

# ***SAFETY FIRST!***

## **Basic Safety for Support Staff and Students**

### Department of Mechanical Engineering

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**UVic Occupational Health, Safety and Environment Policy # SS9200 states:**  
[https://www.uvic.ca/universitysecretary/assets/docs/policies/SS9200\\_3250\\_.pdf](https://www.uvic.ca/universitysecretary/assets/docs/policies/SS9200_3250_.pdf)

2.2 *Students Shall:*

2.2.1 *Comply with the University's safety policies and procedures, and departmental regulations associated with all of their University-related activities;*

2.2.2 *Seek guidance from their instructors or supervisors concerning safety-related knowledge and skills required to ensure safe performance in their University-related activities;*

2.2.3 *Attend safety training programs and meetings as instructed;*

2.2.4 *immediately report to their instructor or supervisor any accident, near accident, hazardous practice or condition with respect to their University-related activities;*  
*and*

2.2.5 *Comply with the health and safety policies and procedures of other institutions when they are engaged in University-related activities in these other institutions.*

## **1. GENERAL**

Familiarize yourself with the location of the exits, fire extinguishers, emergency shower station, and handicapped refuge areas on each floor that you use. Read this booklet and study the red and white maps/signs on each floor of the building, as well as the maps in the Appendix of this booklet. After entering the lab for the first session, locate the basic safety utilities such as: the exit, the fire extinguisher, the first aid kit, and the telephone.

Additional information on safety can be located at the [www2.worksafebc.com](http://www2.worksafebc.com) site and others

## **2. FIRST AID**

For simple cuts or minor first aid, use the First Aid Kits available in each room. The University Health Services may also be contacted at **8492**. All injuries to students should be reported to the instructor and/or technician. The Departmental Incident and Investigation Report must be filled by the injured student/staff and be submitted to their respective instructor/supervisor.

(<https://www.uvic.ca/ohse/assets/docs/worksafe/dept.incident.investigation.report.pdf>)

For medical emergencies call **911** and Traffic and Security at **7599**.

## **3. MECHANICAL HAZARDS**

Several mechanical hazards exist in most of the laboratories and the Machine Workshop, mostly associated with the use and handling of tools, demonstration and laboratory equipment, and machinery. They include:

- Displacement machinery (eg: Robot Arms, Links, Impact Testing, MTI machines, etc.)
- Air sucking and blowing fans and pumps (eg.: Air Lines, Wind Tunnels, etc.)
- Fluids pumping machinery (eg: Oil Pumps, Air Lines, Water Flume, hydraulic benches, etc.)
- Heat and gas producing equipment (eg: Diesel engine, HVAC Apparatuses, Heat Exchangers, etc.)
- Rotating machinery (eg: Lathes, Mills, Drills, Motors, etc.)

**Follow basic safety procedures to minimize potential safety hazards:**

1. Plan your activities and discuss safety concerns as a group before running an experiment.  
If unsure of the correct operating procedure, request assistance from your instructor or the TA.
2. Read the lab manual thoroughly, and observe specific safety concerns mentioned.
3. In general, do not turn on any mechanical equipment without:
  - a) The presence of an assistant, supervisor or a TA.
  - b) Anticipating the motion reach of any moving equipment and staying well clear of it.
  - c) Knowing beforehand how to turn the equipment "OFF".
4. Recognize sources of heat and avoid coming in contact with hot surfaces.
5. When operating machinery wear a lab coat, safety goggles, and if necessary, ear protectors. Make sure there are no dangling ties, gloves, or hair that can be sucked in or become tangled in machinery.
6. Immediately report any equipment malfunctions or unusual occurrences such as undue vibrating or heating of equipment to the TA and/or technical staff. If possible, switch the power off immediately.
7. Ensure that all equipment is powered-off at the end of each experiment.
8. Certain equipment can be turned "on" or used **only** by qualified operators.

