University of Malta

SAFETY MANUAL

General Regulations

Built Environment Laboratory
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Working in the Laboratory

Before starting work

In general, working in the laboratory is defined as attending an undergraduate laboratory class or demonstration; all laboratory based final year research projects or postgraduate research work that involves interaction with materials and/or equipment.

Students attending undergraduate lab classes will receive a safety briefing from the relevant member of academic staff before or at the start of each session.

Undergraduate and postgraduate project students requiring to work in the laboratory or on site will be required to carry out a risk assessment covering all aspects of the work to be undertaken.

The risk assessment should be done in conjunction with the project supervisor.

A laboratory safety induction **must** be attended by all undergraduate and postgraduate project students, for a safety induction session please contact Nicholas Azzopardi.

Any visiting researchers from outside this university will be required to go through the same system as University of Malta research students.

Safety during laboratory work conducted in groups

A Risk assessment form must be completed by the academic staff before any practical work begins. It is then the responsibility of the academic staff to pass on the information contained in the assessment to the group.

You are specifically required to:

- Become familiar and comply with relevant codes of practice and/or procedures.
- Follow instructions carefully concerning the use of equipment, and chemicals.
- Wear appropriate protective clothing as instructed by the member of staff in charge e.g. a laboratory coat/overalls, gloves, face protection, ear protection, appropriate footwear etc.
- The wearing of open-toed shoes or sandals in laboratories is prohibited, as their use makes the feet extremely vulnerable to injury from falling objects from benches, broken glass, split corrosive substances etc.
- Wash your hands thoroughly after handling any material.
- Never bring food or drink into a laboratory.
- Refrain from applying cosmetics.
- Store bags, coats etc. safely during laboratory work.
- Avoid all hand to mouth contact in a laboratory and wash hands thoroughly on leaving.
- Clearly and legibly label all containers to show contents and hazards and keep the outside of containers clean.
- Avoid placing containers, bottles etc. on the edge of benches. Keep work areas tidy.

Safety during independent laboratory work

All procedures for Safety during laboratory work conducted in groups, are to be observed and in addition: no preparatory, experimental or analytical work should be conducted in any laboratory until permission has been obtained from an appropriate member of staff (i.e. supervisor in the case of students or researchers, or laboratory director in the case of other staff) and the member of technical staff responsible for the laboratory has been made aware of your intention to work. You should enquire as to what dangers may exist in the laboratory to be used.

General laboratory safety rules

Attitude Towards Safety

- Act sensibly at all time.
- Develop safety consciousness.
- Ask yourself - is it safe?
- If in doubt, if you hesitate, STOP and seek advice.

Safety Procedure

The following rules must be adhered to by all personnel using the laboratory.

Work Safely

- wear sensible footwear (safety shoes)
- wear ear protection in noisy areas
- wear protective goggles or glasses when necessary
- wear protective clothing
- tie long hair back
- ensure that equipment, cables etc. cannot trip anyone up
- lift heavy weights correctly
- watch out for falling objects
- hang spare clothing on coat hooks
- be aware of colleagues working around you and look after their safety

Move Safely

- look where you are going
- walk

Do Not

- use machine tools (except Lab Officers)
- use welding equipment (except Lab Officers)
- use the overhead crane (except trained personnel)
- smoke inside the building
- consume food or drink inside the building except in designated areas

Horseplay and practical joking is very dangerous in workshops. The following guidelines must be followed at all times.

- Before any work is carried out in the laboratory, permission must be obtained from the lab officer in charge.
- All materials coming into the laboratory are to be accompanied by MSDS documentation detailing the material source, type, quantity and any known characteristics. Particularly those relating to hazardous materials. This documentation is to be stored in a file specifically for this purpose and is to be readily available to all staff.
- Never direct a jet of compressed air against anybody this can be fatal.
- Ensure that flexible hoses used with compressed air are properly terminated and carefully maintained.
- Where machinery is in use, arrangements must be made so that a second person is within calling distance should an emergency arise.
- No equipment is to be used without adequate training and supervision.
- Safety goggles are to be worn when undertaking processes that present a hazard to the eyes.
- Ear defenders must be worn when working in noisy areas and signs indicating the need for personal protective equipment must be heeded.
- Floor areas are to be kept clear. No heavy specimens or equipment to be left close to the edges of benches.
- Floors are to be kept tidy and dry.
- Benches are to be kept clean and free from chemicals and apparatus that are not being used.
- Work areas and equipment are to be thoroughly cleaned after use.
- Equipment and machinery must not be repaired, tested or tampered with in any way by anyone who is not authorised or qualified to do so.
- Warning signs must be visible on machinery and equipment that presents a particular hazard.
- Overnight experiments must carry a notice which shows: name of responsible person, name of academic supervisor, date, emergency contact numbers, special instructions if required e.g. DO NOT TURN OFF – EXPERIMENT IN PROGRESS.

