



Faculty of Engineering and Applied Science

ENGINEERING LABORATORY POLICIES AND SAFETY PROTOCOL REFERENCE MANUAL

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1. INTRODUCTION

1.1 Objective

The objective of issuing this *Reference Manual* is to provide precautionary information and direction to those who will set up, implement, maintain, and/or use the Laboratories, Laboratory Support Areas, Machine Shops, and/or Hazardous Materials Storage Sites such that a safe and hazard-free workplace is maintained at all times. The above noted areas will be occupied by the Faculty of Engineering and Applied Science at the Ontario Tech University (Ontario Tech).

2. GUIDELINES and SUGGESTIONS

This *Reference Manual* is to serve as internal safety guidelines and suggestions for those working in an Undergraduate Laboratory, Research Laboratory, Laboratory Support Area, Machine Shop, and/or Hazardous Materials Storage Site.

All the safety protocols and policies outlined in this *Reference Manual* should be considered as the minimum requirements to be used, to maintain a safe and hazard-free workplace.

The proper safety procedures for all Ontario Tech personnel and students that will set up, implement, maintain, and/or use the Laboratories, Laboratory Support Areas, Machine Shops, and/or Hazardous Materials Storage Sites are not restricted only to those mentioned in this *Reference Manual* but are outlined in but not limited to the following safety documents:

- Laboratory Safety Manual for General Laboratory Operations (<https://shared.ontariotechu.ca/shared/department/healthandsafety/documents/lab-safety-manual.pdf>)
- Emergency Management Plan (<https://shared.ontariotechu.ca/shared/department/campus-safety/documents/letter-of-promulgation1.pdf>)
- Radiation Safety Manual (<https://shared.ontariotechu.ca/shared/department/healthandsafety/radiation-safety-program/radiation-safety-manual-2022.pdf>)
- Lab Hazardous Waste Manual (https://shared.ontariotechu.ca/shared/department/healthandsafety/documents/Hazardous_Waste_Manual.pdf)

All users accessing laboratories are also subject to all applicable safe occupation regulations, including but not limited to the following authorities:

- Ontario Ministry of Labour (<http://www.labour.gov.on.ca/english/hs/>)
- Canadian Centre for Occupational Health and Safety (<http://www.ccohs.ca/>)
- Ontario Ministry of Safety & Correctional Services - Office of the Fire Marshal (http://www.mcscs.jus.gov.on.ca/english/FireMarshal/OFMLanding/OFM_main.html)
- Electrical Safety Authority (<http://www.esasafe.com>)

- Technical Standards & Safety Authority (<http://www.tssa.org>)
- Health Canada (<http://www.hc-sc.gc.ca/index-eng.php>)
- Environment Canada (<https://www.ec.gc.ca/>)

Information in this manual may be amended from time to time.

3. RESPONSIBILITIES

3.1 Employers and Supervisors

- It is the responsibility of the Technical Services staffs and Laboratory Supervisors to confirm that laboratory users are informed about this *Reference Manual*, *The Emergency Guidelines* and that their employees have access to these resources. (<https://ontariotechu.ca/campus-services/safety-security/policies-and-procedures/index.php>),
- It is the responsibility of the Technical Services staffs and Laboratory Supervisors to have the student complete the Laboratory Policies and Safety Protocols Acknowledgement Form located at <https://shared.ontariotechu.ca/shared/faculty/feas/documents/student-acknowledge-form-current.pdf>

3.2 Worker (Student and Personnel)

- The worker is responsible for reading and comprehending the guidelines and information set out in this *Reference Manual*.
- The worker is responsible for completing Laboratory Policies and Safety Protocols Acknowledgement Form located at : <https://shared.ontariotechu.ca/shared/faculty/feas/documents/student-acknowledge-form-current.pdf>, and for submitting it to the Faculty member or designate for signature.
- Before entering and/or carrying out any task within the Laboratories, Laboratory Support Areas, Machine Shop or the Hazardous Material Storage Site the Laboratory users are responsible for reading and comprehending the *Emergency Guidelines*, (<https://ontariotechu.ca/campus-services/safety-security/policies-and-procedures/index.php>)
- Laboratory users are responsible for informing their supervisor when equipment is not operating properly or a concern is noticed.
- No lab user shall operate or use laboratory without proper training and safety orientation from their supervisor.
- It is highly recommended that all workers consult their supervisor and conduct safety assessment pertaining to their laboratory work such as equipment use, experiments and

other activities within the lab.

