University of Waterloo Faculty of Engineering

Management Science and Engineering Department

Health and Safety Manual

Last revised: October 2026

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1. Introduction

This manual is provided to all “Members” of the Management Science and Engineering Department. “Members” include all MSE faculty, staff, students (undergraduate and graduate), postdoctoral fellows, research personnel, work term placements, volunteers, and visitors (paid or unpaid).

The information in this manual will include health & safety policies and procedures for safe practices in research and teaching labs, classrooms, and general office environment.

It is expected that all “Members” read and understand the information in this document regarding laboratory safety and emergency procedures.

All “Members” are required to read this manual in its entirety and sign the attached form acknowledging that they understand these regulations and will comply with them.

2. Emergency Information

Emergency Contacts	**Phone / Extension**	
Fire / Ambulance / Police	911	
Special Constable Service	External	519 888 4911
	Internal	Ext. 22222
Spil Control	External	519 888 4911
	Internal	Ext. 22222
Health Services and First Aid	519 888 4096	
Poisoning / overdose information	1 800 268 9017	
Plant operations (24h)	Ext. 33793	
Director of Safety Andrew Scheifele COM 116A	Ext. 36359	
Safety Office - https://uwaterloo.ca/safety-office/	Ext. 33587	
MSE H&S Coordinator Zivojin Pantic CPH 4318	zpantic@uwaterloo.ca	
Administrative Officer Emilie Mechler CPH 4301B	emilie.mechler@uwaterloo.ca	

Department Chair Mark Hancock CPH 4301C	mark.hancock@uwaterloo.ca

3. Laboratory Listing and Contacts

Laboratory Name	Room	Supervisor
WANOPT Waterloo Optimization Lab	CPH 3609	Fatma Gzara fgzara@uwaterloo.ca Samir Elhedhli elhedhli@uwaterloo.ca
Uncertainty Management Lab	CPH 4366	Frank Safayeni fsafayen@uwaterloo.ca Rob Duimering rduimeri@uwaterloo.ca
Natural Language Processing Lab	CPH 4365	Olga Vechtomova ovechtom@uwaterloo.ca
Information Retrieval Lab	CPH 4363	Mark Smucker msmucker@uwaterloo.ca
Data Science Lab	CPH 4359	Lukasz Golab lgolab@uwaterloo.ca
WatMIMS Lab	CPH 4341	Jim Bookbinder jbookbinder@uwaterloo.ca
Critical ML Lab	CPH 3641 CPH 3643	Sirisha Rambhatla sirisha.rambhatla@uwaterloo.ca

4. First Aid

4.1. First Aiders and Emergency Wardens

First Aiders

1. Emilie Mechler
2. Jill Miller
3. Umair Shah
4. Janine Graham

Fire Wardens

1. Emilie Mechler
2. Jill Miller
3. Heidi Jensen
4. Shelley Vossen
5. Janine Graham

6. Rosalind Klein

4.2. First Aid Kit Locations

Room	Department
CPH 1327	Engineering Society
CPH 1338	Engineering Society
CPH 4301H	Management Science and Engineering

4.3. First Aid Procedures

Minor injuries may be treated at health services or by trained MSE staff (See Emergency Information – Trained First Aiders).

Major injuries or illness are best handled by phoning **911**. After contacting **911**, also inform Special Constable Service (519-888-4911 or ext. 22222) of your situation so that they can provide immediate assistance. The ambulance entrance for your area is listed on the first aid poster. First aid posters are in the Management Science and Engineering department, CPH building fourth floor close to CPH 4301H.

If you encounter someone who is suffering from a medical condition or injury take the following action:

- If an ambulance is required, contact **911** and Special Constable Service (ext. 22222), advising them of your location and the location of the individual.
- Special Constable Service will dispatch a constable to the location.
- Special Constable Service will meet the fire/paramedic service and escort them to your location.
- If qualified, administer first aid. If not, seek assistance from someone who is qualified.
- Monitor the individual until the arrival of fire/paramedic service personnel.

4.4. Chemical Spills Exposure

Review safety data sheet (SDS) prior to handling any chemical or material for proper handling and safety recommendations.

In case of spill, see SDS for appropriate cleaning procedures. Call Special Constable Service (519-888-4911 or ext. 22222) for hazardous material spills.

See SDS for instructions on skin exposure, eye exposure, inhalation, or ingestion. Avoid wearing contact lenses if chemical splash is a concern. An eye wash station is in the CPH 1324 laboratory.

4.5. Electrical Shock

- ACT FAST – CALL SPECIAL CONSTABLE SERVICE Ext. 22222
- GET EMERGENCY CARE
- Do not touch the person until the power has been shut off.

- Do not remove the person from the electric source until the power has been shut off
- If you cannot shut off the power, use an insulator such as dry rope, cloth, or broom handle to drag the person away from live wire.
- If there is no heartbeat and no breathing; do CPR only if you are trained.
- If there is a heartbeat but no breathing, immediately start rescue breathing.
- Check for burns and treat as third-degree burns.
- If the person is breathing, put them in the recovery position.
- Got person to doctor if heart skipping beats, fever, or coughing up sputum.

