

Sedra Student Design Centre

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# **SAFETY MANUAL**

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Revised: March 20, 2017

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## 1. INTRODUCTION

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The *Sedra Student Design Centre Safety Manual* is intended for use by all individuals, students, staff, faculty and visitors accessing the UW Faculty of Engineering Sedra Student Design Center (SSDC) as part of a student team, class activity, or special event. Teams are provided with an unprecedented level of access and resources through the SSDC; as a result, policies, procedures, and guidance must be implemented to assist students with operating safely in the space.

The goal of the Safety Manual is to:

1. Construct procedures:
  - a. To guide teams in the creation of their own safety programs.
  - b. To provide for enforcement measures available to the SSDC management, based on Policy 34 and Policy 71.
2. Outline practical information:
  - a. On the specific hazards present at the SSDC.
  - b. On the resources available to teams at the SSDC to operate safely.

Thousands of people visit the SSDC each year; it is the responsibility of design teams, lab instructors, and event organizers to read this manual and ensure all activities are done as safely as possible. Being familiar with and following the rules and procedures described in this manual will promote a safe working environment and reduce the risk of injury.

The Safety Manual is organized into four main sections, as follow:

- *University of Waterloo Policies* goes through Policy 34 and Policy 71, which provide the basis for the rest of the Safety Manual.
- The *General Information* section covers hours of operation, access, SDC staff, safety equipment and emergency procedures.
- *Safety in Shared-use Areas* identifies potential hazards in the spaces common to all SSDC users and presents processes to mitigate these hazards.
- The *Team Safety Programs* section outlines the requirements for teams. Since they are the primary users of the space, and often do the highest-risk activities, they must develop their own safety programs in accordance with the guidelines set forward in this section.

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## 2. UNIVERSITY OF WATERLOO POLICIES

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The Sedra Student Design Centre Safety Manual is based on two University of Waterloo policies:

1. **Policy 34 – Health, Safety and Environment.** This policy is concerned with the University of Waterloo as a safe workplace, and deals primarily with the responsibilities of supervisors and employees. In addition, all members of the university community – students included – have primary responsibility for their own safety and actions, and others affected by their actions.
2. **Policy 71 – Student Discipline.** Due to the nature of work at the SSDC, the most important section of this policy concerns non-academic conduct. In particular, students must allow for the peaceful and safe enjoyment of the University campus and facilities, respect the property of others, and abide by all University policies, municipal bylaws, and provincial and federal legislation.
  - a. Examples of non-academic offences under Policy 71 are theft, violating safety regulations, unauthorized use of equipment, unethical behaviour, and misuse of university resources.

Policy 34 is available in full in the appendix on page 32. Policy 71 is available as a truncated version in the appendix on page 34.

## 3. GENERAL INFORMATION

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### 3.1 Hours of Operation

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The Student Design Center is available 24 hours per day, 7 days per week for use by registered users (see Section 3.2.1 for details on registered users). The SSDC is located within Engineering 5 which operates under the following schedule:

- Open: 7 am Monday to 11 pm Friday, 7 am to 11 pm Saturday and Sunday
- Closed: all other times and on all University holidays

### 3.2 Access

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- **Commons (E5-1001):** This area is open to the general public during normal business hours, 8:30am - 4:30pm Monday - Friday. These rooms are kept unlocked after hours, but are intended for use by the student design teams only.
- **Team Work Bays (E5-1002 – 1012, E5-2003, E5-1101, E5-1104):** Each team has access to their work bays via a combination lock. Each team will be given their own code. Codes are set by the Manager and can be changed, deleted or added as necessary.
- **Engine Assembly Room (E5-1013) –** All teams share access to this room via a combination lock. One code will be given to all teams. Codes are set by the Manager and can be changed, deleted or added as necessary.
- **Painting Room (E5-1016), Loading / Washbay (E5-1102) –** These rooms are unlocked but are intended for student team use only.
- **Hydrogen Vehicle Work Bay (E5-1103) –** This room is used exclusively by the UW Alternative Fuels Team, who access it via a combination lock. Codes are set by the Manager and can be changed, deleted or added as necessary.
- **Engine Test Rooms (E5-1107, E5-1106) –** These rooms are used by various student team members for engine testing, under supervision of a staff member. Under certain circumstances students will be provided a key by the Director or Manager, once they have met engine test room requirements. The Engine Test Cell Safety Manual contains details on these procedures.
- **Electronics Assembly and Test (E5-2006), Student Team Office (E5-2001), Meeting Rooms (E5-2103, 2004) –** Team members who have been given permission to use these rooms have access via electronic key fob.
- **Team Meeting Rooms (E5-2007) –** Team members who have been given permission to use this room have access via a combination lock. Codes are set by the Manager and can be changed, deleted or added as necessary.
- **3D Print Centre (E5-2002) –** This room is intended only for co-op students and other SSDC staff. Access is given by electronic key fob.

### 3.2.1 Registered Users

Team members must complete and sign the Team Code of Conduct Form, which requires that teams:

- Read and understand the SSDC Safety Manual and the team safety manual.
- Have completed the online SO1010 Laboratory Safety Training.
- Present a valid Engineering Student Machine Shop safety card.
- Complete WHMIS for students and present an unofficial transcript showing its completion, or complete SO1002 WHMIS for Employees.

This ensures a baseline level of safety knowledge has been obtained for the use of hand tools and other equipment. More information on training required from users, co-op students, and supervisors is available in section 5.1.8 Training on page 28.

Upon completion of the Team Code of Conduct form, the individual will receive access to:

1. The SSDC computer stations, located in the CAD Room (E5-2001) and the Electronics Assembly Room (E5-2006).
2. After-hours access to the work bay through the use of a combination code, *at the discretion of their team lead*.
3. The SSDC SharePoint site, enabling the member to book space for their team.
4. SSDC shared-use areas, such as the paint room, design studio (E5-2001), electronics assembly room, etc.

### 3.3 Staff

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**Director** Peter Teertstra  
Office: E5-2105  
Phone: 519 888 4567 x35610 email: peter.teertstra@uwaterloo.ca

**Manager** TBA  
Office: E5  
Phone: 519 888 4567 x31442 email: @uwaterloo.ca

**Administrative Assistants** Paula Petrie  
Office: E5-2104  
Phone: 519 888 4567 x31484 email: ppetrie@uwaterloo.ca

Victoria Alderson  
Office: E5-2109  
Phone: 519-888-4567 x31018 email: victoria.alderson@uwaterloo.ca

### 3.4 Capacity

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The room capacities are listed below. For team bays and the SSDC commons, these are hard limits from fire code; for other rooms, it is the safe capacity based on the number of workstations.

Table 1. Room capacity

Room	Name	Capacity	Notes
E5-1001	Commons	????	
E5-1816	Drive aisle	???	The drive aisle can be used as overflow to the SSDC commons. Event planners wishing to make use of this space should ensure the bulk of the hall way remains unblocked.
E5-1003	Team bays (first floor)	????	
E5-1004			
E5-1006			
E5-1007			
E5-1008			
E5-1009			
E5-1011			
E5-1012			
E5-1101			
E5-1015		Paint room	????
E5-1013	Engine assembly room	6	Very limited work surfaces available. Due to the nature of the work being done and space limitations, teams should allow access only to essential people.
E5-2001	Team Studio/CAD Room	45	25 – work stations (either computer or powered laptop stations). 20 – meeting tables (10 each)
E5-2002	3D Print Centre	10	3D Print Centre has four workstations and there is little reason for customers to stay after they have set-up their order. Due to the nature of the chemical processes, untrained/unsupervised customers should not be left in these rooms.
E5-2004	Meeting room	60	Limited by the number of seats. For larger events, use the SSDC Commons – E5-1001 (see Admin Assistant, SSDC) or use E5-3101/3102 (MME Lecture halls).
E5-2103	Meeting room	14	Small meeting room intended for sub-team meetings, committees, etc. but <i>not whole team meetings</i> .
E5-2007	Meeting room	25	Medium sized meeting room appropriate for meetings with the entire team (if the group is small) or large sub-teams.
E5-2006	Electronics assembly room	10	Limited workbench space. As a result of the nature of the work (soldering) the room should not be crowded.

### 3.5 Safety Equipment

#### 3.5.1 Fire Extinguishers

Fire extinguishers are located in each team workbay, as well as in all shared-use work and common areas. All fire extinguishers in the SSDC are multi-purpose dry chemical extinguishers, which can be used on any type of fire except combustible metal i.e. magnesium or sodium.

