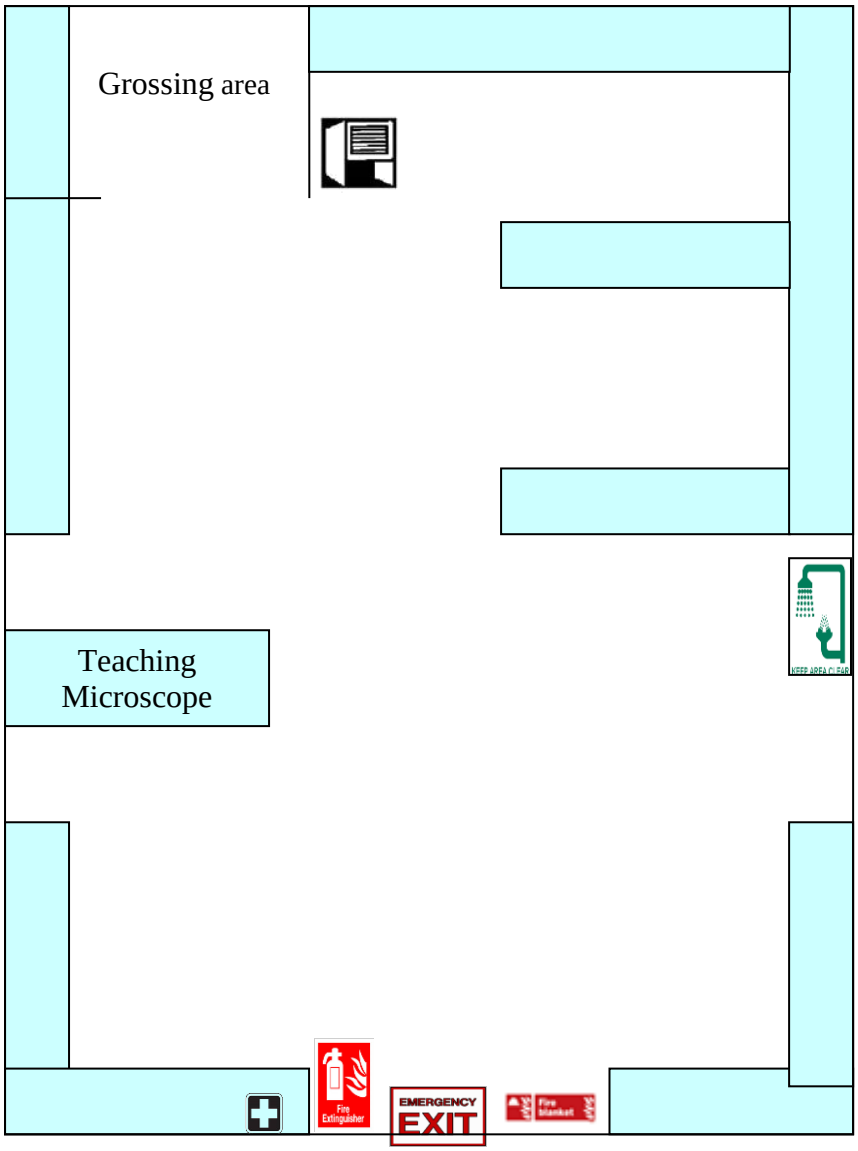
MDL Layout Plan & Location of Safety Equipment
MDL 5, MDL 6, Milling Room, Clean Room & IR2