This equipment and respective qualified operators include:

- **Equipment** in the **Machining Facility** ELW B103/111; Rodney Katz
- **Equipment** in the **Advanced Manufacturing Lab** ELW B127; Rodney Katz
- **All equipment** in the **Model Making Workshop** ELW B123; Rodney Katz

Specifics:

- **MTS/Laser Welder** in ELW B111; Rodney Katz.
- **Impact Tester** in ELW A135; trained Teaching Assistant.
- **CNC Machines** in ELW B119; Rodney Katz
- **Laser Cutting Machine** in ELW B118d; Rodney Katz/ Ian Fraser
- **3D Printing Machines** in ELW B118d and B118a; Ian Fraser
- **MTI Machines** in ELW A127; Ian Fraser
- **Wind Tunnels** in ELW A140; trained Teaching Assistant/ Ian Fraser

## 4. ELECTRICAL HAZARDS

1. When handling electric wires, never use them as supports and never pull on live wires.
2. Report to the TA and/or Technical Staff (eg. Ian Fraser) and do not use equipment with frayed wires or cracked insulation and equipment with damaged plugs or missing ground prongs.
3. Report to the TA and/or Technical Staff (eg. Ian Fraser) and do not use receptacles with loose mountings and/or weak gripping force.
4. Avoid pulling plugs by the cord and avoid rolling equipment over power cords.
5. Be sure that line-powered equipment has three-wire grounding cords and that you know how to use the equipment properly. Ask for help and instruction when needed.
6. Any electrical failure or any evidence of undue heating of equipment should be reported **immediately** to the instructor and/or Technical Staff. If you smell over-heated components or see smoke coming from any circuit or equipment, switch the power off **immediately**.
7. Ensure that all equipment is powered-off at the end of each experiment.
8. If serious electrical shock occurs, **dial 911 immediately**. Cardiopulmonary resuscitation (CPR) will often revive the victims of high-voltage shock. Only qualified people should attempt CPR.

## 5. FIRE

If a **Fire Alarm sounds**:

1. Secure any equipment you are using and switch off the power.
2. Close windows and doors behind you as you leave. Do **not** lock doors.
3. Evacuate the students from the lab.
4. Check that no one is left in the lab.
5. Leave building using recommended exits with reasonable speed.
6. Assist individuals with mobility disabilities to an Emergency Evacuation Site.
  - Follow the instructions of your emergency coordinators (see Appendix A).
  - **DO NOT** use elevators for evacuation.
  - **DO NOT** re-enter the building until allowed to do so by the Fire Department.
7. Move to your Department's evacuation site.

If **you discover a fire, smoke or witness an explosion**:

1. Shout for assistance.
2. Activate the nearest fire alarm pull station.
3. Call **911** and Campus Security 7599.
4. If it is a small fire, attempt to put it out with available fire equipment. **Do not endanger yourself and/or others at any time.**
5. If the fire is out of control or it is too large to handle with one fire extinguisher, isolate the fire

- by closing the doors and windows behind you as you leave. Do **not** lock the doors.
6. Leave building using recommended exit with reasonable speed.
  7. Assist individuals with mobility disabilities to an Emergency Evacuation Site.
    - Follow the instructions of your emergency coordinators (see Appendix A).
    - **DO NOT** use elevators for evacuation.
    - **DO NOT** re-enter the building until allowed to do so by the Fire Department.
  8. Move to your Department's evacuation site.
  9. Stand by to identify yourself and provide information to fire personnel.

## 6. CHEMICAL HAZARDS - SPILLS - FUEL STORAGE

1. When handling any chemicals, be sure to at least **ALWAYS** wear eye protection and gloves.
2. After handling the chemical replace and secure the lid or cap and place it back in its **designated cabinet**.
3. Report any spill to the TA and/or Technical Staff, or follow these steps for **CHEMICAL SPILL**:
  - Tend to any injuries if safe to do so, call **911 and** Campus Security at **7599**, and identify yourself to them.
  - Secure the area and close the door.
  - Pull the fire alarm to evacuate the building. Direct people away from the spill area.