The following procedure should be followed when using fire extinguisher:

1. Quickly size up the situation, and stay calm. Most fire extinguishers only last for 30-40 seconds
2. Fire extinguishers are located near room exits or in hose cabinets located in the hallway



3. Get everyone out and pull fire alarm. If fire is still small, fight it using appropriate extinguisher
4. Keep near the door – so you have an escape
5. Stay low – out of heat and smoke
6. Use the PASS technique - Pull the pin or locking device, Aim low at the base of the fire, Squeeze the handle, Sweep the agent slowly and evenly at the base of the fire

Once a fire extinguisher has been used, the SSDC Manager must be notified immediately. Fire extinguishers are serviced regularly by Plant Operations.

Fire extinguishers are not be removed from their cabinet or mount except to fight fires. If a team requires a fire extinguisher elsewhere (e.g., at the race track) they may request a fire extinguisher from the Director, SSDC.

### 3.5.2 First Aid Kits

First aid kits are located in three areas in the SDC: in the Engineering Student Machine Shop, E5-1101D; in the SSDC Commons, E5-1001; and in the Team Office, E5-2001 (see map on page 39). The kits are inspected every 4 months and will contain the following items:

- 1 - First Aid Flip Booklet (ECIS)
- 6 - Hand cleansing towelettes
- 1 - Card of safety pins
- 24 - Adhesive dressings individually packaged
- 6 - Non adherent absorbent pads 7.6 cm x 10.2 cm (3 x 4")
- Gauze bandages 10 cm (4")
- 2 - Compress bandage surgical pads (pressure dressings)
- 4 - Triangular bandages
- 1 - Roll non-adhesive tape 2.5 cm (2")
- 1 - First aid scissors
- 2 - Instant cold packs
- Pairs nitrile gloves
- 2 - Single use CPR protective devices

Please note that medications, ointments or disinfectants are **not** permitted in first aid kits.

Anyone who uses the first aid kits located in E5-1001 or E5-2001 should notify the SSDC Manager as soon as possible to report the injury and to assess whether the first aid kit needs to be re-stocked. This can be done through the SDC Incident Report form: [uwaterloo.ca/sdc/report](http://uwaterloo.ca/sdc/report)

First aid is available at the Engineering Machine Shop in E5-1101D.

### 3.5.3 Phones - 911

All the phones in E5 can be used to place emergency 911 calls. When a 911 call is made, the Campus Police automatically receive a signal which displays the exact location of the call. An officer is immediately dispatched to this location. If the emergency is not in the same location as

the call is placed, someone should wait near the phone from which the call was made to direct the officer to the scene.

Please note that 911 calls should be placed from a campus phone and not a cellular phone. Calls placed from cellular phones will not be monitored by the Campus Police and emergency services will not know the location of the accident or how to get there. If required to call 911 from a cellular phone, follow-up with a call to UW Police (519-888-4911) immediately afterwards so they may assist.

There is a phone in the E5-1001 commons that is intended for emergency use.

### **3.5.4 Eyewash Stations**

Eyewash stations are located at the north and south ends of the Commons E5-1001, in the Hydrogen Vehicle Work Bay E5-1103, in the Engine Assembly Room E5-1013, in the Engine Test Cell E5-1106, and in the 3D Print Centre E5-2002, as shown on the map in the Appendix. In case of emergency, use the following procedure.<sup>1</sup>

1. Flush eyes for at least 15 minutes.
2. Keep eyes open and rotate the eyeballs in all directions to remove contaminants from around the eyes. An injured person may require assistance.
3. Call UW Police immediately by dialling 911 on a Campus Phone or 519-888-4911.
4. Collect and read the material safety data sheet for the chemical.
5. Once help has arrived, report the incident to the Manager/Director, SSDC.

### **3.5.5 Safety Showers**

Safety showers are located at the north end of the Commons E5-1001 and in the Hydrogen Vehicle Work Bay E5-1103, as shown in the map in the Appendix. There should be no storage in the yellow lines that surround the safety showers. In case of emergency, use the following procedure.<sup>2</sup>

1. Flush affected areas with copious amounts of water for at least 15 minutes. Protect the eyes from inadvertent contamination.
2. Removed contaminated clothing, jewelry, and shoes. Do not let modesty slow you down – every second counts. Use a clean lab coat to provide the victim with privacy and warmth.
3. Call UW Police immediately by dialling 911 on a campus phone or 519-888-4911.
4. Collect and read the material safety data sheet for the chemical.
5. Once help has arrived, report the incident to the Manager/Director, SSDC.

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<sup>1</sup> Procedures adapted from UC San Diego safety office, see <http://blink.ucsd.edu/safety/research-lab/laboratory/eye-wash.html#Eye-wash-operation>

<sup>2</sup> Procedures adapted from UC San Diego safety office, see <http://blink.ucsd.edu/safety/research-lab/laboratory/eye-wash.html#Emergency-shower-operation>

### 3.5.6 Fire Alarms

There is a fire alarm with a strobe light in each bay. The strobe light must be unobstructed, and is used to announce a fire to people who are hearing impaired.

### 3.5.7 Carbon Monoxide Detectors

Each team work bay, in addition to common areas like the engine assembly room, are equipped with a carbon monoxide detector. These are calibrated annually, as coordinated by Rick Zalagenas from Plant Operations. When a CO detector goes off, the area ventilation system increases to evacuate the fumes. If a CO detector goes off:

1. Isolate the source of the CO leak and turn off the source of the leak.
2. Silence the alarm
3. If the source of the CO leak is unclear, or if the alarm continues to go off, evacuate the area and phone UW Police 519-888-4911 or ext. 22222.

### 3.5.8 Other Detectors

- In the hydrogen vehicle work bay E5-1103, there is a hydrogen gas detector. If it detects hydrogen gas, the room's electrical system is shut down to prevent explosion.
- Outside Engineering 5, there is an oil and solvent trap for wastewater from the entire building. If sufficient levels of oil or solvent have been flushed down the drain, they are caught in the trap and an alarm is activated.

### 3.5.9 Spill Kits

Spill kits are located throughout the Sedra Student Design Centre. These are pails with sorbent inside. When a spill of oils, solvents, or coolants occurs:

1. Stop the source of the spill. If there is a leak, try to close the leak, or place the part in another container to prevent the spill from spreading.
2. Obtain a spill kit with sorbent. This will absorb approximately 25x their weight. Apply it to the spill to soak everything up. Spill kit locations are listed below.
3. Once the spill has been cleared, place the used sorbent in the pail and place it in the Engine Assembly Room at the hazardous waste disposal area. Label it appropriately (follow guidelines on page 18).
4. Immediately notify the Manager or Director, SSDC so they can arrange for its disposal and acquire another spill kit for the team. This can be done through an incident report: [uwaterloo.ca/sdc/report](http://uwaterloo.ca/sdc/report)

Spill kits are located in the following work bays/areas:

- 3D Print Centre (E5-2002) – **Hazmat**
- Baja (E5-1012)
- Electric Motorsport (E5-1104)
- Engine Assembly Room (E5-1013) – **Common to all teams**
- Engine test cell (E5-1106)

- Formula SAE (E5-1009)
- Hydrogen vehicle work bay (E5-1103).
- Midnight Sun (E5-1002)
- Rocketry (E5-1008) – **Hazmat**
- Snowmobile (E5-1006)
- UWAFI (E5-1011)
- Waterloo Hybrid (E5-1007)

Not all teams have spill kits since not all teams are working with chemicals or fluids that could be spilled. The spill kit in the Engine Assembly Room can be used by other teams, if required, and contains additional sorbent if more is required.

The 3D Print Centre and Rocketry team have additional hazmat sorbent, which is pink and is base- and acid-resistant. If these are used, the Director must be notified immediately to restock them and to assess the situation. Depending on the situation, the UW Safety Office or UW Police should also be contacted immediately for assistance (see details in Section 3.6.4 on page 15). There is additional hazmat sorbent located in the 3D Print Centre. Teams that feel their work necessitates this hazmat sorbent may contact the Director, SSSC, to receive some in their spill kit.

#### **3.5.10 Flammable Fuel Storage**

No more than 300 L of combustibles (class II and class III) and flammables (class I), of which no more than 50 L can be flammable (class I), can be outside of a flammable liquid storage cabinet at any one time, per team.

Flammable fuels cannot be in a container greater than 5 L in size unless they are in the flammable fuel storage cabinet. Additionally, there is a concrete bunker outside the wash bay, which has been designed for flammable fuel storage. Keys for both are located in E5-2000, and the Manager/Director must be notified before storing fuel in the bunker or cabinet. When removing flammables from the cabinet, place them into containers no greater than 5 L in size. This must be done outside.