- Violation of any of the procedures in this *Reference Manual* may subject the Individual to suspension of laboratory privileges, dismissal, or legal action, if negligence is found.

4. UNDERGRADUATE/RESEARCH LABORATORY

4.1 Laboratory Policies

- Always follow instructions and use only machines and equipment that you are authorized and qualified to operate. If you have any questions, consult with your Supervisor, Instructor, Technical Services staff, or Teaching Assistant (TA), who assigned you the activities.
- Never work alone. Two people should be present whenever an experiment is being conducted. For research laboratory, one may work alone only if, approved by the supervisor. Refer to University's Working Alone Procedures for more details. (<https://hr.ontariotechu.ca/health-and-safety/procedures/working-alone-procedures.php>)
- All undergraduate experiments, and activities should be conducted under the supervision of an Instructor or TA, unless working without supervision is approved by the Laboratory Supervisor.
- For research laboratory experiments, supervision is highly recommended. Therefore, a Colleague, Instructor, or Co-Worker can be present for safety. If nobody is available in the laboratory, a **buddy system** should be used. Refer to University's Working Alone Procedures for more details. (<https://hr.ontariotechu.ca/health-and-safety/procedures/working-alone-procedures.php>)
- In certain situations people may establish a buddy system where people (i.e. Instructor or Supervisor) located in other parts of the building are responsible for checking to see that the laboratory user is safe. The "buddy" could call the user every 15 minutes or so to check on his/her safety. If the "buddy" does not get a response, he/she would then immediately go to the laboratory or call security at Ext 2400 to check on the user. As part of this system, a sign-in sheet may be placed at the laboratory entrance such that the users would log in and out. Refer to University's Working Alone Procedures for more details. (<https://hr.ontariotechu.ca/health-and-safety/procedures/working-alone-procedures.php>)
- Smoking is not permitted in any part of the building and within 10 meters of any entrance
- Food or beverages are not permitted in the laboratory unless an exception is granted by

the Laboratory Supervisor. Food and/or drinks are not permitted to be present, under any circumstances, in any laboratories containing radioactive sources.

- The Laboratory is to be kept well ventilated at all times. All work should stop immediately if the ventilation is not working properly and the failure must be reported to the Supervisor immediately.
- Do not start any experiment or activity in the laboratory if the required facilities and/or equipment (including any Personal Protective Equipment (PPE) or emergency equipment) are defective or have passed their effective dates. Notify your Laboratory Supervisor, TA or Technical Services staff immediately of the situation.
- Wear clothing that is appropriate for the tasks that are being performed. Do not wear loose sleeves, cuffs, rings, bracelets, sandals, open-toed shoes, or anything else that may get caught in moving machinery and cause injury.
- Long hair must be tied back, loose clothing secured, and neckties are to be removed. While an approved laboratory coat can be worn to minimize the risk of clothing getting caught in the machines. Caution must always be taken around the machinery.
- Horseplay around the machines or equipment will not be tolerated within the laboratory.
- Undergraduate laboratory equipment is only intended to be used for the teaching purpose of undergraduate students and should not be used for any research purpose unless prior approval has been given.
- After receiving approval from the appropriate Supervising Faculty, the Technical Services Staff should be contacted to ensure the equipment is available and functioning properly.
- Undergraduate laboratory equipment time use must be scheduled with Laboratory or Technical Services Staff.
- Laboratory cleanliness must be maintained at all time.
- When the work assignment has been completed or at the end of the day all tools, equipment accessories, and any remaining stock must be returned to their designated locations.
- All work areas must be cleaned. Garbage and waste must be disposed of properly. Garbage into the trash can, chemicals into designated disposal tanks, and recyclable materials into the recycle bin. Chemicals must be stored appropriately until disposed.