## 7. EARTHQUAKES

### IF INDOORS:

**Take action at the first indication of ground shaking.**

1. Duck, cover, and hold. Crouch low to the ground, protect head with your arms, seek cover and hold onto heavy furniture. Stay inside; move away from windows, shelves, heavy objects and furniture that may fall. Take cover under a table or a desk, or in a strong doorway (anticipate that doors may slam shut).
2. In halls, stairways or other areas where no cover is available, move to an interior wall. Turn away from windows, kneel alongside the wall, bend your head close to your knees, clasp your hands firmly behind your neck covering the sides of your head with your elbows.
3. Elevators **must not** be used. They are extremely vulnerable to damage from earthquakes. Ground shaking may cause counterweights and other components to be torn from their connections, causing extensive damage to the elevator cabs and operating mechanisms.
4. When the shaking stops, Floor Emergency Coordinators (see Appendix A) direct people in evacuating the building. When exiting a building, move quickly through exits and away from buildings. Parapets and columns supporting roof overhangs may fall.
5. Assemble away from gas, sewer and power lines.

## **IF OUTDOORS:**

1. Assemble at the Department's Emergency Evacuation Site, or at an open space away from buildings, trees and overhead power lines.
2. Lie down or crouch low to the ground (legs will not be steady) and constantly survey the area for additional hazards.

## **8. EYE AND FACE PROTECTION**

(extract from WorkSafeBC)

### **8.14 Safety eyewear**

- (1) A worker must wear properly fitting **safety** eyewear appropriate to the conditions of the workplace if handling or exposed to materials which are likely to injure or irritate the eyes.
- (2) Properly fitting **safety** eyewear appropriate to the conditions of the workplace must be worn if a worker
  - (a) has 20/200 or less vision in either eye, or is blind in either eye, or
  - (b) is working on or testing electrical equipment energized at a potential greater than 30 volts.

### **8.15 Prescription safety eyewear**

- (1) Prescription **safety** eyewear must meet the requirements of *CSA Standard CAN/CSA-Z94.3-92, Industrial Eye and Face Protectors*.
- (2) Bifocal and trifocal glass lenses must not be used if there is danger of impact unless they are worn behind impact rated goggles or other eye protection acceptable to the Board.
- (3) If the use of polycarbonate or plastic prescription lenses is impracticable, due to the conditions of the workplace, and there is no danger of impact, workers may use prescription lenses made of treated **safety** glass meeting the requirements of *ANSI Standard Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection*.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

### **8.16 Side-shields**

**Safety** eyewear must be fitted with side-shields when necessary for the **safety** of a worker.

### **8.17 Face protection**

- (1) If there is a risk of face injury, suitable face protection must be worn.
- (2) Face protectors and non-prescription **safety** eyewear must meet the requirements of
  - (a) *CSA Standard CAN/CSA-Z94.3-92, Industrial Eye and Face Protectors*, or
  - (b) *ANSI Standard Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection*.
- (c) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

\* See also section [4.4](#) of the OHS Regulation.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

### **8.18 Contact lenses**

Adequate precautions must be taken if a hazardous substance or condition may adversely affect a worker wearing contact lenses.

## 9. PERSONAL CLOTHING AND ACCESSORIES

(extract from WorkSafe BC)

- (a) the clothing of the worker must fit closely about the body,
- (b) dangling neckwear, bracelets, wristwatches, rings or similar articles must not be worn, except for medical alert bracelets which may be worn with transparent bands that hold the bracelets snugly to the skin, and
- (c) cranial and facial hair must be confined, or worn at a length which will prevent it from being snagged or caught in the work process.
- (d) Open-toed shoes and sandals must not be worn in the facility.