Inside Engineering 5, flammables must be kept inside the flammable fuel storage cabinet inside the Wash Bay. The key is available in E5-2000, and the Manager/Director must be notified prior to using the storage cabinet.

All containers placed inside the fuel storage cabinet must be labelled clearly and tightly closed. They should also have a team name on them. There is no storage of any other chemicals than flammables in the flammable fuel storage cabinet.

#### **3.5.11 Chemical Storage**

- Collect an MSDS for all chemicals and place in the team MSDS binder.
- Separate chemicals by their chemical classes.
- High hazard chemicals should be in separate cabinets, and organic and inorganic materials should be segregated from one another.

- Do not store chemicals until they have been clearly labelled.
- Do not store old or outdated chemicals. Remove all chemicals past their expiration date. Chemicals that have not been used for six months to one year should be discarded.
- Liquid chemicals should not be stored above eye level.

<i>Material</i>	<i>Storage conditions</i>	<i>Examples</i>
Flammables	<ul style="list-style-type: none"> <li>• Store in flammable liquid storage cabinet</li> <li>• Separate from oxidizing materials</li> </ul>	Acetone Ethanol
Non-flammable solvents	<ul style="list-style-type: none"> <li>• Store in cabinet</li> <li>• Can be stored with flammable liquids</li> <li>• Separate from oxidizing materials</li> </ul>	Carbon tetrachloride Ethylene glycol
Acids	<ul style="list-style-type: none"> <li>• Store in cabinet, dry area (acid storage cabinet is preferable for large quantities)</li> <li>• Separate oxidizing acids, organic acids and mineral acids</li> <li>• Use plastic bins to provide separate areas in the same cabinet</li> <li>• Separate perchloric acid from all other acids using ceramic glass or clay bins</li> </ul>	Nitric acid Hydrochloric acid Sulfuric acid
Caustics	<ul style="list-style-type: none"> <li>• Store in cabinet, dry area</li> <li>• Separate from acids</li> <li>• Separate from caustics, cyanides, sulfides</li> </ul>	Ammonium hydroxide Sodium hydroxide Potassium hydroxide
Water reactive chemicals	<ul style="list-style-type: none"> <li>• Store in cabinet, dry location</li> <li>• Separate from aqueous solutions</li> </ul>	Sodium Potassium Lithium
Oxidizers	<ul style="list-style-type: none"> <li>• Store in cabinet of non-combustible material</li> <li>• Separate from flammable and combustible materials</li> </ul>	Sodium hypochlorite Benzoyl peroxide Potassium permanganate
Non-volatile, non-reactive solids	<ul style="list-style-type: none"> <li>• Store in cabinets or open shelves with edge guards</li> </ul>	Agar Sodium Chloride Sodium bicarbonate

More detailed information is available from the Safety Office for teams who have specific concerns about their chemical storage. The Safety Office website is a good starting point for teams with concerns.

## 3.6 Emergency Procedures

### 3.6.1 Fires

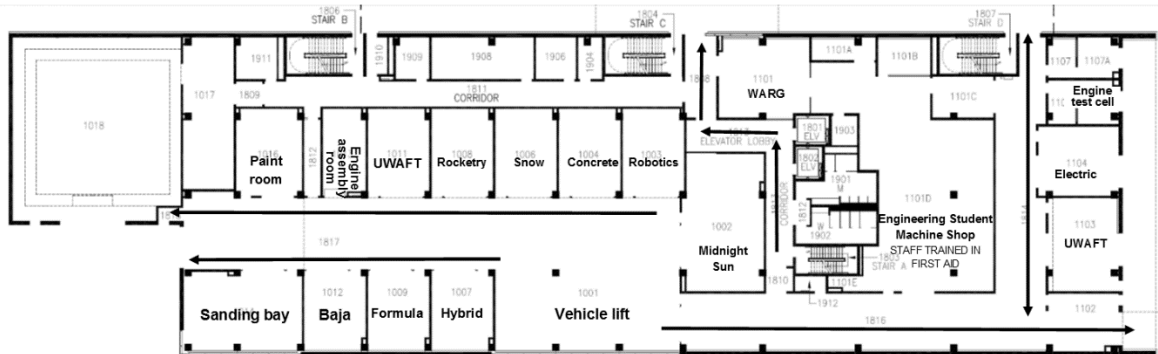
If you discover a fire:

1. Activate the nearest wall mounted fire alarm (pull station).
2. Calmly and quickly assess the situation.
  - If the fire is small, locate and use a fire extinguisher to put it out
  - If the fire is too large to fight, vacate the area and calmly leave the building. Do not use the elevator.
3. Do not re-enter the building until permitted by the Fire Wardens who will be posted at each of the doors.

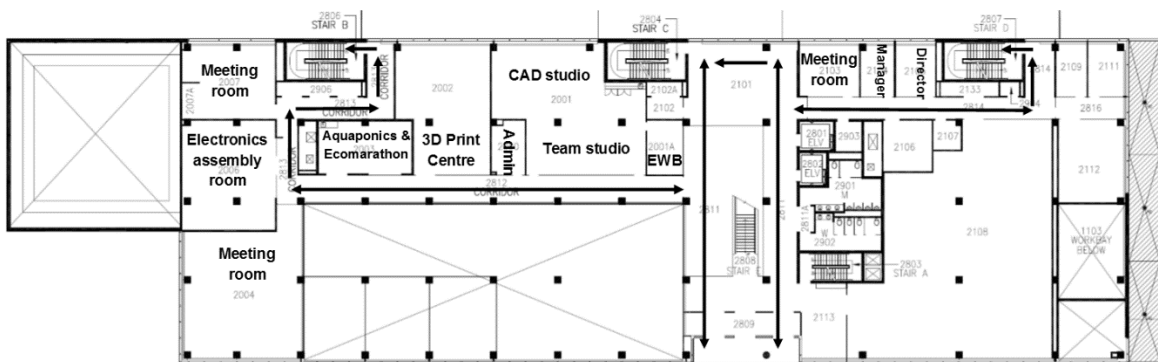
### 3.6.2 Evacuations

In the event of a control evacuation, as a result of a building service interruption or hazardous material spill, UW Police and fire wardens will coordinate an evacuation of the building. Refer to the map below for evacuation paths. The fire alarm should not be used to evacuate a building.

First Floor



Second Floor



### 3.6.3 Accidents and Injuries

All members of the University community, including student using the SSDC and related facilities, must report to their supervisor any injury or illness related to their work or assignments (includes UW walkways, parking lots and field sites). In the case of an accident which leads to injury, the following procedure must be followed in all cases.

1. Obtain medical aid if necessary
  - a. Small injuries during normal operating hours should be managed at the Engineering Student Machine Shop in E5-1101D. Depending on the severity of the injury, the person may be taken to Health Services.
  - b. Severe injuries or injuries that occur outside of normal business hours that will require medical assistance should be managed by contacting the Police at ext. 22222 or by calling 911 on a university phone (see Section 3.5.3 – Phones on page 9).
2. Report any injury to the SSDC administration or Engineering Student Machine Shop personnel immediately. This can be done online through [uwaterloo.ca/sdc/report](http://uwaterloo.ca/sdc/report) or in person.

3. The SSDC Manager will complete an injury/incident report with your assistance.
4. Incidents of a more serious nature that require medical attention or have a high potential for recurrence must be investigated. The University's Injury/Incident Investigation procedure outlines the requirements, scope and procedures for investigating incidents.

If first aid is required, see the Engineering Machine Shop staff, all of whom are first-aid trained.

#### **3.6.4 Chemical Spills**

1. Before working, make sure the MSDS for the chemical is in the team MSDS binder and any area MSDS binders (e.g. paint room).
2. Ensure everyone working with the chemicals has WHMIS training.
3. Obtain a spill kit appropriate for the materials being worked with. There are universal spill kits available in many team bays (see Section 3.5.9 on page 11 for details).

For small spills:

1. Notify occupants in the immediate areas of the spill.
2. Use spill clean up materials to absorb and contain the spill.
3. Place material in a secure and well-ventilated area.
4. Contact Manager/Director, SSDC for disposal instructions. Alternatively, notify the Safety Office at x35755.