4.6. Reporting Accidents

All accidents, incidents, and near misses must be reported. Should an injury or incident occur:

1. Obtain medical aid, if necessary (in which case, departments must provide immediate transportation to health services, hospitals, doctor's office, walk-in clinic, or worker's home).
2. Report any injury to your supervisor, the health & safety coordinator, and/or the administrative officer immediately.
3. Complete injury/incident report with your supervisor, the health & safety coordinator, and/or the administrative officer and forward it to the Safety Office, Commissary Building within 1 day of the injury.
4. Should you have any questions or concerns contact Kate Windsor at ext. 35814 or Sheila Hurley at ext. 33587.

4.6.1. Major Accidents

Call 911. Critical injuries must be reported immediately to the Safety Office (ext. 33587). Critical injuries include:

- Heart attack
- Stroke
- Difficulty breathing
- Unconsciousness
- Substantial loss of blood
- Fracture of leg or arm, but not finger or toe.
- Amputation of a leg, arm, hand, or foot, but not a finger or toe
- Burns to major portion of body.
- Eye injuries
- Shock

In the event of a death or critical injury, do not "interfere with, disturb, destroy, alter, or carry away any wreckage, article, or thing at the scene of or connected with the occurrence until permission to do so has been given by an inspector", unless necessary to:

a) Save life or relieve human suffering.
b) Maintain an essential public utility service or a public transportation system.
c) Prevent unnecessary damage to equipment or other property.

4.6.2. Minor Accidents

- If you use material from a first aid kit, you must record the details in a hazard report.

If you require the services of a health professional or lose time from work as a result of an accident, an UW accident investigation form must be completed. This is a government (Workers Compensation Act) regulation and results in a fine if ignored. Remember that breaches of the OHSA can result in significant fines to the corporate employer.

5. Fire Evacuation Emergency Procedures

EVACUATION IS MANDATORY DO NOT USE ELEVATORS!

5.1. Emergency Shutdown Procedures

Lab personnel or the instructor in charge of the class must follow basic steps for an emergency shutdown if time permits.

- STOP ALL ACTIVITIES
- Shut down experiments that could be affected by the loss of electricity, water, gas, or other services.
- Turn off, unplug, and cover all electrical or electronic equipment.
    - CAUTION: Do not cover ventilation vents and/or fan motors that could result in over-heating and possible fire.
- Cap all chemical containers. Ensure that water reactive chemicals are in sealed containers and stored in areas that are unlikely to become wet.
- Ensure that all chemical and hazardous waste containers are properly covered and sealed.
- Turn off all appliances, computers, and other equipment.
- Refrigerators and freezers must be closed.
- Elevate equipment, materials, and supplies, including electrical wires and chemicals, off the floor, particularly in lower elevations that are prone to flooding.
- Close all doors, including cabinets, storage areas, and offices.
- Secure lab notebooks/CDs and back up critical data on computers.
- Close and secure windows.
- Lock all exterior lab doors before leaving.

Upon returning to laboratory or facility:

- Visually inspect the lab through the room or door windows to determine lab condition before entering.
- Conduct a damage assessment of the lab.

5.2. Evacuation Procedure

All undergraduate laboratories have fire and first aid posters located in the lab near the door.

Upon hearing the fire alarm or when an evacuation order is received, WALK immediately to the nearest exit. Remain outside until further instructions are received.

Laboratory supervisors are responsible for ensuring that there are appropriate evacuation procedures in place for those persons with mobility difficulties.

5.3. Fires

1. If on fire: STOP, DROP, and ROLL.
2. Notify others in the immediate area that there is a FIRE.
3. Activate the nearest alarm or, if there is no convenient fire alarm, call **911** and alert the Special Constable Service on ext. 22222.
4. Attempt to extinguish the fire only if you are trained to do so and if you can extinguish the fire without putting your own safety or the safety of others at risk. NOTE the type of fire extinguisher must correspond to the type of fire.
5. Close the windows if you can do this safely.
6. If safe to do so, assist physically impaired to a safe location (stairwell or office with phone).
7. Leave the room and close the door. Put a coat on in winter for protection.
8. WALK out of the building via the closest safe emergency exit. DO NOT USE THE ELEVATOR.
9. Move away from the building at least 30 meters, leaving clear access for emergency services.
10. Report any information about the fire or persons remaining in the building to Special Constable Service and fire department.
11. Follow the instructions of emergency response services and fire wardens.
12. Do not re-enter the building until authorized by fire department or Special Constable Service.

5.4. Fire Extinguishers

Numerous fire extinguishers are in the hallways of CPH. Identify the location of the extinguisher, alarm, and exit closest to your work area. A fire extinguisher is also located in the room CPH 1324.

5.5. Emergency Procedures and Violent Situations on Campus

What is a violent situation? - A violent or armed intruder on campus who is actively engaged in killing or attempting to kill people in a confined and populated area.

How will I know a violent situation is occurring?