Location of Safety Equipment
MDL 7 & 8



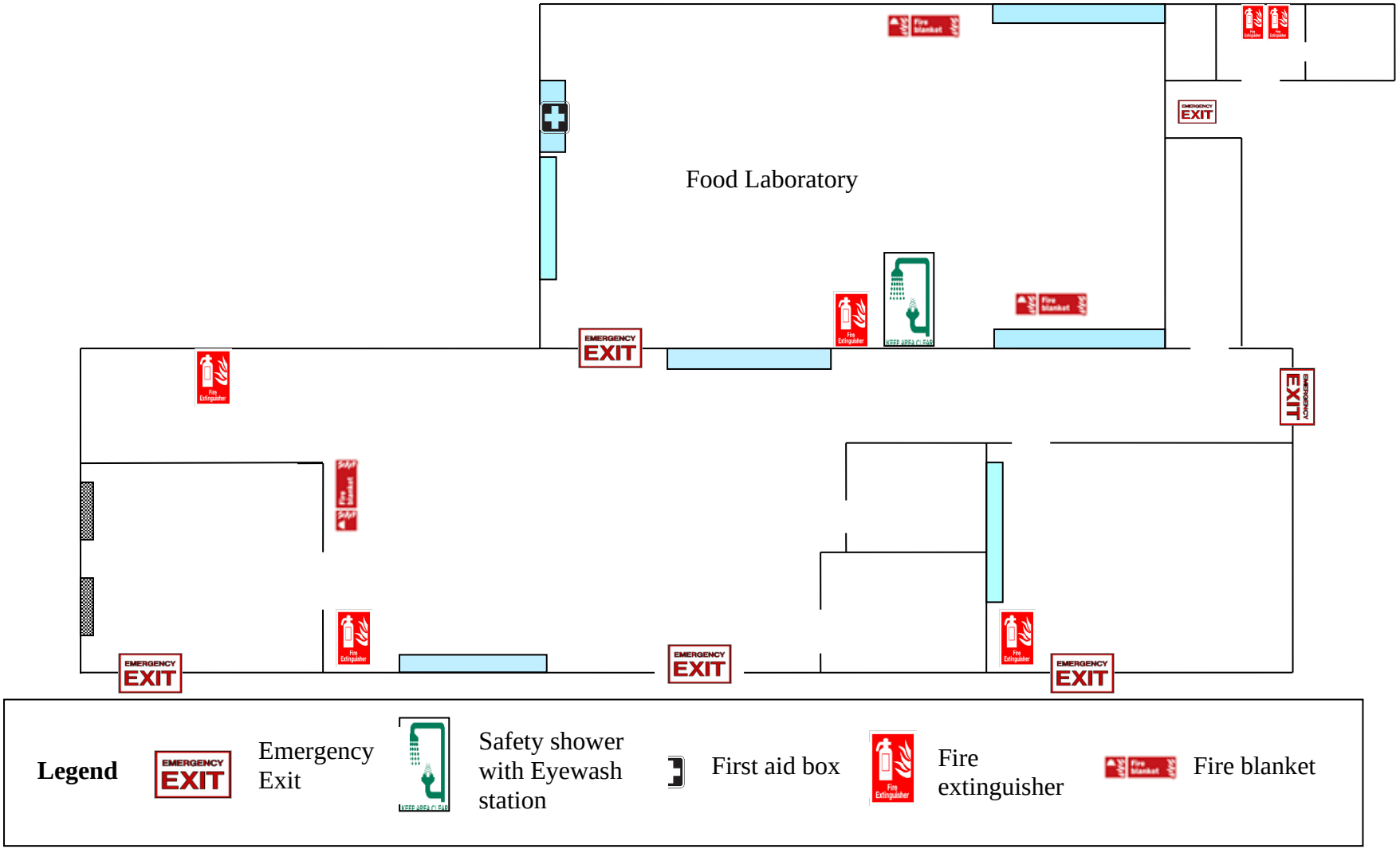
Location of Safety Equipment
Pathology Lab