For large spills, or spills that cause an immediate threat to health:

1. Remove any source of ignition, if possible.
2. Evacuate the immediate area.
3. Notify UW Police, ext. 22222.

## 4. SAFETY IN SHARED-USE AREAS

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The Sedra Student Design Centre has several shared-use areas and equipment that have their own safety procedures. Users of these spaces should review the safety requirements prior to conducting any work in these spaces.

### 4.1 General safety guidelines

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1. **Employ a buddy system when working.** Activities should be completed with at least one other person present. When working alone is required, the SSDC Working Alone guidelines must be followed, as outlined in Section 4.2 Working Alone.
2. **Do not leave hazards unattended.** Never leave work out on benches, and shut down all equipment before leaving. If work must be left unattended, leave a note indicating who is using the equipment and provide an emergency contact number in case anything goes wrong.
3. **Teams must provide training for all members sufficient to complete tasks safely.** For co-op students, this is documented through the Co-op Student Agreement. For other members, team and project leads must provide adequate training for any tasks assigned to team members. This also includes general workplace safety documentation, including: team safety manual, standard operating procedures, and MSDS.
4. **Engineering Student Machine Shop (ESMS) safety training is mandatory for team members.** The safety orientation given by the ESMS provides a strong foundation for the use of power tools and other equipment found in team bays. Additionally, this allows access to the ESMS, which is critical for most teams. In order to become a registered team member on the Sharepoint, ESMS orientation must be completed.
5. **Do not work while tired or under the influence of drugs or alcohol.** Additionally, there is absolutely no alcohol allowed at the SSDC.
6. **Long hair should be tied back.** Hair bands are available from the ESMS.
7. **Headphones and MP3 players are prohibited while operating machinery and tools.** These inhibit communication and can divert attention from the task at hand.
8. **Bays must be kept tidy.** Teams are expected to, at the least, keep the aisle ways in their bay clear of debris and the work spaces uncluttered. Particular care should be taken of shared use spaces – when these are left messy, often times they stay that way since others do not want to clean up your mess. Plant Operations will not clean the bays or other shared-use areas. Leave shared use spaces in a better state than you found them.
9. **Safety equipment should not be tampered with.** This includes guards and other safety mechanisms, signs and regulatory items, and MSDS & SOP binders. Worn-out safety equipment (e.g. gloves) should be replaced.
10. **There is no driving through the SSDC.** See Section 4.12 University Vehicles on page 21 for details.



## 4.2 Working Alone

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Students and staff should be aware of the specific risks associated with working alone. At the SSDC, this is of particular concern, as team members have 24/7 access to the workspace. Team members should always employ a 'buddy' system, where at least two people are working at any given time. If working alone is absolutely necessary, the team member must follow the procedures below:

1. **Hazard Analysis.** Any activity conducted alone must have a full hazard analysis completed, as described in Section 5.1.3 Team Safety Manual on page 25.
  - a. Any high risk activity cannot be conducted alone. For the purposes of working alone, this includes using **any** machines or power tools.
  - b. Any medium risk activity must have a Standard Operating Procedure (SOP) completed before work is done alone, and the individual working with the equipment must be trained in its operation using the SOP.
  - c. A low-risk activity may be completed alone. Team leads should endeavour to check-in on individuals working alone regularly.
2. **Approval.** Team members who wish to work alone (whether or not it is after hours) must receive permission from their Team Lead or Safety Captain. Permission is given to an *individual for a specific activity or task*. While one person has permission to work alone on an activity, this does not mean that someone else has the same permission; further, though someone may have permission to work alone, they should conduct only the activities they are authorized to complete.
  - a. The Team Lead or Safety Captain will approve or deny the request based on the work being conducted, the consequences of a worst-case scenario accident, the individual's training and expertise, and the time the work is to be conducted.

## 4.3 Compressed Air

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Compressed air is available in work bays and many common areas.

- **Use the nozzles.** Many compressed air lines at the SSDC have a nozzle on them, which lowers the pressure and noise level. Whenever compressed air is used for cleaning, only these nozzles may be used (do not substitute for others, which may be too forceful or loud). When compressed air is used for cleaning, ensure there is adequate ventilation (e.g., paint room).
- **Compressed air should never be used on clothing or skin.** Compressed air is very powerful, and in rare cases, can enter the blood stream through breaks in the skin. This can lead to an air bubble in the blood stream, and can result in a coma, paralysis, or death.
- **Compressed air can dislodge particles and launch them in the air.** Whenever compressed air is used, the operator, and others in the area, must wear eye protection.

## 4.4 Electricity

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### 4.4.1 Electrical Outlets

There are electrical outlets throughout the SSDC. In team bays, these are controlled by a panel in the E5-1811 corridor. For outlets in the E5-1001 atrium, they are controlled by a panel on the central concrete pillar.

Teams should ensure they have adequate outlets for their work. Power bars should never be used for equipment. If additional power outlets are required, the Director, SSDC, should be consulted.

Whenever extension cords (or other cables) are used across floors, they must be taped down or used with cable protectors. This is to prevent tripping hazards. Cable protectors are available in the concrete bunker. Consult with the Director, SSDC for details.

### 4.4.2 Electrical Equipment & CSA Approval

All electrical equipment should be in good, working order. If cables are frayed they must be replaced immediately.

All equipment must be CSA approved. Most equipment sold by Canadian retailers is already CSA approved. However, often times imported equipment is not. Non-approved equipment must not be used. For large equipment purchases where the only option is to use imported devices, the team must **first** consult the Director, SSDC to create a plan to have the equipment approved before its use. By extension, teams may not modify (i.e., rewire) any equipment they have purchased without re-certifying the equipment.

For equipment/tools created by teams that do not run from a battery, they must not require a voltage source greater than 30 V or draw more than 100 VA without being CSA certified. The Director, SSDC, can assist with and pay for CSA certification for projects that require it.

There is absolutely no electronic devices permitted in the paint room. Paint fumes are combustible, and this presents a significant safety hazard.

Teams working with high voltage should develop their own procedures, in consultation with their Faculty Advisor and the Director, SSDC, to ensure they are operating safely.

## 4.5 Hazardous Waste Disposal

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In the course of their work, most teams will produce hazardous waste (oils, solvents, batteries, etc.) SSDC users should never flush these down the drain. There is a hazardous waste disposal area in E5-1016 Engine Assembly Room, on the left when entering the door. There are pre-designated containers for oils, solvents, and coolants. Do not fill these more than 80% (leave another container and label it, then notify Manager, SSDC).

Other waste (paint, batteries, etc) can be left in the 'other' section. **They must be labelled** with a Safety Office label and must be signed in. It is costly and time-consuming to dispose of

unlabelled waste. **Never leave waste unlabelled within the hazard tape at the waste disposal site.**

Rules for disposing of waste:

- Whenever teams dispose of waste in a container that is not already labelled, they must label the container with a Safety Office sticker. There is a stack of these on the clipboards.
- Whenever waste is dropped off, it **must** be signed-in by a team member on the clipboard.
- If the waste area is full, contact Manager, SSSDC, to arrange for waste disposal through the Safety Office.

This is provided as a convenience to teams and is *significantly easier and more streamlined than the methods that are required on the rest of campus*, so long as the above rules are followed.

Empty paint can and empty aerosol cans can be disposed of in the recycling. Many other containers can be recycled when they are empty and washed out instead of being placed in chemical waste; for details, contact Greg Friday (gfriday@uwaterloo.ca) from the Safety Office.

Teams should clean out their bay of leftover chemicals on a termly basis. Teams generally have a high turnover, so chemicals can be abandoned. When this happens, people forget what the chemicals were for and this leads to an accumulation of hazardous waste.

#### **4.6 Engine Test Cell (E5-1106, 1107)**

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Refer to the Engine Test Cell safety guidelines for information on this space.

#### **4.7 Paint Room (E5-1016)**

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**Before** beginning work in the paint room:

1. **Collect relevant MSDS for all paints.** For paints, print two copies, with one in the paint room MSDS binder and the other in the team MSDS binder.
2. Read the MSDS and instructions on the paint can.

**While** working in the paint room:

3. **There is no paint storage in the paint room.** Paint, along with other chemicals, must be stored in the team bay in an appropriate cabinet. Paint and other chemicals should be moved to the paint room and removed whenever work is stopped (e.g., do not store them overnight).
4. **No electronic devices.** Many paints are combustible, and sparks can cause a fire. No electronic devices should be used in the paint room.
5. **Use adequate ventilation.** Turn on the room ventilation once work begins, and turn it off once all the paint, composites, etc. have cured.