Precautions with Chemicals

All work involving chemicals must comply with the Control of Substances Hazardous to Health Regulations.

Chemicals may give rise to various hazards and careful thought should be given to replacing hazardous substances with a less hazardous one, which is able to perform the same function.

For the hazards associated with particular substances refer to the manufacturer's data or consult a reference book.

All users of chemicals must be adequately trained to be aware of the hazards of the materials they use and the correct precautions to be adopted. The use and storage of all chemicals should be adequately controlled, especially those which are flammable, explosive, toxic or carcinogenic. All containers must

be labelled with accurate information as to the contents and where appropriate with information on the hazards. The minimum quantity necessary should be used and hazardous materials should be disposed of as soon as possible after use.

Before carrying out an experiment with unfamiliar and potentially hazardous substances, plans should be made to deal with emergencies arising from unexpected releases of chemicals by spillage or other means. For example, neutralising agents should be available and in the case of noxious vapours it may be necessary to arrange for breathing apparatus to be at the ready, together with a trained operator.

Hazardous Substances

Hazardous Substances do not just refer to chemicals.

A Risk Assessment form must be completed before any practical work may begin. This will identify potential hazards, assess risks associated with the procedure and determine necessary safety precautions, which must be followed. Forms are available from supervisors and/or technicians. Before work can commence these must be signed by the supervisor in the case of students or researchers, or laboratory manager in the case of staff.

On the basis of these assessments the level of supervision necessary will be made by the supervisor.

If, at any time, the project, process or hazards change, the supervisor must be made aware and the risk assessment reviewed and subsequently approved by the supervisor before work may continue.

Flammable Liquids

Many solvents such as alcohol, acetone and petroleum products are highly flammable. The quantity of any highly flammable liquid present in a work area must be kept to a minimum having regard to the processes or operations being carried out.

Containers and stores of flammable liquids must always be clearly marked.

It is important to prevent these substances from coming into contact with sources of ignition, such as lighted cigarettes, gas burners or hot surfaces. Working areas and store rooms should be well ventilated to prevent the formation of explosive vapour mixtures. Any spillage should be cleaned up immediately.

Eye Hazards

Acids, alkalines or other chemicals can cause burns or irritation to the eyes. The wearing of safety spectacles or other eye protection is essential when handling chemicals.

Skin Hazards

Acids, alkalines or other chemicals can cause burns or irritation to the skin. Protective clothing such as gloves, face shields, aprons and appropriate footwear should be worn if there is a danger of contact, for instance by splashing when pouring liquids. Long-term effects, such as dermatitis and skin cancer can occur as a result of repeated skin contact with some chemicals.

Spills

Chemical spills must be cleaned up immediately. Inform staff if the spilled material is of a hazardous nature, which can be determined from the appropriate MSDS available in the laboratory.

Specific information on spills clean-up methods should be obtained from the MSDS. Prior to commencing the clean up ensure you are wearing the appropriate personal protective equipment.
It should be noted that even small spills of volatile materials in a confined space could generate significant concentrations of fumes and respiratory protection may be needed.

As a guide to spill clean up the following steps should be taken:

1. Containment – contain the spill by bonding around it.
2. Absorption – as a general rule:

- Organics – use the spill kit available
- Acids or alkalis – first neutralize then absorb with paper towel, cloth or mop
- Mercury – cover with absorbent material available within the mercury spill kit then remove with a dustpan and broom before placing in a sealed container.

3. At the completion of the spill, clean up. All absorbent or contaminated material should be placed in sealed containers, labeled and disposed of as contaminated waste

.
If chemicals are spilled on the skin, wash skin immediately regardless of the substance involved by referring to the MSDS for first aid information.

Equipment information

2 Ton Overhead Crane

The following guidelines are for students who request the use of the overhead crane.

Guidelines:

- **NO LIFTS MAY BE PERFORMED WHERE THE LOAD PASSES OVER ANOTHER PERSON!**
- **NO LIFTS MAY BE PERFORMED WHILE WORKING ALONE!**

- **HARD HATS MUST BE WORN FOR ALL LIFT OPERATIONS!**
- Persons in care and control of any hoisting equipment are responsible for the safety of all personnel in the near vicinity

Crane pre-operation inspection

- Visually inspect cables, rope drum, hook (hook should turn freely), and safety latches ensuring they are in good working conditions.
- Test limit switches by raising the hook block without load.
- Ensure the hoist trolley and brakes work properly by moving crane in all directions.