- Emergency notifications on campus are distributed through the WatSAFE app **https://uwaterloo.ca/watsafe/**
- Notification via your desktop computer
- uWaterloo website **uwaterloo.ca**
- In person notification by police

Who to Call? – Call 911 or university police 519-888-4911, or ext. 22222 for all campuses

What to Report? When contacting authorities, report the following:

- Your specific location, building name and office/room number.
- The number of people at your specific location.
- If there are injuries, the number, and types of injuries; and
- If you have seen an assailant or identified a threat:
    - location and number of suspects.
    - direction of travel.
    - their clothing and description.
    - their identity if known.
    - any weapons or accessories (e.g., backpack), and
    - any unusual or threatening sounds (e.g., gunfire or explosion).

If a violent situation is not occurring near you, take the necessary steps to secure yourself in a safe location as follows:

1. Move immediately to the nearest room you feel is safe with as many people as possible.
2. Lock and barricade the door.
3. Turn off the lights or maintain minimal lighting.
4. Cover all windows with blinds, curtains, etc.
5. Keep back from windows and doors.
6. Lie flat on the floor or take cover out of sight.
7. Mute cell phones
8. Keep calm and quiet; and
9. Stay in the room until the police arrive. Remember It may be several hours before you can be safely evacuated.

If a violent situation is occurring near you, please follow the safest course of action as follows:

- GET OUT: Getting out is by far the best option if you believe you can escape safely. This is why it is a good idea to make mental notes of means of escape wherever you may be on campus. If you hear something that could be gunshots, don't wait get out.
- HIDE: Hide if you don't know exactly where the shooting is happening or it's too late to escape safely. Follow the above procedure 1-9 to secure yourself in a safe location.
- FIGHT: Fighting is your absolute last resort. You would only confront a violent or armed intruder if you somehow became trapped in a space with no escape. A violent or armed intruder typically doesn't respond to reason so you must assume they intend to harm you. Find an object you can use to strike the shooter with; trip them with a chair; be as aggressive as you can; do anything you can to stop them.

In Case of Injury:

Follow these steps when safe to do so:

- Call 911 or 519-888-4911 or ext. 22222, from a hard-wired line if possible.
- Place a sign in an exterior window to identify the location of the injured people.

If Fire Alarm Sounds During Lockdown:

- DO NOT respond normally as a fire alarm during a lockdown may be a ploy by an armed intruder.

- Remain calm in your lockdown secure area, if safe to do so.
- In case of fire, follow Fire/Evacuation procedures.

6. Emergency Procedures

It is your responsibility to read safety posters and follow instructions during an emergency. Know the location of the fire extinguisher and eye wash in your lab and know how to use them. Know the building evacuation procedures.

General advice:

- Do not panic.
- Size up the situation quickly and decide what to do.
- If you are in personal danger, first get to safety, and then summon help.
- If you are asked to leave the area, make your area safe if time permits by turning off hazardous experiments or equipment, and closing the door. Then leave the area promptly.

6.1. Earthquake

- Stay calm.
- Get under a table, desk, or bench, or stand in a doorway.
- Avoid windows.
- Leave building by stairs after shaking has stopped.
- Do not use elevators.
- When outside, stay clear of buildings and overhead hazards.

6.2. Flooding, Water Damage, and Leaks

Serious water damage can occur from several sources: overland flooding, broken water pipes, clogged drains, damaged skylights, windows, or leaking roofs.

If flooding or water leaks occur:

- Contact plant operations (ext. 33793) and report the exact location and severity of the flood or leak.
- If there is a hazard of electrical shock, evacuate the area immediately.
- If safe to do so, take steps to avoid or reduce water damage by covering vulnerable objects.
- If you know the source of the water and are confident of your ability to stop it (e.g., close the window), do so.
- If in doubt, phone ext. 22222

6.3. Gas Leaks

When a natural gas odour/leak is detected take the following action:

- Evacuate the immediate area.
- If safe to do so, turn off the natural gas supply.

- Depending on the strength of the odor or size of the leak, contact emergency services **911**, plant ops (ext. 33793), or Special Constable Service (ext. 22222), advising them of the location of the odour/leak.
- If the odor/leak is from an off-campus site, evacuate the area and contact emergency services. **911**.

6.4. Utility Failure

All utility failures (electrical, elevators, heat, etc.) must be reported immediately to plant operations (ext. 33793).

Note phones will not work in power outages; please use your cell phone.

In partial electrical power disruption students, faculty, and staff should move to areas where there is light and not return to the affected area until power has been restored. Take all personal belongings and secure the room, if possible.

In complete electrical power disruptions students, faculty, and staff should leave the buildings and not return until power has been restored. Take all personal belongings and secure the room, if possible.

Students, faculty, or staff members who need to enter the affected area(s) to pick up personal belongings should report to the Special Constable Service and request an escort.