6. **Clean up when finished.** When the paint room is left with garbage, old paint cans, etc lying in it they can pile up. Always clean your area. Leave it in a better state than you found it. This room is not cleaned by Plant Operations.

#### 4.8 Engine Assembly Room (E5 -1013)

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**Before** working in the engine assembly room:

1. **Collect relevant MSDS for all oils, other materials.** Print two copies, with one in the engine assembly room MSDS binder and the other in the team MSDS binder.
2. Read the MSDS for each chemical you are using.

**While** working in the engine assembly room:

3. **Clean up all oils and other chemicals.** The Engine Assembly Room has a drop-off point for chemical waste, including oils. Never leave an open oil pan – put it in chemical waste if required.
4. **Keep the room clean.** The work benches should be cleared each day. Storage is available on the shelves, but the work benches should be kept clean for others to use. Any stored components must be labelled with a name and team. This room is not cleaned by Plant Operations.
5. **Parts washer.** There is a parts washer that can be used for cleaning up parts.
  - a. The lid is to stay left open – it has a fusible link which breaks when there is a fire. The lid will close, stopping the fire.
  - b. Do not do hot work – e.g., work involving grinding, flames, etc. – next to the parts washer. This will prevent a fire from starting.
  - c. Always use gloves when using the parts washer.
  - d. Clean parts thoroughly with a cloth first, before using the parts washer. This will help to extend the longevity of the cleaning solution, which is recirculated through the parts washer.
6. **Oily rags must be collected in an oily rags container.** There should be an oily rags container at the hazardous waste disposal area. Ensure this does not become full – oily rags can combust when bunched together. Notify the Manager, SSDC if the oily rags container is full.

#### 4.9 Vehicle Lift (E5-1001)

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1. Only for use by trained personnel. Manager, SSDC, must be present at all times while operating the vehicle lift, unless the Manager feels the students are qualified to operate it without supervision.
2. Only team vehicles or approved research vehicles may be worked on using the vehicle lift. **Absolutely no personal vehicles.**
3. The vehicle lift is inspected annually, as arranged by the Director.

#### 4.10 Scissor lift (side of E5, next to bunkers)

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1. Used to load and unload team equipment.

2. Only for use by trained personnel. Director or Manager, SSDC, must be present at all times while operating the scissor lift.

#### **4.11 Electronics Room (E5-2006)**

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Before soldering, always place the MSDS for solder or other consumables in the MSDS binder.

Soldering safety:

1. Soldering stations are hot. Never touch the tip of the soldering iron. If the soldering iron falls, never reach out to catch it.
2. Always wear safety glasses while soldering.
3. Use helping hands, clamps, or tweezers to hold wires.
4. Keep the cleaning sponge wet during use.
5. Do not put the iron down on the workbench. Always use the stand.
6. Turn off the unit and unplug it when the soldering station is not in use.

Solder:

1. Use lead-free solders.
2. Always wash your hands with soap and water after soldering.
3. Use a fume extraction unit to remove fumes from working area.
4. Never eat or drink while soldering.

Hot air rework station:

1. Connect to compressed air line. Follow compressed air safety procedures.
2. Be careful where the hot air tip is pointed – do not point at areas you do not want to get ruined. Having a scrap piece of wood to hot-air on is highly recommended.
3. Always use helping hands, vice grips, etc. to prevent needing to hold the component.
4. Use tweezers to move parts – not hands.
5. If smoke, warping, or black goo is coming from the board, turn the heat setting down.
6. Allow the station to cool when finished.
7. Always connect station to 58 psi compressed air. There is a regulator with the rework unit.

If any soldering equipment is not working correctly, notify Director, SSDC for repairs. Do not remove electronics room equipment from the electronics room. This prevents other teams from using the equipment.

#### **4.12 University Vehicles**

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The Sedra Student Design Centre owns and operates two vehicles, two enclosed trailers, and a flatbed trailer for team use. There are specific policies and procedures in place in order to obtain permission to use the vehicles/trailer.

- Vehicles may only be operated by team members that have been deemed eligible to drive the vehicles. This is done through the Team Vehicle Questionnaire, which is

submitted to the SSDC Administrative Assistant for approval. Once approved, the driver must sign the Terms of Agreement Form, Insurance Policy Consent form, and provide a colour copy of their driver's license. Driving the team vehicles is a privilege, and SSDC administration reserves the right to revoke this permission at any time.

- The GMC Sierra is a commercial vehicle, and as such, team members must undergo an additional three-part training exercise which will help them become familiar with operating a large vehicle and trailer. The GMC Sierra is the only vehicle that can tow the large trailer.
- The Toyota RAV4 can tow the small trailer and the flatbed. The RAV4 is only a four cylinder vehicle, and therefore the maximum towing weight is 1500 lbs.
- The vehicles may only be used for team business – travelling to competition, trade shows, etc – and not for personal use or 'team-building' activities.

#### **4.12.1 Incidents on the Road**

In the event of an accident while on the road, call 911 immediately for assistance. Notify the Director and Manager immediately. In the event of a catastrophic accident, UW Police may be contacted for after-hours contact information for the Director/Manager.

For smaller incidents, CAA is available. Notify the Director or Admin of any defects with the vehicles before you leave campus. Taking pictures is advised. The UW Vehicle Shop is the only organization permitted to do work on the vehicles, unless approved by the Director or Admin if the team is out of town and work needs to be done immediately.

#### **4.12.2 Moving Vehicles Inside the SSDC**

Occasionally, teams and other users will need to move vehicles inside the SSDC. This may only be done for:

- Display
- To transport a vehicle currently being worked on
- To store the vehicle, with permission from the Director/Manager, SSDC.

Gas powered vehicles must be powered off and pushed when going through the SSDC. There are jacks with wheels on them that are shared between the SSDC and WatCAR – check with the Director, SSDC for details.

Electric vehicles may be turned on indoors, but they may only be operated slowly and with a spotter.

#### **4.13 Exhaust Vents**

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There are three exhaust vents: one in the Wash Bay E5-1102, one in the Hybrid workbay E5-1007, and one in the SSDC atrium E5-1001. Whenever an internal combustion engine is being used indoors, the operator should place the exhaust vent hose over the exhaust and turn on the vent. Once the hose has been placed over the exhaust and turned on, the engine can be turned on.

This system is only designed for engines running at low speeds and loads – effectively, only engines at idle. If exhaust fumes are smelled or a CO detector is triggered, shut down the engine immediately.

The exception to these procedures is the Engine Test Cell E5-1106. This room is equipped with an extensive ventilation and cooling system, which allows engines to be tested safely at high RPM. Refer to the Engine Test Cell safety manual for more information.

## 5. TEAM SAFETY PROGRAMS

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Each team is responsible for designing and maintaining their own safety program, specific to their work at the SSDC. It is impossible for the SSDC staff to anticipate every hazard that a team will encounter – from nano materials to rockets to high-voltage work – so teams are required to critically examine their work. They must set forth a series of mitigating processes that will allow their members to operate all equipment safely, and they must make this team safety manual accessible.

For full details, refer to the safety section of the SSDC Sharepoint.

### 5.1 Program safety requirements

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Teams must complete each item below in a timely manner. Teams that fail to meet these requirements, or new teams that fail to make progress towards them, will be locked out of their bay until **all** requirements are met. For more details on lockout procedures, refer to Section 5.1.4 Mid-term Review on page 26.

#### 5.1.1 Team Safety Captain

All teams must have a team safety captain that is responsible for designing, implementing, and maintaining the team safety program. It is strongly encouraged that this is someone other than the team lead. For teams that have co-op students, this is a requirement. The Safety Captain should be someone who is familiar with the work the team does and the hazards they face, and is able to commit to:

- Conduct monthly inspections (once a month, 1 hour)
- Attend a safety captain meeting and mid-term review (1 hour each).
- Sign-off on co-op students and other documentation (1 hour per semester)
- Review and update the team safety manual, standard operating procedures, and MSDS.
  - These tasks can be delegated to others, but the safety captain must review them and provide feedback.
- Be knowledgeable on the hazards that the team face. Industry experience is an asset.
- Act as a point of contact for the team and Director for all safety-related matters.

Team safety captain names must be submitted to the Director, SSDC, at the beginning of each semester.

#### 5.1.2 Safety Captain Orientation

At the beginning of semester, team safety captains will attend a presentation given by the Director, outlining the requirements for the team safety program and highlighting any changes to the program from the past semester. The purpose of this meeting is to go over this section of the SSDC Safety Manual in detail, discuss important deadlines, and answer any questions teams have about implementing the procedures.