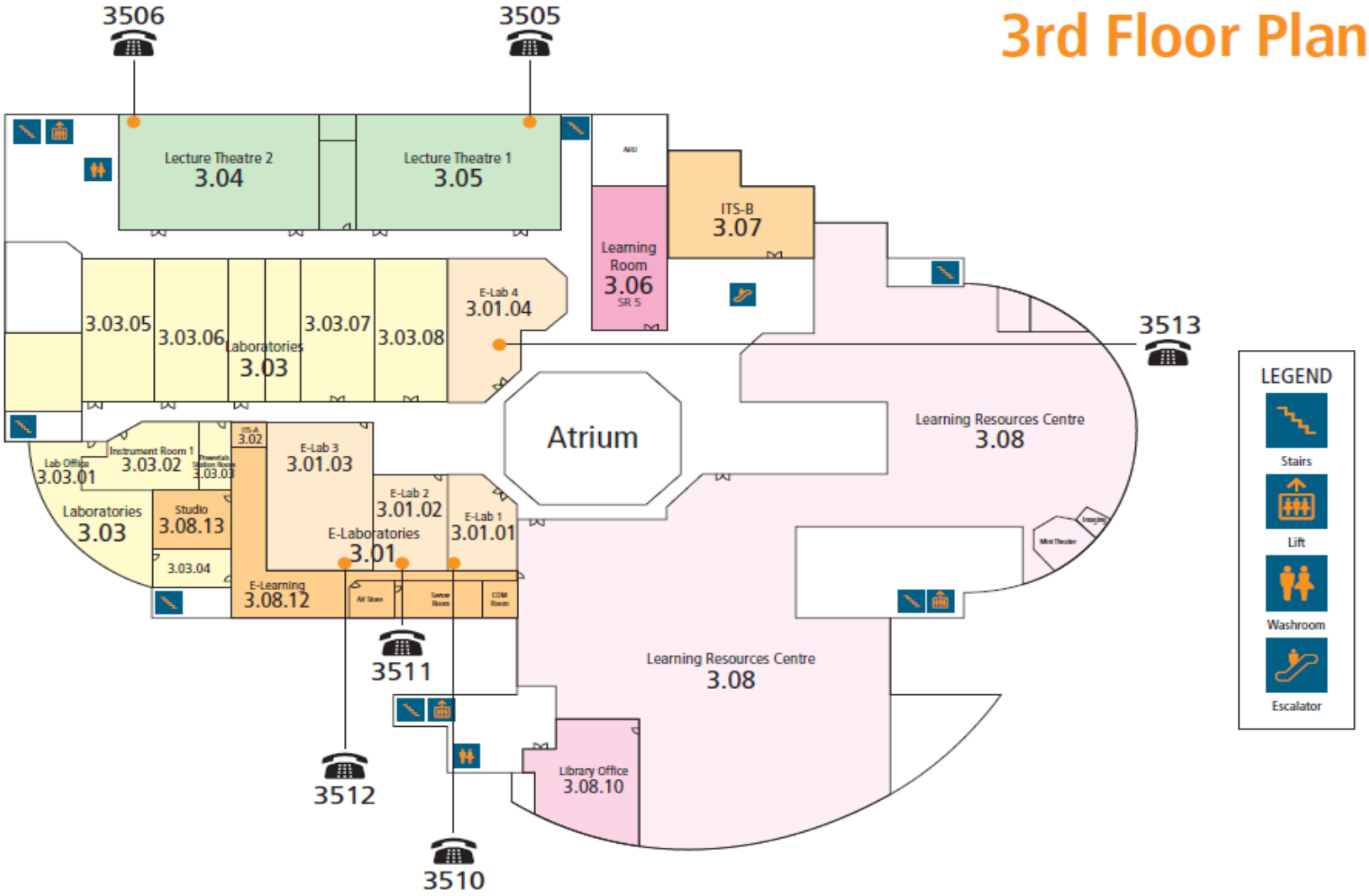
Legend

EMERGENCY EXIT	Emergency Exit		Fume hood		Fire extinguisher
	Safety shower with Eyewash station		First aid box		Fire blanket