NOTIFY YOUR SUPERVISOR/INSTRUCTOR, HEALTH & SAFETY COORDINATOR, AND/OR THE ADMINISTRATIVE OFFICER IMMEDIATELY

AFTER ANY INJURY, FIRE, EXPLOSION, OR SPILL

7. Health and Safety Training

7.1. Mandatory Health and Safety Training

Those “working” in paid or unpaid positions at **University of Waterloo** (UW) must take the following courses to comply with UW health and safety requirements **(click on the links below to log into the course). A UW user id and password are required to access the modules.**

Employees include:

- Faculty
- Staff
- Graduate students
- Co-op students/unpaid learners
- Undergraduate students employed at uWaterloo
- Visiting faculty/post-docs
- Teaching assistants

  Employee Safety Orientation (SO1001) (on-line module - requires 30-60 minutes to complete)

Workplace Violence Awareness (SO1081) (on-line module - requires 30-60 minutes to complete)

Employee Accessibility Training (AODA) (OPD102) (on-line module)

WHMIS 2015 (SO2017) (on-line module - requires 30-60 minutes to complete) - This online course is available by self-registering on LEARN. All employees (new and existing), regardless of job description, must complete the WHMIS 2015 course.

Who is the supervisor? – A supervisor is defined in the OHSA to mean a person who has charge of a workplace or authority over a worker. This includes all uWaterloo employees who exercise a supervisory role within their duties, including:

- All supervisory and managerial staff
- Faculty members who supervise employees, graduate students or undergraduate students in a laboratory, fieldwork, or other work setting
- Technical staff and paid graduate students are assigned responsibility to supervise the work of others or the operation of a laboratory/shop.

Supervisor Orientation Online (SO1100) (requires 30-60 minutes to complete)

These courses can be found at: https://uwaterloo.ca/safety-office/training/training-programs

Training is provided to all laboratory users. Emphasis in this training is placed on safe operating procedures, hazards related to specific equipment usage, and general laboratory safety. Personal protective equipment (PPE) is issued to each laboratory user while working in the facility. This PPE includes, but is not limited to, safety glasses and goggles. Numerous first aid kits and fire extinguishers are mounted through the building. An eye wash station is easily accessible to users of the Management Engineering Undergraduate Laboratory.

7.2. Hazard Specific Training

All laboratory workers must receive adequate training in the use of specific equipment and how to use the information provided by warning labels and safety data sheets (SDSs).

Safety training and/or information should be provided by a faculty member, teaching assistant, or staff member at the beginning of a new assignment or when a new hazard is introduced into the workplace.

The following training modules are mandatory for those working with the specific hazard or performing the specified functions. Online sessions may be held at any time. Classroom sessions are scheduled on a regular basis each term.

Format	Title	Course Number	Approximate Duration
Classroom	Emergency First Aid	SO1038	8 hours
Classroom	Incident Investigation	SO1012	3 hours
Online	Laboratory Safety	SO1010	45 minutes
Online	Supervisor's Safety Awareness	S01100	1 hour
Online	WHMIS 2015	SO2017	1 hour

Format	Title	Course Number	Approximate Duration
Classroom	Workplace Inspections	SO1007	3 hours

Every person working in a laboratory is responsible for ensuring that he or she:

- Completes all applicable health and safety training.
- Follows all applicable safety rules and practices.
- Uses and wears protective equipment as required.
- Reports unsafe equipment and working conditions to the laboratory supervisor.
- Reports all accidents/incidents to the laboratory supervisor, the health & safety coordinator, and/or the administrative officer.

YOU ARE RESPONSIBLE FOR YOUR OWN SAFETY

8. General Safety

8.1. Working Alone

Working alone under certain circumstances can increase an individual's risk to health and safety.

Procedures

1. Working alone, especially after regular business hours, should be avoided whenever possible.
2. Working alone requires supervisor/PI knowledge or approval.
3. Approval for working alone or after normal hours must consider:
    - Tasks and hazards involved in the work.
    - Consequences resulting from a worst-case scenario.
    - The possibility of an incident or injury that would prevent an individual from calling for help.
    - The individual's training and experience level
    - The time the work is to be conducted.
    - Access to emergency assistance
4. Conduct a risk assessment as per the guideline, identifying the hazards involved and safety protocols in place:
    a) High risk: Working alone prohibited as per applicable regulations.
    b) Moderate risk: Each area must develop a Standard Operating Procedure for working alone, including materials, equipment, and processes that may not be used, and security measures to protect against theft, property damage, or personal injury due to an intruder. All individuals who are approved to work alone must be trained in the SOP.
    c) Low risk: May work alone. However, minimal precautions are required, including periodic check-in (supervisor or Special Constable Service), access to phone and security measures to protect against theft, property damage, or personal injury

due to intruder. Individuals should follow the university police personal safety guide. A campus safety app is also available for download, which includes emergency tools, notifications, and tips for staying safe.