### 5.1.3 Team Safety Manual

The backbone of each team safety program is the team safety manual. This document outlines the specific hazards that the team will encounter and outlines which procedures the team is pursuing in order to mitigate these hazards. Teams can design this in any format that they choose; however, it is strongly recommended that teams follow an identify – rate – mitigate procedure:

1. Identify the hazard. Under what circumstances does it occur? What procedure is being done to bring about the hazard?
2. Rate the hazard to determine if it is high, medium, or low risk. See the SSDC Team Safety Manual files on Sharepoint for details of the rating methodology.
3. Mitigate the hazard. Identify policies and procedures that can be put in place to reduce or eliminate the threat posed by the hazard. Specifically:
  - a. High risk
    - i. A comprehensive SOP must be created and reviewed by the Team Safety Captain.
    - ii. Include specific hazard training (e.g., compressed gas training), delivered either by the team Safety Captain/Team Lead or through another resource.
    - iii. Implement lockout procedures to prevent unauthorized access to the hazard. This should guarantee that users without training to use the resource cannot use it. For example, storing the hazard in the bay does not constitute adequate lockout if members without training on its use have access to the bay.
    - iv. Hazard signs must be posted to warn others of the risk.
      1. Use a label maker/print in colour to increase authority.
      2. Hazard signs should be located where the specific hazard occurs: for example, a DANGER HIGH VOLTAGE sign posted outside the bay is not as useful as one put on the specific high voltage power source.
      3. Hazard signs should be specific and identify the exact nature of the hazard. For example, DANGER KEEP OUT is inadequate;  
DANGER CORROSIVE MATERIAL is acceptable;  
DANGER CORROSIVES: CONTAINS SULPHURIC ACID is best.
    - v. Members may not be exposed to the hazard alone (i.e., there must always be another person present).
  - b. Medium risk
    - i. A comprehensive SOP must be created and reviewed by the Team Safety Captain.
    - ii. Members must receive approval before being exposed to the hazard alone (see Section 4.2).
    - iii. Include other procedures to mitigate the hazard, as appropriate.
    - iv. The hazard may be labelled to help identify it.
  - c. Low risk

- i. Only a cursory procedure is required to mitigate the hazard. For example, the procedure may be to reference the manual before operating the equipment.

For help identifying and mitigating hazards, contact the Director or Manager, SSSDC. Faculty advisors are also good resources, in addition to departmental technical staff.

#### **5.1.4 Mid-Term Review**

During the 8<sup>th</sup> week of semester, the Director, SSSDC, will meet with each safety captain one-on-one to discuss the team safety program for a formal review. During this time, the Director will:

1. Review co-op hiring and forms.
2. Review any changes to the Safety Manual and inspect the procedures to ensure they are adequate for the work being done.
3. Review the team member registry to ensure that it is up-to-date.
4. Review the Standard Operating Procedures to ensure they are being adequately completed.
5. Review the team MSDS binder and any area MSDS binders (e.g. paint room) to ensure the team had been keeping them up-to-date.
6. Conduct a termly inspection, using the safety inspection checklist, of the team workbay. The monthly inspection checklist will also be reviewed to ensure it is being completed adequately.

The review is scored, and reviews below a certain threshold will require re-inspection of the bay in one week's time. If the team has not improved above that threshold after re-inspection, they will face immediate lockout from their bay, pending disciplinary and corrective action. The inspection sheet is available in the appendix on page 40.

A large part of the review is a 'holistic appraisal' of the team, which will look at the overall progress towards safety. A list of good/bad practices is available below in Table 2 to help give teams some familiarity with what is expected from them for this aspect. Ultimately, a team will do poorly in this category if they do not take safety seriously. On the other hand, even if there are mistakes in other areas, a team that obviously cares about creating a *culture of safety* will score well.

Table 2 Good and bad practices/behaviour examples for the holistic score category

Good practices & behaviours	Poor practices & behaviours
<ul style="list-style-type: none"> <li>• Team seems engaged with the safety progress, and seeks to make improvements.</li> <li>• Team has sought the advice of the Director, SSDC, on safety matters <b>before</b> the review.</li> <li>• Team has gone above and beyond the requirements for the program.</li> <li>• Team bay is clean and easy to work in.</li> <li>• Hazards are well-labelled.</li> </ul>	<ul style="list-style-type: none"> <li>• Team bay is cluttered to the extent that members have difficulty moving or working in the bay.</li> <li>• Common use areas used by the team are left in a poor state.</li> <li>• Overall attitude of the team shows lack of care for the safety program.</li> <li>• Lack of knowledge on the requirements from the team that are outlined in the Team Safety Manual.</li> <li>• Evidence of co-op students or other team members operating in an unsafe manner previously.</li> <li>• Evidence of co-op students being poorly trained for the tasks they are assigned.</li> <li>• Poorly completed inspections, SOPs, or other safety documents.</li> </ul>

### 5.1.5 Monthly Inspection

Teams must complete a monthly inspection. A checklist template is provided by the SSDC, which is available on the Sharepoint. Instructions are also on the Sharepoint for completing the checklist.

### 5.1.6 MSDS

Teams must collect MSDS for all products that are put in their bay. In general, if a material is consumed, it should have an MSDS associated with it. Many manufacturers make their MSDS available on their website. For some MSDS, teams will have to contact the company to get them. MSDS should be recent – within 3 years.

MSDS must be duplicated in the team and area MSDS binders. For example, a paint that is being worked with should have its MSDS in both the team bay MSDS binder and the paint room MSDS binder.

To prevent cluttering of old, out-dated MSDS, the area MSDS binders must have a label attached (available in the MSDS binder) that shows who was using it, what team they were on, and when it was last used. This allows for an annual review of the MSDS binder by the Director/Manager, where old MSDS will be removed. Additionally, teams may be asked to update specific MSDS that are out of date.

### 5.1.7 Standard Operating Procedures (SOPs)

The purpose of the Standard Operating Procedures is to outline how to use equipment safely. It does not replace a manual – it augments the information found in the manual, to help students use the equipment within the context of the team’s specific use. It shows the additional safety requirements the team has implemented and other guidance for using it in the space. For

example, the hot air rework station in the electronics room has both a manual and a SOP. The manual states the rework station must be connected to 58 psi; the SOP includes a picture of how to do this with the connector and regulator available in the electronics room. There is a template Standard Operating Procedure that is available on the SSDC Sharepoint.

Equipment will require an SOP if the team has decided it is a medium- or high-risk piece of equipment. This is done through a methodical review, looking at how frequently the equipment is used, the frequency of an accident, and the consequences of an accident. Details of how to conduct this review is available on the Team Safety Manual information page on the SSDC Sharepoint.

### 5.1.8 Training

All volunteers and co-op students must be trained in the hazards they may face. To this end, the team safety manual, this safety manual, and all other safety documentation must be accessible to all team members. Additional requirements are shown below:

Table 3. Mandatory training requirements

	<i>Team Members</i>	<i>Co-op Students</i>	<i>Team Lead, Safety Captain, Co-op Supervisors, Faculty Advisor</i>
<i>ESMS safety orientation</i>	✓	✓	✓*
<i>Familiarity with team &amp; SSDC Safety Manual</i>	✓	✓	✓
<i>SO1001 Employee Safety Orientation</i>		✓	✓
<i>SO1081 Workplace Violence Awareness</i>		✓	✓
<i>SO1002 WHMIS for Employees</i>		✓	✓
<i>WHMIS for students (shown on transcript)</i>	✓		
<i>SO1010 Laboratory Safety</i>	✓	✓	✓
<i>SO1100 Supervisor's safety awareness</i>			✓

Teams can complete the Safety Office training courses online by visiting:

<https://uwaterloo.ca/safety-office/training/training-programs>

\* Faculty advisors are exempt from completing the ESMS training.

### 5.1.9 Laboratory Hazards Poster

Teams must post a Laboratory Hazards Poster on the front of their bay door. This is a standard document that identifies if the team has specific hazards – like flammables or corrosives – so that a first responder or firefighter knows what hazards are in the room when they arrive. In order to complete this document, teams are strongly encouraged to keep a list of all chemicals that are kept in their bays, since certain hazards are only identified on the poster once they reach a certain threshold.

Instructions for completing the Laboratory Hazards Poster are available on the SSDC Sharepoint.

### 5.1.10 Poster requirements

Teams must have the following posters in their workbay:

- Hazardous waste disposal poster
- Hazardous waste transport poster – only if team deals with hazardous chemicals/waste
- Hazardous Material Spill poster – only if team deals with hazardous chemicals/waste
- First Aid, Lockdown, and Fire posters – depending on space.
- “No disposal of chemicals into any drains, sinks, or sewers” sticker on all sinks.