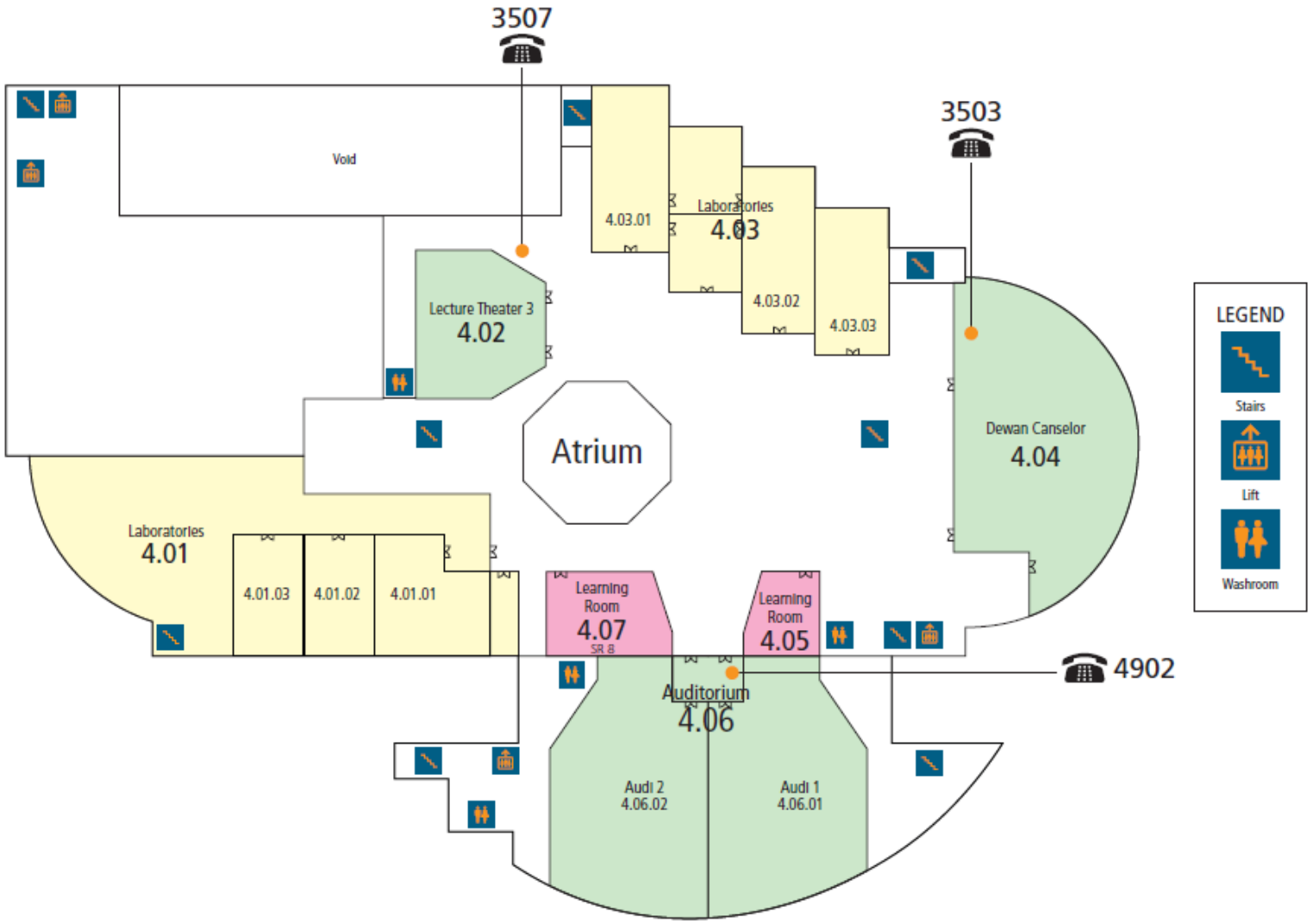
Location of Safety Equipment
N&D Lab



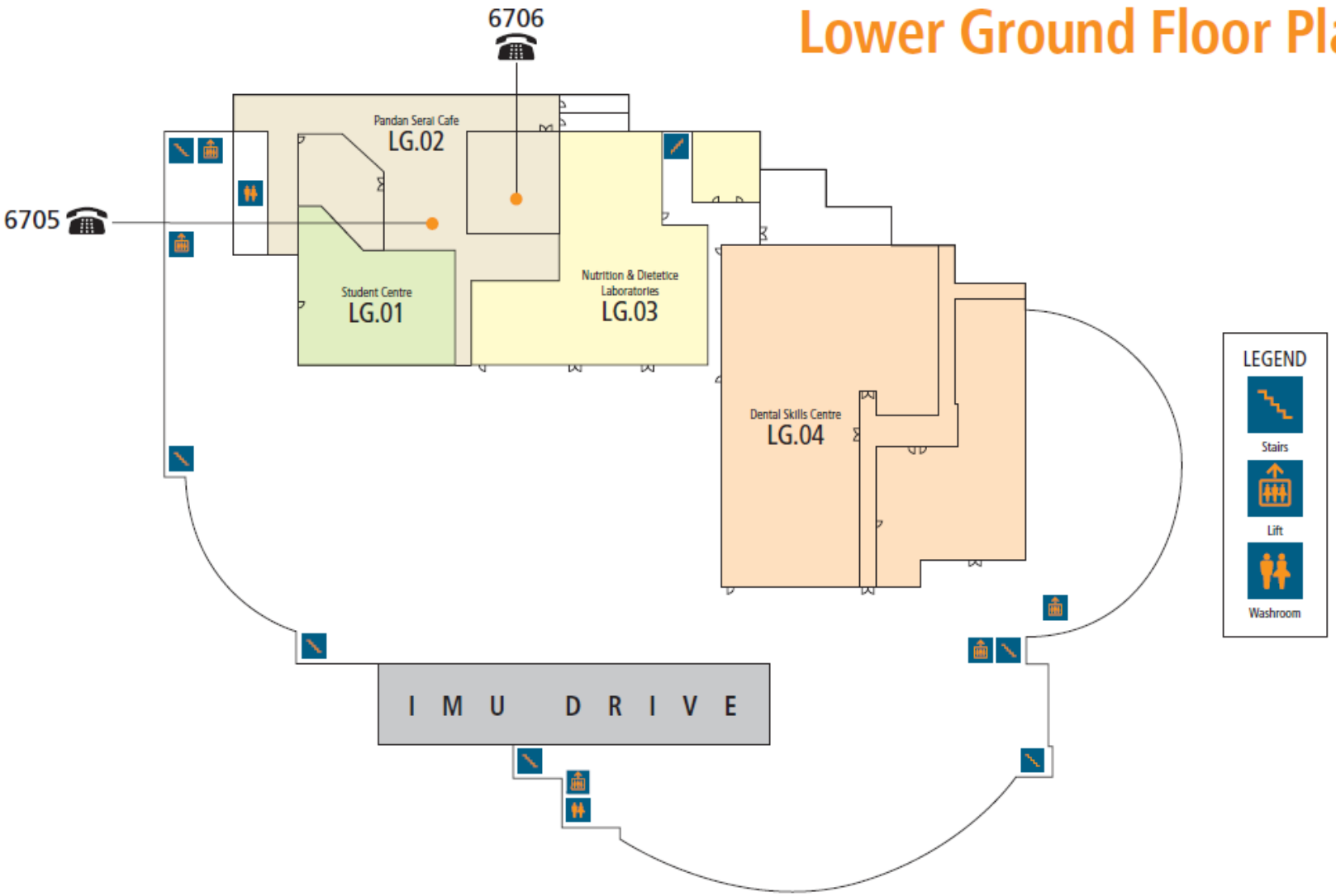
3rd Floor Plan



4th Floor Plan



Lower Ground Floor Plan



8. Handling Laboratory Equipment

This section provides instructions for the safe and proper handling of laboratory equipment that is commonly used during practical session in MDL. You may refer to the following link https://elearn.imu.edu.my/course/view.php?id=4377 to view the prepared e-demo for handling laboratory Equipment in MDL.