## 10. HARASSMENT

**UVic Occupational Health, Safety and Environment Policy # GV0205 states:**

*Discrimination and Harassment are prohibited at the University of Victoria. Members of the University Community have the right to work, study and participate in activities at the university in an environment free of Discrimination and Harassment. Eligible WorkSafeBC claimants also have a right to an environment free of workplace bullying or harassment as it is defined by regulations pursuant to the British Columbia Workers' Compensation Act."*  
[http://www.uvic.ca/universitysecretary/assets/docs/policies/GV0205\\_1150\\_.pdf](http://www.uvic.ca/universitysecretary/assets/docs/policies/GV0205_1150_.pdf)

1. *The purpose of this policy is to prevent Discrimination and Harassment from taking place, and to act upon complaints of such behaviour promptly, fairly, judiciously and with due regard to confidentiality for all parties concerned.*
  - 1.1. *This policy recognizes that education about human rights and the development of work and learning cultures that value diversity and inclusion and foster respect are key to the prevention of Discrimination and Harassment.*
  - 1.2. *This policy deals with Discrimination and Harassment on the Prohibited Grounds of Discrimination set out in the British Columbia Human Rights Code. It also addresses Sexual Harassment and Personal Harassment. Discrimination and Harassment as defined in this policy are prohibited at the University of Victoria.*
  - 1.3. *This policy also deals with the process for addressing incidents of workplace bullying and harassment, as defined in regulations under the Workers' Compensation Act.\**
  - 1.4. *Nothing in this policy is intended to prohibit discrimination based upon bona fide and reasonable occupational or educational requirements.*

If a situation arises that person becomes a victim of verbal or physical harassment the person should immediately cease work, and report the abuse to the Department Chair. A written, email report of the incident is highly encouraged.

## Mech Undergraduate Laboratories

### Safety Regulations and Hints

#### GENERAL REGULATIONS

- Computers in Mechanical Engineering laboratories are loaded with licensed software. Unauthorized software is not allowed, and will be removed.
- It is unlawful to tamper with the lab security system, computers, or facilities.
- Keep lab doors closed at all times.
- Consumption of food or drinks is not permitted in any of the labs.
- First aid kits and fire extinguishers are available in every laboratory.
- Report any problems or shortcomings with the designated lab support personnel or to the **Manager of Laboratories: Dr. Vahid Ahsani**, Tel: 8893, Email: [mech.lab.manager@uvic.ca](mailto:mech.lab.manager@uvic.ca)

#### COMPUTATIONAL /DESIGN LABORATORY - ELW B228

Shared by all MECH students on a 24 hour basis. There are 45+ workstations, and they should be used in a considerate and professional manner.

- Computers should not be tampered with, or used for non-course related tasks.
- Software not licensed for use in this lab must not be installed on any machine.
- Afternoon lab use is prioritized reserved for scheduled course sessions.
- Windows should be kept closed as much as possible.
- Lab support person is Barry Kent, ELW A212, Tel: 6033, Email: [bkent@uvic.ca](mailto:bkent@uvic.ca)

#### CAM LABORATORY - ELW B119

Used in MECH 460. The CNC lathe and CNC mill in this lab can be operated **only** by, or with the presence of the lab support person; Rodney Katz, ELW B 111, Tel: 8667, Email: [rkatz@uvic.ca](mailto:rkatz@uvic.ca)

#### INSTRUMENTATION LABORATORY - ELW B232

Used for the following courses; MECH 455 Instrumentation, MECH 458 Mechatronics, Mech 380 Automatic Control Engineering, and MECH 285 Properties of Engineering Materials. Dangers in the lab include:

- Burns from the heating elements, glass vials and molten lead (Mech 285).
- Electric shock.
- Lab support person is Patrick Chang, ELW A216, Tel: 6032, Email: [pchang@uvic.ca](mailto:pchang@uvic.ca)



## **SOLID MECHANICS LABORATORY - ELW A135**

Used for Mech 220 and Mech 320 Solid Mechanics courses. The most dangerous piece of equipment there is the IMPACT TESTER. The mass of the swinging pendulum is high and will cause permanent injury to anything in its way. It should **ONLY** be operated by TA's who have been trained and are experienced in its use, and understand its safety aspects. During its demonstrations, all students **must** stay well outside of the chained perimeter. Watch for:

- Being brushed or impacted by the Impact Tester's pendulum.
- Dropped weights on hands and feet.
- Lab support person; Ian Fraser, ELW A218, Tel: 7297, Email: [ifraser@uvic.ca](mailto:ifraser@uvic.ca)

## **THERMODYNAMICS AND ENERGY CONVERSION LABORATORY - ELW A127**

Used for MECH 390 Energy Conversion and MECH 220 Tensile Test experiment with MTI machines. It contains the Sterling Engine, Air Conditioning Experiment (HVAC), and the MTI-10K Machines.