## 5.2 Safety Equipment Available to Teams

Table 4. Safety equipment available for team use

<i>Item</i>	<i>Intended use</i>	<i>Location</i>
Safety vests	Used when testing vehicles, other projects, to increase visibility of participants.	10 class 2 safety vests are kept in E5-2002. Contact Admin Assistant, SSDC, for details on booking them.
Radios	Communicating among team members while testing projects, particularly fast-moving objects (e.g., rockets, cars)	24 radios are kept with the Engsoc office (jointly owned by FOC and Engsoc). Check with the Engsoc office to book. In addition to the radios, there are three base stations (hold 6 radios each), plus power supplies for the base stations.
Bull horn	Used for communicating with a large number of people at once.	One bull horn is kept in the Engsoc office. The bull horn is not very loud (~30 m distance). It has an alarm option (siren, similar to emergency vehicles).
Label maker	Label hazards	Two label makers are owned by the SSDC. <ul style="list-style-type: none"> <li>• One is kept with Admin Assistant, SSDC, and is light-duty.</li> <li>• The other is larger and requires special software. It has high-strength, 1” black-on-yellow hazard tape. Can produce danger signs and other hazard labels. Kept in E5-2002, and can be requested from the Admin Assistant, SSDC.</li> </ul>
MSDS binder	Contains MSDS. All teams <b>must</b> use an SSDC-provided MSDS binder.	All team bays are equipped with MSDS binders. Tenaquip product # SI985. Request from Admin Assistant, SSDC.
Fire extinguisher	On-hand while testing projects	Do not take a fire extinguisher from the bay, except to fight fires.  There are two ‘floating’ fire extinguishers, which can be taken from work bays to competition, outdoor tests, etc. To obtain these, contact the Manager or Director, SSDC.  Whenever a fire extinguisher is discharged, for any reason, its use must be reported to the

		Director or Manager, SSDC through the incident report form.
Spill kit	Cleaning up hazardous waste spills	Spill kits are located in most work bays. See section on spill kits on page 11.
High-voltage gloves, face shield, and cane	Interacting with high voltage equipment. Cane is to pull people who are incapacitated by electric shock (never touch someone being shocked).	Equipment kept with UWAFT. Request from UWAFT if required.
First aid kits	Small injuries	Teams should use the first aid kits located in the SSDC (see page 9, First Aid Kits) for any injuries in the building.
		First aid kits are not provided for travelling (competitions should have their own medical staff).
Cable protectors	Secure cables on the floor from tripping.	Concrete bunker. Consult Director, SSDC for details before using.
Hazard tape	<b>Permanently</b> identify hazards	3" wide black/yellow hazard tape is available in E5-2002. Consult Director, SSDC, for details.

Additional safety equipment may be available. Consult with the Director, SSDC, for more information.

The SSDC will provide to teams, at no charge, reasonable equipment required to work safely. This is intended to offset the high cost of specialty safety equipment. To qualify, equipment should be **reusable** and should be a **shared** resource for the teams (i.e., items are broad enough that they can be reused by other teams).

These items will not be supplied by the SSDC and must be supplied by teams:

- Safety glasses
- Dust masks
- Respirators
- Protective suits
- Safety shoes

This is not an exhaustive list. In particular, expensive equipment that is one-time use or is made to fit a person (e.g., some protective suits) do not qualify for this.

### 5.3 Program deadlines

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These deadlines are issued for the academic year. This file will be revised on an annual basis with new deadlines, as they become available.

## Sedra Student Design Centre Safety Manual

Table 5. Program deadlines

	<b>Generally due</b>	<b>Fall</b>	<b>Winter</b>	<b>Spring</b>
<i>Safety captain name submitted</i>	<i>End of the first week of lectures</i>	<i>September</i>	<i>January</i>	<i>May</i>
<i>Mid-term review</i>	<i>8<sup>th</sup> week of semester</i>	<i>1st Week of November</i>	<i>3rd Week of February</i>	<i>3rd Week of June</i>
<i>HSEMS Agreement</i>	<i>As soon as the team intends to hire co-op students. Must be submitted by second day of lectures.</i>	<i>September</i>	<i>January</i>	<i>May</i>
<i>Co-op student agreement due</i>	<i>Completed during first week of work, submitted second week. *dates assume co-op students start on the official start date.</i>	<i>September</i>	<i>January</i>	<i>May</i>
<i>Term information form</i>	<i>As soon as all co-op student names are known. Resubmit for new co-ops. Must be received by the first day of work. (Official first day of work is listed).</i>	<i>August</i>	<i>January</i>	<i>May</i>
<i>Safety Captain Orientation Meeting</i>	<i>Second week of semester</i>	<i>September</i>	<i>TBA</i>	<i>TBA</i>

## **6. APPENDIX: UW POLICY 34 HEALTH, SAFETY AND ENVIRONMENT**

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Established: January 7, 1970

Last updated: June 30, 2010

Class: G

### **1. INTRODUCTION**

The University of Waterloo strives to provide a safe, healthy work and educational environment for its students, employees, visitors and contractors. The University insists on compliance with legislative requirements and regulations contained in, but not limited to, the Occupational Health and Safety Act, the Workplace Safety and Insurance Act, the Fire Prevention and Protection Act and the Environmental Protection Act, and University of Waterloo policies and procedures.

The University's Health, Safety and Environment Management System and Health, Safety and Environment Program ensure that faculty, staff and students are aware of, and know it is their responsibility to adhere to, legislation, policies and procedures. Policy Section 2 outlines general requirements and responsibilities relating to health, safety and the environment. Sections 3, 4 and 5 specifically address additional health and safety matters.

### **2. GENERAL REQUIREMENTS AND RESPONSIBILITIES**

- A. The University insists that all persons associated with the University (including those who are employees and those who are not, e.g., students, visiting professors, contractors, sub-contractors) adhere to the pertinent municipal, provincial and federal legislation and standards, and University policies and procedures.
- B. Each faculty member, staff member, student, visitor and contractor has primary responsibility for their own safety and actions, and for others affected by their actions. Supervisors and other persons in authority must provide for the health and safety of those under their authority, including training in specific work tasks and must take necessary measures to comply with environmental requirements.[1]
- C. All members of the University community must report to their supervisor any hazardous conditions which are contrary to good health, safety or environmental practices or which contravene any legislative requirements. Supervisors are responsible for ensuring that corrective action is taken at once.
- D. Each member of the University community must minimize the impact of University operations on the environment and respond diligently to incidents resulting from University activities.
- E. Departments are required to post in conspicuous locations this policy and related Health, Safety and Environment Program information.

### **3. JOINT HEALTH AND SAFETY COMMITTEES**

A Joint Health and Safety Committee is an advisory group of worker, management and student representatives who perform duties as set out in the Occupational Health and Safety Act.

### **4. PROCEDURES TO ADDRESS HEALTH AND SAFETY CONCERNS**



- A. All members of the University community must report to their supervisor any injury or illness related to their work or assignments. It is the supervisor's responsibility to ensure that prompt first aid and health care treatment is obtained, if necessary, and that University reports are completed by the end of the business day following the incident.
- B. Members of the University community have the right to refuse work or assignments that they believe are unsafe. In such cases the refusal must be immediately reported to their supervisor. The supervisor must investigate the situation as prescribed by University procedures.
- C. All members of the University community have the right and obligation to bring, without prejudice, health and safety concerns to their supervisor. After their supervisor has been informed and if a concern remains unresolved after a reasonable amount of time, a member of the University community may take the concern to the Director of Safety or a Joint Health and Safety Committee member.
- D. The Director of Safety or designate is empowered to deal with dangerous circumstances, including the authority to stop any process or procedure, or to correct any condition.
- E. Unsafe buildings and grounds conditions shall be reported to the Plant Operations Department.
- F. Health and safety concerns identified by the Director of Safety or a Joint Health and Safety Committee will be addressed by members of the University community acting through established University channels. When a health and safety concern cannot be solved in this manner it will be reported in writing by the Director of Safety to the senior University administrator accountable for the area, usually with a recommendation. The action on a recommendation rests with this senior administrator. The senior administrator's decision shall be communicated in writing to the Director of Safety.
- G. In addition to receiving periodic reports from the Director of Safety, the Provost reviews University-level health and safety concerns coming from a Joint Health and Safety Committee. Based on the advice received through whatever mechanism the Provost deems, the Provost shall determine the appropriate action, and shall inform a Joint Health and Safety Committee of the decision.