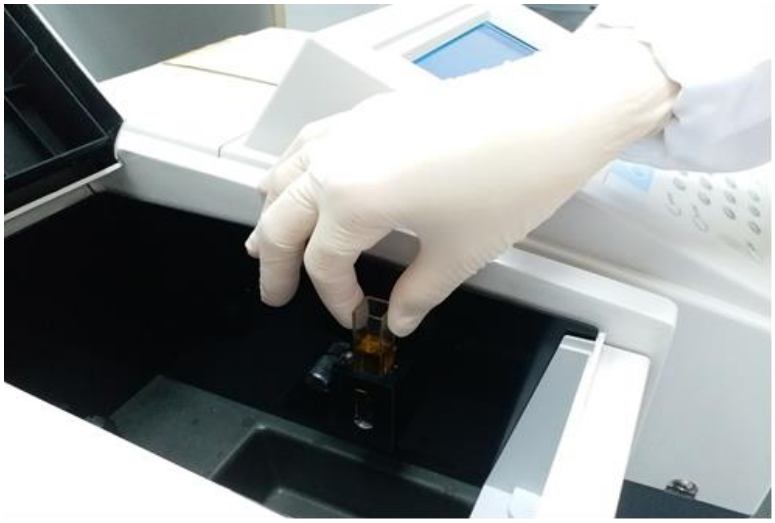
8.1 UV/ Visible Light Spectrophotometer

1. In order to ensure accuracy, the instrument must be allowed to warm up for at least 30 minutes before readings are taken.

2. Ensure the lid is closed before readings are taken.

3. Wipe up any spills as soon as they occur.

Picture 8.1 Spectrophotometer



Picture 8.2 Correct way of handling cuvette

8.2 Analytical Balance

1. Ensure the balance is level and free from draughts before you use it. Levelling is achieved by adjusting the leveling screws, normally found at each bottom corner of the balance.

2. Switch on and allow the balance 30 minutes to warm up.

3. Before use ensure the weighing pan is clean and free from grime or spilled chemicals. Use the brush to remove any loose material present.

4. Never weigh directly onto the pan- use an appropriate container for your material: weighing boat, weighing paper or weighing container.

5. Use a spatula to handle the material to be weighed: never use your fingers.

6. Securely replace the caps of stock containers immediately after weighing.

7. When you have finished weighing:
    a. Clean the pan if necessary.
    b. Shut the sliding doors.
    c. Wipe/wash the spatula and return it to its correct location.
    d. Place all used weighing containers in the designated basin.

Picture 8.3 The balance and its surrounding area must NOT be left messy and dirty after use

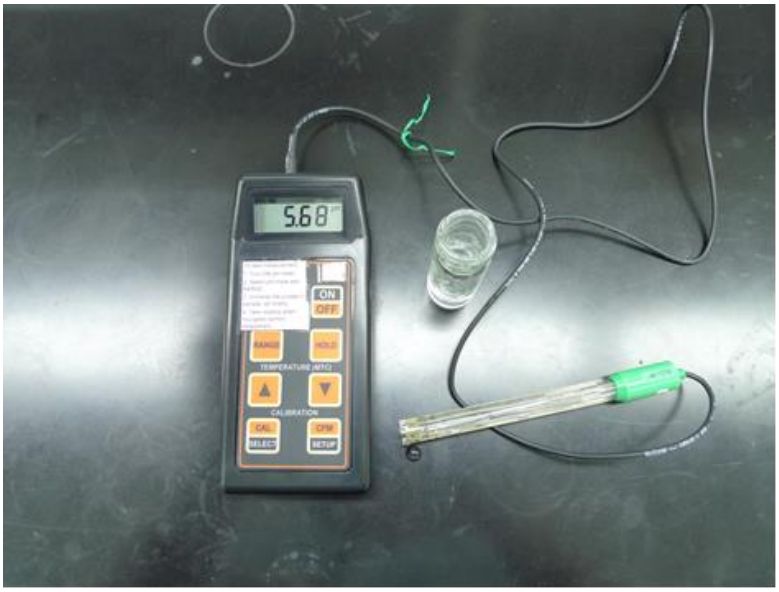
Picture 8.4 Clean the balance and place all items properly after use.

8.3 pH Meter

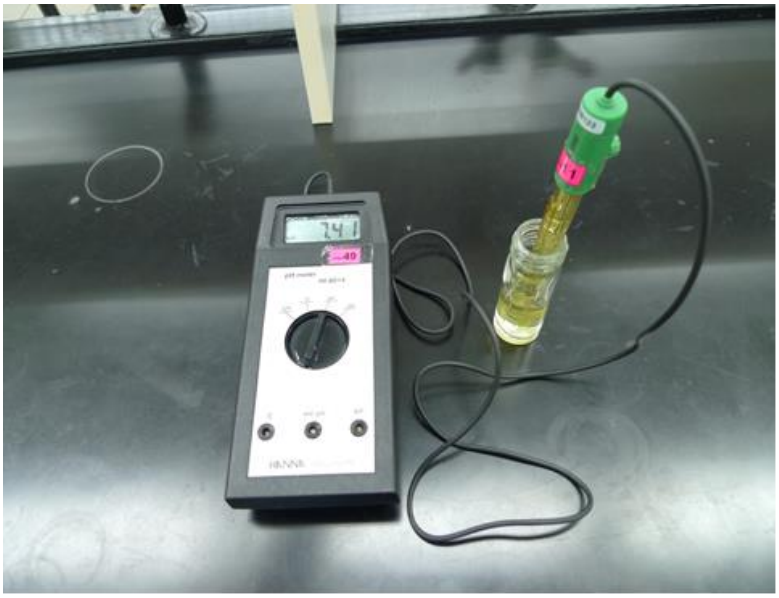
1. Never store the electrode in distilled or de-ionised water.