4.2 Laboratory Safety Protocols

- Know and follow the safety rules for specific experiments or tasks.

- Know the potential hazards associated with your work and ways of working safely to prevent such hazards. If you foresee a potential hazard, appropriate corrective action should be taken immediately to eliminate the hazard. If necessary, you should contact your Supervisor, Instructor, Technical Services staff, TA, and/or Ontario Tech security before proceeding.
- In case of fire, medical emergency or the need of security follow the emergency procedure outlined in the university's *Emergency Guidelines* (<https://ontariotechu.ca/campus-services/safety-security/policies-and-procedures/index.php>)
- Fire alarm. Ontario Tech has a two-tier fire alarm.
 - The first tier warning fire alarm is 20 beats / minute. This indicates that people should prepare to evacuate the area (Persons with disabilities or who need special attention should evacuate right away or move to the Designated Safety Zone immediately). Upon hearing this fire alarm, cease any active experiment or instruction, shut down the equipment, and store equipment and supplies in the designated area. Shut off any services (e.g., compressed air). Listen to Security via the PA system for instructions to evacuate wherever applicable. Then exit the laboratory and building. Doors should never be wedged open and it is essential to ensure the doors to the laboratory are shut upon leaving.
 - The second tier evacuation fire alarm is 120 beats / minute. This indicates that immediate evacuation is necessary. Upon hearing this alarm, active experiment or machinery use should cease immediately and, if possible, any materials should be safely stored before leaving the laboratory. Ensure the doors to the laboratory are shut upon leaving.
- Carbon monoxide detectors. During equipment operation, ventilation should always be operating. If the carbon monoxide detector sounds, shut down the equipment and leave the laboratory. Ensure the doors to the laboratory are shut. Contact your Supervisor immediately.
- In case of an emergency call Ext 2400 (Security Desk) immediately. If you think it is not safe to stay in your current location, leave immediately, call Security at Ext 2400 and state which service you require: Police, Fire, or Ambulance. To avoid confusion and miscommunication, we recommend you contact the Security first and allow Security staff to coordinate with Emergency Responders. Advise Security of:

Building Name and Address (OPG Engineering Building: 60 Founders Drive, or
UA: 31 Avenue of Champions)

**Room Number or Location Phone
Number or Extension Description of
the Emergency**

Alternatively, you can dial "0" for the Switchboard Operator so that the on-site

emergency response procedures can be initiated immediately. When the Switchboard is closed, all calls are automatically routed to the Security Desk. If you know someone has already called 911, please contact Security at Ext 2400 or dial “0” for the Switchboard and advise them that 911 has been called.

- Report unsafe work practices and unsafe conditions to the Laboratory Supervisor. Undergraduate students and laboratory users should report to the Instructor or TAs.
- Report all injuries including minor scratches, cuts, burns, slips and falls to the Laboratory Supervisor. First Aid Kits are located in each laboratory and an Incident Report should be filled in and filed with the Faculty Health and Safety Coordinator. Emergency procedures should be followed in the event of a serious injury. Corrective actions should be taken to prevent future injuries.
- Know the location of all emergency equipment, such as fire alarm pull stations, water hoses, fire extinguishers, defibrillator, carbon monoxide detectors, eyewash stations, safety showers, and stretcher. Know where they are located and how to use them.
- Use Personal Protective Equipment (PPE) as specified in your instructions and/or operation’s manual. Such equipment includes, but is not limited to, safety glasses, hearing protection, respirators, protective clothing, apron, safety boots, gloves, head protection, and face shields.
- Follow electrical safety rules and make sure your hands are dry before using electrical equipment, grounding portable electrical tools, or working near overhead power lines. Make sure electrical wires are connected properly without short circuit before operating. Wear protective clothing, well-insulated groves and boots, if required.