General Operating Instructions

- Students may operate this unit only when assisted by a lab officer or supervisor.
- Ensure the load to be lifted is within the crane, chains or slings capacity.
- Before picking-up a load, check for hook to be directly above load and load is balanced; **AVOID OFF-CENTER LOADING OF ANY KIND.**
- Never lift or transport a load until all persons are clear.
- Avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower load.
- **DO NOT** allow load to bear against the hook latch.
- Take up a slack load chain carefully and start load slowly to avoid shock and jerking of hoist load chain. If there is any evidence of overloading, immediately lower load.

Safety Procedure

- **DO NOT** use crane for lifting persons.
- **DO NOT** use damaged chains or slings.
- **DO NOT** load hoist, chains or slings beyond the rated capacity.
- **DO NOT** allow load to swing or twist while hoisting.
- **DO NOT** leave suspended load unattended.
- **DO NOT** allow load to bear against the hook latch.
- **DO NOT** move load over the head of any person. Warn all persons of your intentions to move load into their area.
- **DO NOT** wrap load chain around load or choke the chain around load.
- Ensure attachments to the hook are firmly seated in hook saddle.
- **DO NOT** load the point of hook; avoid off-center loading of any kind.
- **DO NOT** operate hoist if reeved hoist chains are twisted.
- **DO NOT** allow load to bear against the hook latch.
- **NEVER** operate the hoist when flammable materials or vapours are present. Electrical devices produce arcs or sparks that may cause a fire or explosion.
- **DO NOT** uses hoist when tired, distracted or under the influence of drugs, alcohol or medication which cause diminished control.
- **STAY ALERT**, watch what you are doing and use common sense.

Pallet jack

The following guidelines are for students who request the use of the pallet jack.

Always

- Students may operate this unit only when assisted by a lab officer or supervisor.
- Wear safety shoes.
- Check the jack for damage before operation.
- Center the load on the jack.
- Be sure the path is clear of obstructions and large enough to accommodate the item being moved.
- Be aware of others in the work area.
- Get help to move large and/or heavy items or in difficult conditions.
- Make sure the item being moved does not exceed the rated capacity of the jack.
- Keep the load as close to the floor as possible.
- If on a sloping surface, operate uphill of the load and keep others out of the downhill path.
- Make sure the load-bearing surface is strong enough the support the item.
- Secure unstable items before moving.
- Make sure others are clear of the item before lowering.
- Keep fingers, hands and toes out from under the item being moved.
- Take out of service if repairs are required.

Never

- Attempt to move items if the ability to do so safely is in question.
- Attempt to move items that exceed the capacity of the jack.
- Attempt to move items that are not centered on the jack.
- Attempt to move items that are unstable.
- Attempt to move large heavy items alone.
- Use the jack on unstable surfaces.
- Use the jack if its mechanical condition is in question.
- Use the jack for anything outside of its designed purpose.
- Allow untrained personnel to operate the jack.

Personal Protective Equipment

- Safety shoes

Potential Hazards

- Crushing Injuries
- Pinching Injuries
- Back Injuries
- Property Damage
- Falling Objects

Walk-behind forklift

The following guidelines are for students who request the use of the forklift.

Always

- Students may operate this unit only when assisted by a lab officer or supervisor.
- Check the lift before operating for any mechanical or safety problems.
- Wear safety shoes.
- Be aware of your surroundings and allow only necessary personnel in the work area.
- Make sure the path to be taken is clear of obstacles and large enough for the load being moved.
- Be aware of overhead and tripping hazards.
- Make sure that the load does not exceed the capacity of the lift.
- Use alternative method of moving if concerned about the ability to safely move the load.
- Keep the load as close to the floor as possible.
- Use a spotter if the load is large enough to block view.
- Use caution when stacking items to avoid toppling hazards.
- Keep hands and feet out from under the load.
- Make sure everyone is clear of the load before lifting, moving or placing the load.
- Tag if repairs are required.

Never

- Allow students to operate the lift.
- Operate the lift if unsure of your ability to do so safely.
- Use the lift if the mechanical condition is in question.
- Allow anyone under a load being lifted.
- Lift or ride anyone on the lift.
- Lift items that exceed the rated capacity of the lift.
- Use the lift for activities outside of its intended use.
- Move stacked items unless they can be adequately secured before moving.
- Move unstable, unsecured loads.

Personal Protective Equipment

- Safety shoes

Potential Hazards

- Tripping
- Falling Objects
- Pinching
- Crushing
- Obstacles

Concrete mixers

The following guidelines are for students who request the use of the concrete mixers.