Working Alone Risk Assessment

High risk – working alone prohibited
• Confined space entry • Electrical Systems rated at more than 750 volts. • Trenches • Portable ladder that exceeds 6 metres in length and is not securely fastened, or work with a ladder that is likely to be endangered by traffic. • Use of fall arrest equipment (without travel restraint) or scaffolds • Machines and power tools that may cause critical injury (e.g., lathe, table saw, chain saw) • Work with acutely toxic material (e.g., cyanides, fumigants, hydrofluoric acid) as described in safety data sheet (SDS) • Use of supplied air or self-contained breathing apparatus (SCBA) • Risk of drowning • Use of a vehicle, boom, or similar equipment near live power lines where it is possible for any part of the equipment or its load to contact the live power line
Moderate risk – presence of others is recommended (within shouting distance) and SOP is required
• Large volumes of chemicals • X-rays • Radioactive materials (above exempt quantities) • Exposed, energized electrical systems. • Risk group 2 biohazard labs • Class 3B and 4 lasers • Work with materials acutely hazardous to health • Work with human subjects
Low Risk – May work alone
• Custodial work • Building maintenance with low risk • Laboratory work with minimal risk (analytical equipment, monitoring equipment or process, work not involving hazardous materials)

8.2. Safety Data Sheets (SDS)

SDSs provide information about chemical and toxicological properties and hazards, and recommended handling and emergency procedures. SDSs must be available for all controlled products in labs.

Hazardous materials likely to be found in Management Sciences labs include:

- Industrial/household cleaners

8.3. Smoking

“Smoking” means the act of holding a smoking device, for the purpose of burning, vaporizing, inhaling, or exhaling any substance.

“Smoking device” means a cigarette, cigar, pipe, hookah, or other apparatus used for smoking substances, including e-cigarettes.

Smoking/vaporizing of tobacco products is not permitted in any university building or vehicle nor in areas within 10 meters of all buildings.

Smoking of cannabis is not permitted on university property, except for the purposes of medicinal use, which may occur only with appropriate documentation provided to the university.

If smoking persists in a no smoking area:

1. Faculty and staff - advise your department management/supervisor.
2. Students - advise your department administrative contact or Dean's Office.

In public areas Special Constable Service shall assist line management with enforcement.

For individuals 19 years of age and over, up to 30 grams of cannabis product can be stored in a sealed container.

Growing or cultivating cannabis plants on campus is not permitted. It is illegal to drive while drug impaired.

Employees must be always fit for work, and working under the influence of cannabis will not be tolerated. An employee who appears to be under the influence will be sent home via taxi and scheduled to meet with their supervisor and human resources the following day.

See Policy 29 for more information.

8.4. Guidelines on Wearing Scented Products

Some people have become very sensitive to certain chemicals because of past exposure. They can suffer a wide range of health effects such as rashes, severe headaches, nausea, dizziness, and fatigue whenever they are exposed to very low levels of chemicals in scented products.

Be sensitive to others and try to avoid wearing scented products when interacting with others. If you have any concerns regarding scented products, talk to your supervisor. See the Safety Office guidelines on wearing scented products for more information.

9. Laboratory Safety

General lab rules are:

- No food or drink allowed in the lab.
- No tampering with wires or network cables.
- No use of illegal software.
- No compromising building or network security.

9.1. General Practices

Safety is a mutual responsibility. Familiarize yourself with the location and use of safety facilities. Know how to operate and understand the hazards before using any equipment. Failure to comply with the following rules may result in dismissal or suspension of laboratory privileges.

1. Be aware of the risks that are present in the lab you are working in.
2. Know and follow the safety rules and safe procedures.
3. Fire doors must be kept always closed.
4. Know and understand the hazards, safe handling, and standard operating procedures of the materials, equipment, and methods being used.
5. Review SDSs, equipment manuals, and procedure instructions before attempting to operate any machine or instrument.
6. Familiarize yourself with properties, hazards, and safe handling procedures of any chemicals or potentially hazardous materials before use.
7. Read labels carefully.
8. Never hurry. Work deliberately and carefully.
9. Learn the location of emergency exits, fire alarms, fire extinguishers, etc.
10. If you are unsure of any work to be done, ask the laboratory supervisor before proceeding.
11. Running, horseplay, pranks, and practical jokes are prohibited.
12. Report accidents and near misses promptly to the laboratory supervisor immediately.
13. Never operate equipment alone. Make sure that others are present and know how to react in an emergency. Always warn others of possible hazards.

Housekeeping

- Do not use stairways or hallways for storage.
- The aisles must be kept clear.
- Never block access to exits, emergency equipment, e.g., fire extinguishers, eye wash stations, emergency showers, or electrical panels.
- Maintain a clear 36” diameter area around all fire sprinkler heads.
- Keep the work area clear of all materials except those needed for your work.
- Maintain an orderly work area. If you spill something, clean it up immediately.
- Extra books, purses, etc. should be kept away from equipment that requires air flow or ventilation to prevent overheating.
- Equipment and chemicals must be properly stored and labeled.
- Clean up your work area once experiments are completed and before leaving.
- Properly dispose of materials, if any, in proper containers. Waste batteries can be deposited into receptacles for recycling.
- If leaving a lab unattended, turn off all ignition sources and lock the doors.
- Ensure drawers and doors are closed after use so they do not present a bump or trip hazard.
- Store large, heavy, or breakable items on lower and middle shelves.
- Be careful when lifting heavy objects.
- Step stools must be used to access items on high shelves.