The Air Conditioning (HVAC) apparatuses each has a boiler which is electrically heated. All equipment in this lab should be operated only by TA's who were trained in the equipment's use. To watch for:

- Burns from the boiler on the Air Conditioning (HVAC) apparatuses.
- Loose/broken samples from the Tensile Test experiment with MTI-10 machines
- Lab support person; Ian Fraser, ELW A218, Tel: 7297, Email: [ifraser@uvic.ca](mailto:ifraser@uvic.ca)

## **FLUIDS MECHANICS AND HEAT TRANSFER LABORATORY - ELW A140**

Used for MECH 345 Mechanics of Fluids I and Mech 395 Heat Transfer. The lab contains large equipment to monitor fluid flow. Most dangerous is the wind tunnel. Keep well away from the intake fan. Watch for:

- Hair, clothes, being sucked into the Wind Tunnel.
- Water flowing over the top of the tank, in the Water Flume.
- Correct valve adjustments in the Oil Line.
- Lab support person; Rodney Katz, ELW 111, Tel: 8667, Email: [rkatz@uvic.ca](mailto:rkatz@uvic.ca) and Ian Fraser, ELW A218, Tel: 7297, Email: [ifraser@uvic.ca](mailto:ifraser@uvic.ca)

## **MECHANICAL VIBRATION / SENSORS AND ACTUATORS / ROBOTICS - ELW A243**

Used for MECH 330 Introduction to Mechanical Vibration, MECH 420 Robotics, and MECH 450F Sensors and Actuators. It contains electronic instrumentation, and electro-mechanical apparatus. Watch for:

- Electric shock.
- Rotating equipment.
- Lab support person; Ian Fraser, ELW A218, Tel: 7297, Email: [ifraser@uvic.ca](mailto:ifraser@uvic.ca)

## **DESIGN FACILITY - ELW B103/B111**

This is a working area consisting of the Machine Shops in B111, and B103. Both rooms containing major power and tools, which can present a very real physical danger when not used properly. The Shop in B111 is for use **ONLY** by support staff.

Room B103 is for use by students taking the Mech 200, 350, and 400, and some 499 courses, but **ONLY** after taking a **Shop Safety Seminar**, where he/she has shown proficiency in the use of the hand tools, shop machinery, and basic safety aspects.

Protective eyewear **must be worn at all times** by those who enter into the Facility.

The Facility Manager is Rodney Katz, Office: ELW 111a, Tel: 8667, Email: [rkatz@uvic.ca](mailto:rkatz@uvic.ca)

A separate “**Shop Policy**” deals in details with specific access, responsibility, and safety issues in this facility.

## **DESIGN PROJECT STUDIO - ELW B188d**

This room is for general use by undergraduate students taking the MECH 350, BME 350, and MECH 400, and some 499 courses. It contains workbenches, hand tools, laser cutting machine, 3D printers, and a drill press for basic project design and construction. Safety glasses are supplied, and appropriate safety signs are posted.

- Lab support person; Rodney Katz, ELW 111, Tel: 8667, Email: [rkatz@uvic.ca](mailto:rkatz@uvic.ca) and Ian Fraser, ELW A218, Tel: 7297, Email: [ifraser@uvic.ca](mailto:ifraser@uvic.ca)

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Mechanical Engineering Department's designated Emergency Evacuation site (Designated Refuge area): The **parking area** South of ELW, between ELW and the Ring Road.

January 31, 2023