2. Do not scratch the electrode.

3. Using the HI 8014 and HI 8424 hand-held pH Meter:
    a. Turn on the pH meter and select pH mode:
        i. HI 8014- turning the knob to pH position.
        ii. HI 8024- by pressing the ON/OFF button. Select pH mode with button RANGE.
    b. Rinse electrode with distilled water and blot-dry with tissue paper.
    c. Immerse the electrode in sample, and stir briefly.
    d. Take reading when:
        i. HI8014- first stable reading is observed.
        ii. HI8424- hourglass symbol (⌛) disappears.
    e. Rinse electrode with distilled water and blot-dry with tissue paper. Put the electrode back into the storage solution.
    f. Turn off the meter:
        i. HI 8014- turning the knob to OFF position.
        ii. HI 8424- by pressing the ON/OFF button.



Picture 8.5 Do not leave the electrode on bench (model shown here is HI8424).



Picture 8.6 Electrode should be immersed in the storage solution after use (model shown here is HI8014).

8.4 Micropipette

1. If the micropipette has liquid in its tip NEVER HOLD IT UPSIDE DOWN. This will result in liquid entering the barrel, leading to contamination and corrosion.

2. DO NOT EXCEED the specified volume limit. For example, a 50 – 200 µl micropipette must not be used for pipetting 250 µl.

3. DO NOT DROP the micropipette.

4. Using a micropipette
    a. Set the volume required.
    b. Fit an appropriate plastic tip to the nozzle.
    c. Depress the plunger until 1st resistance is felt.

d. Place the tip in the liquid to be pipetted.
e. Slowly release the plunger, allowing it to return to its original position. Do not release suddenly as this may introduce air bubble (causing inaccurate measurement) and may cause liquid to enter the barrel.
f. Gently press the tip against the inner wall of the container vessel to remove excess liquid.
g. Press the plunger down completely to discharge the pipetted volume.
h. Press the ejector button to remove the used tip.

Picture 8.7 Correct ways of handling micropipette.

Picture 8.8 Do not hold the micropipette upside down.

8.5 Centrifuge

1. Centrifuges present the possibility of two serious hazards which are creation of aerosols and mechanical failure (broken drive shaft)

2. Before using a centrifuge, inspect tubes for cracks.

3. Use screw caps or a cap that fits over the rim outside the centrifuge tube.

4. Tubes must be properly balanced in the rotor.

5. Do not operate the centrifuge without the appropriate rotor cover securely fitted.

6. Never try to open the lid of a centrifuge, or slow the rotor by hand, while the rotor is in motion.

7. After use, tubes, rotors and centrifuge interiors should be cleaned and/or disinfected.

8. If a tube breaks:
    a. Turn off the centrifuge, and allow standing undisturbed for 30 minutes before opening.
    b. Clean and disinfect the rotor (if infectious material was placed in the centrifuge, follow by proper decontamination procedure).
    c. Clean up spills immediately, using appropriate procedures.

9. Handling Laboratory Glassware

This section provides instructions for the correct use of laboratory glassware in MDL.
All volumetric glassware and glass apparatus must be absolutely clean before use, or measured volumes will be inaccurate and chemical reactions will be affected by contaminants. There are prepared e-demo on handling laboratory glassware in the following link https://elearn.imu.edu.my/course/view.php?id=4377

9.1 Pipettes (Graduated or Measuring)

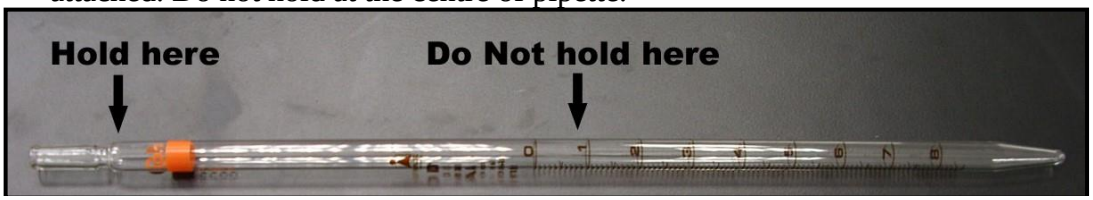
1. Graduated or measuring pipettes are delivery pipettes for predetermined volumes. Two types are available:

    a. Mohr: calibrated between 2 marks on the stem.
    b. Serological: has graduation marks down to the tip.
        i. Commonly used for measuring reagents.
        ii. Must be blown out to deliver the entire measured volume.
        iii. Sizes available are 1.0, 2.0, 5.0 and 10.0 ml.
        iv. Not accurate enough for measuring standard solutions.
        v. Use volumetric pipettes for pipetting standard solutions