- Do not overcrowd storage areas and shelves.
- Remove empty boxes and packing materials from lab.

Food

- Consumption of food, gum, and/or drink (including water) in research and teaching labs is prohibited.
- Use of lab equipment to store or prepare food is prohibited.
- Eating, drinking, smoking, handling contact lenses, applying cosmetics, and storing food for human consumption is not permitted in laboratory areas. If food is stored, it is done outside the laboratory area in cabinets or refrigerators designated and used for this purpose.
- Wash hands before leaving lab and before eating.

Clothing and Personal Protective Equipment

- Long hair must be tied back.
- No loose clothing may be worn (ties, jewelry, scarves, drawstrings, etc.)
- Closed toe shoes must be worn.
- Wear appropriate clothing and personal protective equipment, ensuring that it is in good working condition.
    a. Long sleeves should be worn to minimize burn hazards e.g., when using the soldering station
    b. Short sleeves or long sleeves rolled above elbow should worn around moving parts to minimize entanglement hazards.
    c. No shorts.
- Appropriate gloves must be worn to protect hands from chemicals or high temperatures.
- Work gloves must be worn to protect hands from abrasions.
- Safety glasses should be worn, especially when there is a risk for flying objects.
- Remove gloves before touching computers or phones, opening doors, etc.

9.2. Laboratory Security

Keep laboratories locked when unoccupied to avoid unauthorized entry. Leave doors unlocked while working in laboratory in case assistance is needed.

Individual users are responsible for the security of any space to which they have keys or combination codes and shall not admit unauthorized or non-registered persons into that space. Safeguarding university resources from unauthorized access, misuse, or removal is a duty of all faculty and staff. All laboratory users have a responsibility to take reasonable precautions against theft or misuse of materials, particularly those that could threaten the public. Any extraordinary laboratory security measures should be commensurate with the potential risks and imposed in a manner that does not unreasonably hamper research.

9.3. Electrical Safety

There is always a potential danger of electric shock or fire whenever there are outlets, plugs, wiring, or connections.

- Familiarize yourself with the location of circuit breaker panels in labs.
- Maintain unobstructed access to all electrical panels.
- Electrical cords must be secured.
- Connect to the power source **LAST.**
- Turn off and unplug equipment (instead of relying on interlocks that can fail) before removing the protective cover to replace a part, adjust, or troubleshoot.
- Do not use an electrical outlet switch if the protective cover is ajar, cracked, or missing.
- All electrical apparatus must be properly grounded.
- Never remove the ground pin of a 3-pronged plug.
- Do not run wires over moving or rotating equipment, on the floor, or string them across walkways from bench to bench, as this creates a tripping hazard.
- DO NOT use electric wires as support and never pull-on live wires.
- Ensure that all wires are dry before plugging into circuits.
- Remove electrical cords from the receptacle by grasping and pulling the plug, not the cord.
- Always pick up and carry portable equipment by the handle or base.
- Only use DRY hands and stand on a dry surface when using electrical equipment, plugging in an electric cord, etc.
- If electrical equipment emits smoke or a burning smell, shut off power immediately and take it out of service for repair.

Extension Cords

- Avoid using extension cords whenever possible.
- Extension cords must only be used as a temporary solution and should be appropriately rated for the job.
- Do not run extension cords under doors, across aisles, or hang from ceiling.
- Do not overload circuits by using power strips or multiple outlets on regular sockets.
- “Piggy-backing” or “Daisy-chaining” of extension cords is prohibited.

Report Abnormal Wear, Damage, or Equipment Failure

- Inspect electrical cords regularly – replace frayed or damaged cords and repair broken plugs.
- Inspect electrical equipment with power off and unplug frayed and damaged connections.
- If a piece of equipment fails while being used, report it immediately.
- Report defects/faults to your supervisor.
- If you receive a mild shock from a piece of equipment, turn it in for repair.
- Tag/Label equipment UNSAFE – DO NOT USE and describe the problem.
- Do not attempt to repair electrical equipment yourself. Only qualified and trained people should repair or modify electrical or electronic equipment.

All electrical equipment purchased, regardless of voltage, must be certified by an approved authority. Equipment will have a field approval mark from the Canadian Standards Association (CSA), Electrical Safety Authority (ESA), or an equivalent field approval mark acceptable under the Electrical Safety Code, i.e., Ontario Hydro (OH), International Approval Services (IAS), ULC.

Do not bring into the lab or use in the lab equipment that does not conform to ESC rules without specific permission from your instructor, TA, or lab technical personnel.

9.4. Rotating Components

- Do not work alone and ensure that the other person is familiar with the location of the emergency switch.
- Ensure that the emergency switch is easily accessible.
- Wherever possible, cover all moving components.
- Do not touch moving parts. There are numerous pinch points on the conveyor rollers and belt.
- Do not enter the middle area of the conveyor system.
- Do not attempt to adjust settings without assistance from the Laboratory Personnel.