4.3 Laboratory Experiment Preparations

- Technical Services staffs are responsible to ensure that all laboratory equipment, used by the undergraduate, is maintained regularly and functioning properly for its intended use. Undergraduate laboratory equipment is to be inspected on a regular basis and proper preventive maintenance should be performed to ensure it is always in a good working condition. Report any problems to the Laboratory Supervisor or Technical Services staffs.
- Prior to conducting an experiment, inspect all the required apparatus carefully to ensure that no hazards are apparent (e.g., electrical wires are connected properly without short circuit, no cracks are found on valves and pipe components, safety shields are properly installed, etc.). If you have questions or concerns, consult with your Supervisor, Instructor, or Technical Services staffs.
- Technical Services staffs and Laboratory Supervisors are responsible for inspecting Personal Protective Equipment (PPE) required for each experiment to ensure that

they are available and ready to be used. Experiments are not to be run without the proper safety equipment in place. Report any problems to the Technical Services staffs.

- The Health and Safety Committee is responsible for assuring all First Aid Kits are adequately stocked.
- For new or unfamiliar equipment, you should check with your Supervisor, Instructor, or Technical Services staffs to see if the apparatus or machine exceeds the power rating of the laboratory (i.e. current rating of the apparatus/machine exceeds the fuse rating of the laboratory). Technical Services staffs should be informed before a high-power apparatus or machine is run. Due to the power ratings and restrictions of the building, it may be necessary to schedule the operation of this equipment to off-peak consumption times to avoid power overloads or failures.
- Prior to conducting an experiment, the individual running the experiment, should inform everyone present about the experiment, equipment, required safety procedures, emergency procedures, emergency exits, and PPE to be worn during the experiment. It is the responsibility of the individual running the experiment and equipment to ensure that those present are kept safe and that hazards minimized.
- The experiment should cease immediately if a concern, unsafe condition, or violation occurs and not to be resumed until the situation is corrected.
- Technical Services staffs are responsible to ensure that all equipment is properly identified and that safety protocols and procedures are maintained and available to all laboratory users
- For hazardous materials, the Faculty Health and Safety Coordinator is responsible for maintaining the *Safety Data Sheets* (SDS) records in a centralized location. This information should also be available in the appropriate laboratory or can be found from the *Canadian Centre for Occupational Health and Safety* website: (<https://www.ccohs.ca>).
- All materials must be properly labeled and stored. Do not use any material that you are unfamiliar with or do not know the procedures for safe handling, use, and disposal. Ask for the SDS if you have any questions. Do not guess about how to use the material.
- It is the users' responsibility to ensure that they are properly trained before using unfamiliar material. It is the user's supervisors responsibility to ensure that users are properly trained on material use and documentation of this fact is to be maintained.
- Always keep the phone number of Ontario Tech's security handy and make sure you know how to contact them in case of an emergency.

5. HAZARDOUS MATERIAL and STORAGE SITE

5.1 Hazardous Materials Storage Site Policies

- Only authorized personnel are permitted access to the Hazardous Materials Storage Site. All personnel that use the Hazardous Materials Storage Site must be properly trained in the use and storage of hazardous materials. This training must include WHMIS training and any additional training identified as necessary for the safe use and handling of hazardous materials. It is the responsibility of the supervisor to ensure that all authorized personnel are properly trained and the type(s) of training is/are documented.
- Hazardous materials such as flammable, explosive, corrosive, and radio-active substances should be handled and stored properly according to the By-laws, Acts, and/or Regulations set out by *The Office of Fire Marshal Ontario, Environment Canada, Occupational Safety and Health Association (OSHA), and National Fire Protection Association (NFPA)*.
- If equipment or machines are needed to transport the hazardous materials, the User must be authorized and able to operate the equipment. If you have any question, consult with your supervisor, Technical Services staff, or TA whoever assigned you the activities or tasks.
- Know and understand the SDS for all possible materials that are available in the Hazardous Materials Storage Site.
- Never work alone. In certain situations people may establish a buddy system where people located in other parts of the building are responsible for checking to see that the storage site user is safe at all times. The “buddy” could call the user every 15 minutes or so to check on his/her safety. If the “buddy” does not get a response, he/she would then immediately go to the storage site to check on the user. As part of this system, a sign-in sheet may be placed in the Storage Site that the users would fill in to indicate when they entered and left the area.
- Smoking is not permitted in the Hazardous Materials Storage Site.
- Food and beverages are not permitted in the Hazardous Materials Storage Site.
- Appropriate clothing for the tasks to be performed must be worn. Loose sleeves, cuffs, rings, bracelets, or anything else that may cause a trip over of the chemical, equipment and cause injuries should not be worn.
- Long hair must be tied back and neckties must be removed at all times.
- Sandals or opened toed shoes are not permitted in the Hazardous Materials Storage