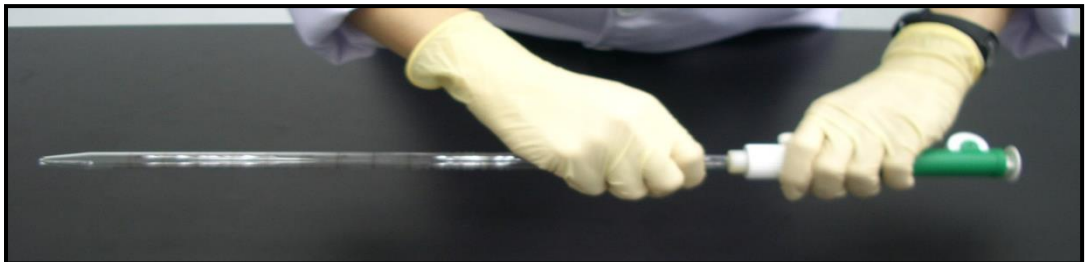
2. Draw up the liquid using the Pi-pump or pipette filler. Never pipette by mouth.

3. Always put pipette on the pipette rack. DO NOT put it directly on the bench.

4. When attaching pipette to the pi-pump, hold it at the end where the pi-pump going to be attached. Do not hold at the centre of pipette.



Picture 9.1 The proper position to hold a pipette while fitting it to a pi-pump or pipette filler.



Picture 9.2 The proper position to hold a pipette while fitting it to a pi-pump or pipette filler.

9.2 Pipettes (Volumetric or Transfer)

1. The volumetric or bulb pipette is calibrated to deliver fixed volumes and is used for accurate measurement of aliquots of non-viscous liquids, filtrates and standard solutions.

2. Ensure liquid is drawn above the etched ring of the pipette and slowly release the excess until it reaches the etched ring. The exact volume is obtained by ensuring the bottom meniscus is at the same level as the etched ring.

3. Place the tip of the filled pipette against the inner wall of your container and release the contents. Do not blow out but allow liquid to drain to the last drop, then wait for 10 seconds before removing the pipette.

4. Gently place the contaminated pipette with its tip downward in a jar of cleaning solution.

9.3 Burette

Burette stopcocks may be made either of glass or Teflon. Teflon does not require lubricant while all-glass stopcocks should be lightly greased with petroleum jelly (white soft paraffin).

1. Before use, rinse the burette with the solution that is to be titrated.

2. Fill the burette to a point just above the zero graduation.

3. Adjust the meniscus to the zero graduation. Make sure there are no air bubbles in the burette itself, the stopcock or in the burette tip.

4. Remove any titrant adhering to the outside of the burette tip by touching the tip to the inside of a glass vessel, followed by washing down the side of the burette using a stream of distilled water into the glass vessel.

5. A white paper sail can be placed behind the graduation mark to enhance the reading of the meniscus.

6. After use, rinse well using tap water, then three times using distilled water.

7. Leave the cleaned burette upside down with the tap open to allow it to dry.

9.4 Volumetric Flask

Volumetric flasks are primarily used for the preparation of solutions of known concentration e.g. standard solutions.

1. Ensure the correct cap is used and the volumetric flask is closed properly.

2. Fill up the bottom of the volumetric flask, make sure it is mixed well and always use a dropper to top up to the mark.

3. Do not hold the bottom of volumetric flask when mixing because it will expand due to body heat.

4. To read the meniscus level, use a piece of half-black and half-white card. Place the card 1 cm behind the flask with the white-half uppermost and the top of the black area about 1mm below the meniscus. The meniscus should then appear as a clearly defined thin black line.

9.5 Separating Funnel

Separating funnels are used for simple extractions. This involves bringing a given volume of a solution into contact with a given volume of solvent (that is immiscible in the solution) and vigorous shaking until equilibrium has been attained. This can be seen by separation of the liquid layers.

1. Ensure that the liquids do not occupy more than approximately half of the volume of the funnel.

2. Constantly release the pressure by venting after shaking. Vent the pressure at fume hood if strong odor solvent is being used.

3. Remove the lower phase from the funnel by opening the stopcock.

4. Remove the upper phase by draining the lower phase first, then pour from top.

10. N&D Cooking Laboratory Guidelines

You should pay particular attention to personal safety and the following general safety rules must be adhered to.

1. Wear the appropriate attire i.e., an apron and beret at all times. Laboratory apron and cap are not to be used anywhere else outside the laboratories, and particularly not in the canteen or places.