9.5. Chemicals

- Treat every chemical as if it were hazardous.
- Read SDS before using a chemical.
- Wear safety goggles.
- Make sure all chemicals are clearly and currently labelled with the substance name, concentration, date, and name of the individual responsible.
- Never return chemicals to reagent bottles. Try for the correct amount and share any excess.
- Comply with fire regulations concerning storage quantities, types of approved containers and cabinets, proper labelling, etc. If uncertain about regulations, contact the lab manager/instructor/teaching assistant.
- Never allow a solvent to come into contact with your skin. Always wear gloves.
- Never “smell” a solvent. Read the label on the solvent bottle to identify its contents.
- Dispose of waste and broken glassware in proper containers.
- Clean up spills immediately.
- Do not store food in laboratories.
- Do not overfill or under-fill equipment.

9.6. Unattended Procedures

Do not leave an on-going experiment unattended.

Unattended lab procedures should be reviewed by the lab supervisor to ensure all hazards are controlled before leaving the experiment unattended.

- Unattended procedures should be visited periodically.
- Post contact information for the person conducting the experiment in case of emergency.
- Unattended heating may be done only with heating equipment that reliably maintains stable temperatures.
- Remove any flammable or combustible materials from the area.

9.7. Unauthorized Experiments

Never do unauthorized experiments. Research or other activities involving the use of lab space, materials, or equipment without the knowledge and approval of the responsible principal investigator is strictly prohibited.

9.8. Online Resources

The Safety Office serves as a health, safety, and environment (HSE) resource for health and safety. The Safety Office oversees many programs on campus and has specific procedures that must be followed to ensure compliance with UW policy and governmental regulations. https://uwaterloo.ca/safety-office/

Most governments have posted regulations pursuant to health and safety on the web and many institutions have placed their health and safety policies, procedures, and programs on the web as well.

10. Safety Training for Undergraduate Students

All undergraduate engineering students receive WHMIS training in 1A.

When students take a course which has some unusual hazards associated with the laboratory, special instructions are given. These are written instructions documenting the hazard and safety procedure and are accompanied by a brief explanation by the lab instructor. The student then signs that he/she understands the safety procedures and will follow them.

10.1. Expectations for Students

- Students must adhere to written safety rules, regulations, and standard operating procedures.
- Follow verbal safety instructions throughout the academic term. Since additional instructions may be given at the beginning of laboratory sessions, it is important that students arrive at each session on time.
- Complete mandatory safety training.
- Consult with PI/lab supervisor before using hazardous materials or conducting high risk experimental procedures and obtain prior approval if required.
- Keep the work area safe and uncluttered. Practice good housekeeping and chemical hygiene.
- Use personal protective equipment as required.
- Never work alone in the lab.
- Absolutely no food, drink, or smoking is permitted in the lab at any time.
- Use equipment for its intended purpose only.
- Report all broken equipment, emergencies, injuries, near misses, or safety concerns to the PI/lab supervisor.
- In the event of an emergency, call **911** and the Special Constable Service at ext. 22222.

It is expected that each student will work in a responsible manner and exercise good judgment and common sense. If at any time you are not sure how to handle a particular situation, ask

your teaching assistant or instructor for advice. **The area lab manager can give you advice if it is requested, but he/she is probably not totally familiar with your project.**

DO NOT TOUCH ANYTHING WITH WHICH YOU ARE NOT COMPLETELY FAMILIAR.

It is always better to ask questions than to risk harm to yourself or others, or damage to the equipment.

STUDENTS WHO DO NOT FOLLOW LABORATORY RULES MAY HAVE THEIR LABORATORY PRIVILEGES REVOKED.

11. Teaching Assistants Working in Teaching Laboratories

All teaching assistants (TA) are considered supervisors and must ensure the safety of all those who enter the lab. TAs who work in teaching laboratories receive written information specifying their responsibilities with respect to safety in the laboratory.

TAs should provide a lab orientation to ensure that all students are familiar with the use and location of equipment and safety aids. Orientation should include information on:

- Electrical equipment and manuals.
- Safety Data Sheets (SDSs).
- Review safety manuals and resources.
- Chemical inventories and demonstrated methods of access.
- Explain use of and limitations of personal protective equipment (PPE), e.g., safety glasses, face shields, temperature resistant gloves, etc.
- Importance of reporting every incident, accident, and unsafe conditions to a supervisor.
- Review emergency procedures and location of emergency equipment and supplies (nearest phone, fire extinguishers, first aid kits, etc.).
- Fire alarm pull stations.
- Evacuation procedures (emergency routes and exits).
- Procedures for medical emergencies and injuries.
- Information concerning the existence of and procedures for dealing with any unusual hazard which may exist in a particular laboratory.

All teaching assistants must sign a form which states that they understand their responsibilities and will follow the specified procedures.