Site.

- Steel-toe safety shoes are required if heavy lifting is to be performed.
- Horseplay is not permitted.
- Hazardous Materials Storage Site must be kept clean. Return chemicals and materials to the corresponding storage site. Clean up the area and put garbage into the trash can, chemical disposal tank, and recycle bin accordingly.
- If material is stored outside, proper protection must be taken when working outside. Know how to protect yourself when working outdoors in very cold weather or in direct sunlight (UV rays).

5.2 Hazardous Materials Storage Site Safety Protocols

- Store hazardous materials in approved containers and/or cabinets with proper identification labels.
- Flammable/explosive materials must be placed in separate containers that are approved for that particular purpose.
- Always try to avoid or reduce the amount of hazardous materials storage and/or usage. Try to find a nonflammable and noncorrosive, or less flammable and corrosive substitute to do the job effectively and safely
- Always try to keep the minimum required supply of hazardous materials in the storage site.
- Never block access to any fire/emergency equipment, exit or electrical panel with equipment or materials.
- Never store evaporative and/or flammable materials in an unventilated space.
- All storage of ionizing radioactive substances except Naturally Occurring Radioactive Materials (NORM) is governed by the Canadian Nuclear Safety Commission (CNSC) and internally by the University Radiation Safety Committee (URSC). Please refer to the Ontario Tech radiation safety manual for additional documentation).
- In case of fire, medical emergency and/or the need of Security, follow the emergency procedures outlined in Ontario Tech's *Emergency Guidelines* (<https://ontariotechu.ca/campus-services/safety-security/policies-and-procedures/index.php>)
- Fire alarm. Ontario Tech has a two tier fire alarm.
 - The first tier warning fire alarm is 20 beats / minute. This indicates that people

should prepare to evacuate the area (Persons with disabilities or who need special attention should evacuate right away or move to the Designated Safety Zone immediately). Upon hearing this fire alarm, cease any active work and store equipment and supplies to a safe area immediately. Shut off any services (e.g., compressed air) that are not needed. Listen to Security via the PA system for instructions to evacuate wherever applicable. Then exit the storage site and building. Doors should never be wedged open and it is essential to ensure the doors to the Storage Site are shut. Inform your buddy of your safe evacuation from the Storage Site.

- The second tier evacuation fire alarm is 120 beats / minute which indicates that immediate evacuation is necessary. Upon hearing this alarm, active work should cease immediately and, if possible, any materials should be safely stored before leaving the storage site. Ensure the doors to the storage site are shut. Inform your buddy of your safe evacuation from the storage site
- Carbon monoxide detectors. During equipment operation, ventilation should always be operating. If the carbon monoxide detector sounds, shut down the equipment and leave the area. Ensure the doors to the storage site are shut. Contact your Supervisor immediately.
- In case of an emergency, call Security at Ext. 2400 immediately. If you think it is not safe to stay in your current location, leave immediately. Call Security and state which service you require: Police, Fire, or Ambulance. To avoid confusion and miscommunication, we recommend that you contact Security first and allow Security staff to coordinate with emergency responders. Advise Security of:

Building Name and Address (OPG Engineering Building: 60 Founders Drive,
UA: 31 Avenue of Champions)