2. Wear shoes which entirely cover your feet. Open-toed sandals provide inadequate protection. No high heeled should be worn.

3. Tie up long hair and neatly tuck hair into the beret and secure with pins if necessary.

4. Do not run in the lab. Do not indulge in horseplay or act boisterously in the lab.

5. Do not apply lipstick or hair spray in the laboratories.

6. Be careful when carrying hot food items or equipment in the lab. Use oven gloves when handling hot items.

7. Use disposable plastic gloves when handling wet items (meat or chicken).

8. Report all accidents immediately to Lab staff or Lecturer, whether or not they result in injury. “Accidents” include broken glassware and spillages of food ingredients.

9. Wash hands frequently with soap and running water in rubbing motion (friction) for 15 seconds before and after every step in food preparation. This is critical before and after handling raw meat, seafood and poultry. Cleanliness is a major factor in preventing food borne illness.

10. Wash hands before eating, after using the rest room, and after handling garbage.

11. Wash your hands thoroughly with soap and water before leaving the laboratories.

12. Dry hands with tissue paper after each hand washing.

13. Wash your aprons and beret frequently to keep them clean.

14. Keep appliances free of food particles (including microwave oven, can opener, blender and mixer blade). Blender blades and the bottom ring should be removed from the blender after each use and wash with soapy water.

15. Make sure all the utensils are washed and dried properly before leaving the lab. Wipe the washed utensils with the colored kitchen towel and use white towel (good morning towel) to wipe the workbench top.

16. Switch off your cell-phone or switch to the silent mode and do not place phones on the workbench.

17. Keep your workbench clear of clutter. Bring in only practical manuals, required stationery & writing equipment; leave bags outside. Remember to secure your valuables.

18. Fill up the Check-in/Check-out list form before start of the first practical and at the end of the last practical session (Food Preparation Module). Each member in the groups is responsible for any lost items. Report to Lab Staff if items are insufficient during the checking.

19. Do not use stove top as a working bench.

20. Do not allow litter to accumulate and keep your workbench clean and tidy. Tidy up at the end of each session.

21. Place all equipment into their respective storage places after the lab.

22. Broken glassware and sharps must be discarded into a sharps bin.

23. Put all trash into the green wheelie bin at the end of class for every practical session. Replenish the trash bag after each lab session. (Get the trash bag from lab staff).

24. No removing items belonging to the Laboratories without prior authorization from Laboratory staff or lecturer in charge.

25. Do not open the refrigerator and side cabinets without permission from the lab staff or the lecturer in-charge.

A SAFE AND CLEAN KITCHEN IS A HEALTHY KITCHEN!

11. MDL Breakage & Replacement Guidelines

These guidelines are to be complied with rules of use in MDL.

11.1 Responsible Use of Laboratory Equipment & Glassware

1. Students are expected to use the laboratory responsibly and to familiarize themselves with the laboratory safety rules and abide by them.

2. Students are responsible for the laboratory equipment /glassware assigned to them.

3. Students are to ensure that the equipment/glassware given to them are complete and usable at checks-in and checks-out. They are responsible for the care of the equipment or glassware during the duration of their laboratory work.

4. Any damage or accident (injurious or otherwise) in the laboratory needs to be reported immediately to the lecturer or MDL staff in charge of practical session.

5. Records of student breakage will be maintained by MDLs Laboratory staff in charge of glassware.

11.2 Replacement and/or Breakage Charges

1. Any laboratory items, damaged, broken or missing have to be replaced by the student(s) who are responsible for their case. In event of a broken item during group practice or unreported breakages (noted after a practical session by a laboratory staff), the cost will be borne by the group or the class respectively.

2. Replacement costs for the broken glassware will be informed to the student(s) once we have obtained the quotation from supplier.
   An official letter will be issued to student(s) for payment purpose.

3. Any student who breaks laboratory items in a willful or abusive manner will have to bear the entire cost of item(s) he/she breaks.

4. All payment must be made at the IMU Cashier's Office within 2 weeks from the date of notification.

5. Failure to settle these charges will result in a withhold of services to the student. A withhold of services means student is not allowed to sit for End of Semester Examination, register/re-register for new semester, withhold of official transcripts of grades and student may also be denied access to other facilities within IMU.

12. Appendix I


Dress Code in MDL
Safety goggles (compulsory as per modules requirement)
Long hair to be tied & pinned
Pointy heel
Buttoned-up Long sleeve white lab coat
Sandal/mule
Partially covered shoes
Fully covered shoes (non-permeable material)
Permeable material

Dress Code in ND Lab

13. References

1. World Health Organization. Laboratory Biosafety Manual, 4th ed. Geneva. 2020. https://iris.who.int/bitstream/handle/10665/337956/9789240011311-eng.pdf?sequence=1
2. IMU/SOP/FMA/15 Waste Management Edition 1
3. IMU/POL/HR/06 Standard Operating Policy and Procedures on Discipline and Standards of Performance Edition 4