12. Students on Unpaid Work Placements

A work/education agreement form is to be used by faculties/departments arranging unpaid placements. MTCU requires information on placement hours, grant eligible, and visa status. The form, adapted from MTCU, includes a student accident/injury report form. To comply with MTCU reporting requirements, faculties/departments are to complete the form with the student before placement, then provide the Safety Office with the completed form (including total hours worked) at the end of each term.

https://uwaterloo.ca/safety-office/occupational-health-safety/student-unpaid-work

13. Safety Procedures for Persons Working in Research Laboratories

All persons working in research laboratories must:

- Complete all applicable safety training.
- Become familiar with what to do in specific situations.
- Review all lab specific hazards and safety precautions with supervising researcher.
    - Become familiar with any unusual hazards in designated areas and procedures for dealing with them. Know the specific safety data sheets and equipment manual(s) for these areas.
- Follow all departmental and university safety procedures and policies.

Report any malfunction of equipment or equipment breakdowns to your project supervisor.

13.1. Expectations for Laboratory Personnel

- Review and follow relevant lab safety manual(s) and materials and hazards.
- Follow oral and written lab safety rules, regulations, and standard operating procedures required for the tasks assigned.
- Keep work areas safe and uncluttered.
- Some labs may have individual operating policies and procedures. The lab supervisor is responsible for providing this information if required.

14. Visiting Researchers and Scientists

The department hosts many visitors who use MSE facilities to pursue their own research or conduct collaborative research under faculty supervision. Those who are engaged in research activities in MSE are expected to comply with the university's policies designed to ensure that their work is conducted safely and in a professional manner. Visitors who will participate in laboratory research must receive appropriate safety training and be familiar with the University's policies concerning laboratory safety and the handling and disposal of hazardous materials. Visitors to the laboratory are expected to follow the same requirements as the laboratory workers regarding such items as personal protective equipment (PPE), proper dress, food, and drink, etc.

The faculty host/supervisor or designate is responsible for the appropriate lab safety orientation and other project hazards. It is expected that visitors to the laboratory will have similar worker's compensation coverage from their own institutions or companies. It is required that visitors to MSE labs provide evidence of insurance coverage.

15. Field Work Risk Management

Field work risk management form must be completed and approved prior to undertaking field work in any location external to UW that involves higher risk. The fieldwork risk management form is available on the Safety Office website.

https://uwaterloo.ca/safety-office/occupational-health-safety/fieldwork

Includes any activity that may cause personal harm and examples include, but are not limited to:

- Field work, field trips, and internships outside Canada and USA.
- Field work at industrial sites such as factories, mining operations, and construction sites.
- Activities that require specialized safety training and/or certification in the use of personal protective or safety equipment.
- Field work at any international or remote location.
- Travel to areas where immunization and/or significant health and safety precautions are required.
- Work at sites with hazardous substances.
- Field work, which by nature entails risk (e.g., travelling on water or ice, high altitude work, etc.)

16. Responsibilities

The principal investigator/laboratory supervisor has overall responsibility for safety in the lab. All lab users (employees, students, and visitors) must be provided with appropriate safety orientation when they are assigned to a lab. These apply to all persons working in any research laboratory and computer area whether they are receiving remuneration or not.

The principal investigator/laboratory supervisor should explain lab expectations, hazards, safety requirements/resources, and emergency procedures associated with the materials, equipment, procedures, etc. associated with their lab. The PI/LS is responsible for training staff and visitors in the use of all lab equipment and processes, and ensuring that they work in a safe manner, follow standard operating procedures, and use the required personal protective equipment.

PI/lab supervisors are responsible for inspections of their lab and ensuring deficiencies are corrected. In addition, they must inform all lab users of any required corrective actions.

The responsibilities with respect to the safety of university employees and students are outlined in Policy 34.

The lab supervisor or designate should escort all visitors to the lab due to potential hazards and to protect the security of the research, equipment, and supplies. The lab supervisor must not knowingly permit entrance to anyone not qualified to be in the lab i.e., has not completed the mandatory training or unauthorized persons without appointments.

Any critical injury at a workplace, whether suffered by a student, visitor, or another employee, may give rise to immediate reporting and evidence preservation obligations under the Occupational Health and Safety Act (the OHSA). These employer accident reporting obligations are initiated when any person, not just a worker, is killed or critically injured.

The safety of visitors is the responsibility of the person in the department who is hosting them or bringing them into the department. If a visitor will only be in the department for one day or less, AND will not be performing any laboratory duties, they should always be accompanied to ensure they are kept safe. If the visitor stays for longer than one day AND/OR they will be working in a lab, they should read this safety manual.

17. University Safety Committee

17.1. UW Joint Health and Safety Committee

Described in Policy 34 (available on the UW website)

https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-34

17.2. Safety Advisory Committee to the Dean of Engineering

The current MSE department representative is Zivojin Pantic.

17.3. Department of Management Science and Engineering Safety Committee

The membership consists of:

- Department chair or designate.
- Laboratory technician/department health & safety coordinator
- Administrative officer
- Department computing representative

This committee meets at least once a term to perform the following duties:

- Review and update the safety manual.
- Review any incident reports.
- Emergency planning.
- Ensure that laboratory areas are inspected regularly and that any safety infringements found are corrected promptly.
- Ensure that all persons using laboratory facilities have acknowledged (by signature) that they will comply with the regulations pertaining to the laboratory that they are working in.