**Room Number or Location Phone
Number or Extension Description
of the Emergency**

- Alternatively, you can dial “0” for the Switchboard, speak to the Switchboard Operator so that on-site emergency response procedures can be initiated immediately. When the Switchboard is closed, all calls are automatically routed to Security. If you are aware that 911 has been called, contact Security at Ext 2400 or dial “0” for the Switchboard Operator and advise them that 911 has been called.
- Know the location of all emergency equipment, such as fire alarm pull stations, water hoses, fire extinguishers, defibrillator, carbon monoxide detectors, eyewash stations, safety showers, and stretcher. Know where they are located and how to use them.
- Hazardous work should never be undertaken if you feel it is unsafe or you are unqualified to do the work. Special safety training and procedures are needed for some hazardous work, including vessel entry, confined space entry, electrical work and welding. Discuss any concerns with your Supervisor before commencing work. All

work is governed by the Occupational Health and Safety Association and unsafe work can be legally refused.

- Technical Services staffs and/or Security must be notified when transporting hazardous materials on campus.

6. HAZARDOUS WASTE DISPOSAL

6.1 Hazardous Waste Disposal Policy:

- Hazardous waste such as scrap metal, solvents, petroleum-based products, biohazardous and radioactive materials...etc. must be handled with special care. Our Faculty has designated a Hazardous Waste Coordinator to assist workers of our Faculty to deal with the disposal of such hazardous waste. For the disposal and handling of radioactive materials, requests should be directed to our Radiation Safety Officer. Please refer to the Faculty of Engineering and Applied Science Safety Manual for details
(<https://shared.ontariotechu.ca/shared/faculty/feas/documents/Safety-Manual-Current.pdf>).

7. PREVENTATIVE MAINTENANCE

7.1 Preventive Maintenance Safety Protocols:

- Inspection and maintenance of equipment and machines should be done only by authorized personnel with valid maintenance and safety training.
 - Where applicable, all energy sources must be de-energized (i.e., zero energy state), before inspecting, cleaning, repairing or replacing electrical, pneumatic, or hydraulic equipment.
 - Once the equipment has been de-energized (electrical, mechanical, hydraulic, pneumatic, chemical, etc.), the equipment must be locked out and tagged, identifying that the machinery/equipment is out of service.
 - Where the unit must be de-energized at an electrical source, a pad lock must be put in place to prevent any accidental energization of the unit.
 - No one should be given the key/combination to the padlock unless authorized.
 - A tag must be placed on the lock indicating who has locked out the device, the reason and the date and time.
 - Exposure to open flames is never permitted while using cleaning solvents or flammable materials.
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- Any equipment that is not operating properly should be labeled and, if possible, removed from the laboratory to the Laboratory Support Room.

8. ASSOCIATED DOCUMENTATION

Ontario Tech University Faculty of Engineering and Applied Science “Safety Manual”

<https://shared.ontariotechu.ca/shared/faculty/feas/documents/Safety-Manual-Current.pdf>

Laboratory Policies and Safety Protocols Acknowledgement Form

<https://shared.ontariotechu.ca/shared/faculty/feas/documents/student-acknowledge-form-current.pdf>

9. REVISION HISTORY

Revision	Summary of Changes	Edited By:	Date Issued
Original	n/a	C. Chan B-A. Leech D. Gorman	Nov. 2004
Approved by: Faculty of Engineering and Applied Science on Sept. 10, 2004 Approved by: Health and Safety Committee on Oct. 21, 2004			
R1	Add new UOIT logo Reformatted completely	D. Roger	Apr. 2009
Approved by: Faculty of Engineering and Applied Science Aug. ,2009 Approved by: UOIT Health & Safety Committee Sept. 2009			
R2	Add Bullet #9 to Sec. 4.1 Laboratory Policies Add Sec. 6.1 Hazardous Waste Disposal Policy Modified Fire Alarm Procedure to include persons with disabilities in Sec. 4.2 & Sec. 5.2	C. Chan	Nov. 2009
R3	Updated university Branding, Added forms to the document, updated links	G. Rehal R. Papadimitriou	Jan. 2023