Always

- Students may operate this unit only when assisted by a lab officer or supervisor.
- Wear safety shoes and safety glasses.
- Be sure all safety guards are in place and operational.
- Keep clear of the ring gear and drive during operation.
- Keep work area clear of hazards.
- Inspect the machine for damage before operation.
- Be aware of the rated capacity of the mixer.
- Secure loose clothing and remove jewelry.
- Work with someone else, if caught during the mechanical operation you may not be able to reach the shut-off.
- Unplug and tag if repairs are required.

Never

- Exceed the rated capacity of the mixer.
- Place hands or tools inside the drum while in motion.
- Operate the mixer if its condition is in question.

Personal Protective Equipment

- Safety shoes
- Safety Glasses-optional

Potential Hazards

- Pinching Injuries
- Crushing Injuries
- Back Injuries
- Eye Injuries
- Electrical Shock

Compression testing machines
The following guidelines are for students who request the use of the compression machines.

Always.

- Wear safety shoes.
- Be sure all safety guards and limiters are present and in operation.
- Use eye protection when breaking test specimens.
- Keep hands and fingers away from the bearing surfaces while ram is moving.
- Be sure the specimen is centered to the head.
- Apply the load at the prescribed rate.
- Get assistance when changing spacers.
- Keep unessential people away for the press while in operation.
- Be aware of others in the testing area.
- Shut the press down immediately if an unsafe condition develops during operation.
- Unplug and tag if repairs are required.

Never

- Allow untrained students to operate equipment
- Operate machine without eye protection.
- Use the machine for anything outside of its intended purpose.
- Stand directly in front of the specimen while under load.
- Operate the press if its condition is in question.
- Leave the press unattended while running.

Personal Protective Equipment

- Safety shoes
- Eye Protection

Potential Hazards

- Falling Objects
- Crushing Injuries
- Pinching Injuries
- High-speed Projectiles

Rock and Masonry saw / Cut-off machines
The following guidelines are for students who request the use of the cutting saws.

Always

- Inspect the saw for any potential operation problems prior to operating.
- Shut the saw off immediately if not operating properly.
- Wear hearing protection, safety glasses or face shield and safety shoes while operating the saw.
- Make sure the cutting table is clear of debris.
- Use an adequate flow of water to cut the material.
- Secure loose clothing and remove jewelry.
- Be aware of the proximity of the blade to your body.
- Use jigs
- Make sure jigs are lined up, secure and clear of the blade before starting saw.
- Make sure the work area is clear of hazards.
- Turn the saw and the water off when not in use.
- Rinse the jig and pan, flush out the drainpipe with water when finished cutting.
- Unplug the saw before servicing.
- Unplug and tag if repairs are required.

Never

- Allow under-graduate students to operate equipment.
- Operate the saw if it's not operating properly.
- Attempt to cut items too small to handle safely.
- Attempt to cut items that cannot be held securely against the cutting table or jig.
- Use the saw to cut material it was not designed for. (wood, metal, etc.)
- Allow others to distract the operator while the saw is running.
- Use more than light pressure on the blade to while cutting.
- Start or stop the saw while the blade is in contact with item being cut.
- Attempt to cut items larger than what the saw can safely accommodate.
- Clean debris from table while the blade is still in motion.

Personal Protective Equipment

- Safety shoes
- Safety Glasses or Face Shield
- Hearing Protection
- Protective Clothing (wet)
- Safety gloves

Potential Hazards

- Cutting
- Air Borne Debris
- Eye Injuries
- Hearing Damage

Ovens

The following guidelines are for students who request the use of the ovens.

Always

- Wear heat protective gloves and safety shoes.
- Check the temperature setting to make sure it is appropriate for the material.
- Be aware of others in the work area as to avoid collisions while removing and transporting hot material.
- Use tongs if the material to be removed is beyond the protective coverage of the gloves.
- Unplug or lock out breaker before service.
- Unplug or lock out and tag.

Never

- Allow untrained students to operate equipment
- Use the oven for anything outside of its intended purpose. Place flammable material in the oven.
- Place material that will give off hazardous fumes in an un-vented oven.

Personal Protective Equipment

Heat Protective Gloves

- Safety shoes
- Safety glasses

Potential Hazards

- Burn Injuries
- Inhalation

Hot plate
The following guidelines are for students who request the use of the ovens.

Always

- Wear heat protective gloves, neoprene apron & eye protection.
- Use in a well ventilated area.
- Be aware of the affect of heating on the material being tested.
- Unplug before servicing.
- Unplug and tag until needed repairs are made.

Never:

- Allow untrained students to use the equipment.
- Leave material being heated unattended.
- Leave the hot plate on when no testing is being done.
- Use the hot plate for tasks outside of its intended purpose.

Personal Protective Equipment

- Heat protective gloves
- Eye protection - Chemical goggles
- Safety shoes

Potential Hazards

- Burn injuries
- Slashing of hot liquids
- Inhalation