### **5. WORKPLACE VIOLENCE**

The University is committed to maintaining a workplace that is violence free. Any act of workplace violence is unacceptable conduct that will not be tolerated. The University strives to minimize the risk of violence, and to ensure that reasonable safeguards are in place to protect members of its community from incidents of violence in the workplace. This section applies to activities that occur while on University premises and to work-related activities or social events occurring off-campus.

All members of the campus community have a responsibility in maintaining a violence free working and learning environment by not engaging in acts of violence and are encouraged to report incidents promptly as outlined in the University's Workplace Violence Program.

Anyone engaging in activities or behavior found to be of a violent or threatening nature will be subject to disciplinary and other sanctions (up to and including termination of employment, expulsion and ban from University premises). Criminal or civil proceedings may also be initiated.

[1] A Faculty or staff member when in a classroom or teaching laboratory is deemed a "worker". A faculty or staff member who supervises a paid worker (Student Research Assistants, Post-Doctoral Fellows, Technicians, etc.) is considered a "supervisor". Students paid as Research or Teaching Assistants are deemed as "workers".

## 7. APPENDIX: UW POLICY 71 STUDENT DISCIPLINE

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Established: June 6, 1989

Last updated: September 13, 2010

Class: G

### 1. INTRODUCTION

This policy applies to University of Waterloo (University or UW) students, including individuals who were students at the time of the event(s) upon which a disciplinary proceeding is based.

A discipline decision of an academic support unit (e.g. athletics, library, parking, on-campus pubs and student residences) is handled under the unit's internal mechanism and not under this policy unless the matter is referred to an associate dean.

Resources to advise students include the Conflict Management and Human Rights Office, Student Resource Office, Secretariat and faculty undergraduate and graduate offices. Resources to assist students include Counselling Services, Health Services, and AccessAbility Services.

Authority to deal with matters under this policy rests with the undergraduate and graduate associate deans. In cases where criminal proceedings have been initiated against a student, the authority usually vested in an associate dean rests with the vice-president, academic & provost, who will keep the associate dean of the student's home faculty informed. A decision of the vice-president, academic & provost is appealable to the University Committee on Student Appeals but remains in effect during the appeal process.

Matters pertaining to courses offered by and events occurring on the property of:

- **Conrad Grebel University College** – Academic discipline is handled under this Policy. Non-academic discipline is handled under this Policy, except that, if the student involved has signed a contract with the college, then the discipline is handled under the terms of the contract and/or Grebel Residents Handbook.
- **Renison University College** – Academic discipline is handled under this Policy. Non-academic discipline is dealt with under this Policy, except for residence matters, which are handled under residence procedures.
- **St. Paul's University College** - Academic discipline is handled under this Policy. Non-academic discipline is dealt with under this Policy except for residence matters, which are handled under residence procedures.
- **St. Jerome's University** - Discipline is handled under policies and procedures established by St. Jerome's.

The associate dean (undergraduate or graduate) of a student's home faculty is the locus for student discipline records. When a student is known to have changed faculties, the student's discipline record is to be forwarded to the associate dean of the new home faculty.

Behaviour which unduly interferes with the study, work or working environment of other members of the University or any aspect of another's University activity is dealt with under Policy 33 - Ethical Behaviour.

## **2. PRINCIPLES**

### **a. Academic**

Communication, inquiry and the free exchange of ideas are fundamental to a university education, and require an environment of tolerance and respect. Academic freedom provides for the freedom to study, learn, publish and debate, independent of current opinion, subject to commonly accepted scholarly standards. Academic freedom is protected and carries with it the duty to use that freedom in a responsible and ethical way. A student's academic freedom does not extend to disruption of other students, faculty or staff members, or their work/study/residence environments.

Academic integrity is a commitment to five basic values: honesty, trust, fairness, respect and responsibility. It applies to all academic endeavours – teaching, learning and scholarship, and applies to a range of academic activities, from conduct in research to the writing of co-op work term reports.

Students are expected to know what constitutes academic integrity, to avoid committing offenses, and to take responsibility for their actions.

Students are responsible for demonstrating behaviour that is honest and ethical in their academic work. Such behaviour includes:

- Abiding by University policies and provincial and federal legislation.
- Following the expectations articulated by instructors for referencing sources of information and for group work.
- Submitting original work, citing sources fully, and respecting the authorship of others.
- Preventing their work from being used by others, e.g. not lending assignments to others, protecting access to computer files.
- Asking for clarification of expectations as necessary. Students who are in any doubt as to whether an action on their part may be viewed as a violation of the standards of academic integrity should ask their instructors, lab assistants and/or advisors.
- Adhering to the principles of academic integrity when conducting and reporting research.

### **b. Non-academic**

Students are individually responsible for their actions whether acting alone or in a group. Students have an obligation to make responsible decisions concerning their conduct. Appropriate behaviour includes:

- Respecting the rights and property of others.
- Allowing for the peaceful and safe enjoyment of the University campus and facilities.
- Abiding by University policies, municipal bylaws, and provincial and federal legislation.

### **c. Procedural Fairness**

The procedures for handling offences reflect the gravity with which the University views such offences. At the same time, these procedures represent the University's commitment to fairness.

Fairness is fundamental when dealing with students. Students have the right to be informed of policies, procedures or guidelines that may affect their academic progress or their conduct, and have the right to question whether decisions are consistent with those policies, procedures or guidelines.

Each student is entitled to:

- a presumption of innocence unless the contrary is established;
- be made aware of the case against him/her;
- have matters addressed fairly and expeditiously;
- be accompanied by a support person to any meeting with administrators and to any hearing;
- have matters heard by those who are not sitting in judgment of their own actions or decisions;
- know, respond to and seek clarification of evidence presented by witnesses; and
- decisions based on the balance of probabilities with consideration given to consistency and University precedent.

### 3. OFFENCES

Student misconduct relating to activities of any type under University auspices, other than that falling under Policy 33 - Ethical Behaviour, is covered by this policy.

Any member of the University who has reason to believe that an academic offence has been committed by a student has a responsibility to report the matter promptly to the instructor of the course or to the associate dean of the faculty sponsoring the activity. A teaching assistant shall report to both the instructor and the appropriate associate dean of the faculty sponsoring the academic activity. The associate dean will investigate and render a decision or refer the matter to the appropriate authority.

Any member of the University who has reason to believe that a non-academic offence has been committed by a student has a responsibility to report the matter promptly to the associate dean of the student's home faculty or to UW Police who will advise the associate dean. The associate dean will investigate and render a decision or refer the matter to the appropriate authority. In cases involving disruptive or threatening behaviour on the part of students (including assault, vandalism, theft and similar behaviour), UW Police shall be contacted to establish order. Individuals should not attempt to resolve a dangerous situation. In all such cases the matter shall be reported to the associate dean by UW Police.

No degree, diploma or certificate shall be awarded, nor shall a student be allowed to withdraw from a course in which an offence is alleged to have been committed, from the time an alleged offence is reported until the final disposition of the matter.

Offenses listed below are intended to be interpreted broadly. The list is not meant to be comprehensive, but rather illustrative of the typical categories of academic and non-academic offenses. Misconduct includes causing an event to occur, either by omission or commission. Any act that violates the principles of this policy or that falls below a standard acceptable in the University community is subject to discipline, as is an attempt to commit or assisting someone to commit any such act.

Offenses include, but are not limited to, the following:

<i>Academic</i>	<i>Non-academic</i>
<ul style="list-style-type: none"> <li>• cheating</li> <li>• plagiarism</li> <li>• unauthorized co-operation or collaboration as defined by the course instructor</li> <li>• unauthorized aids or assistance as defined by the course instructor</li> <li>• unauthorized resubmission of work</li> <li>• violation of examination regulations</li> </ul>	<ul style="list-style-type: none"> <li>• disruptive, dangerous, aggressive or threatening behaviour, including by electronic means</li> <li>• misuse of University resources, equipment or supplies, including, but not limited to, computers and network, keys, records, permits, letterhead</li> <li>• mischief</li> <li>• vandalism</li> <li>• theft</li> </ul>

<ul style="list-style-type: none"> <li>• impersonating another student or entering into an arrangement with another to be impersonated</li> <li>• obtaining, distributing, or receiving any confidential academic material without the express consent of the instructor</li> <li>• theft of intellectual property</li> <li>• academic or admission fraud discovered after registration</li> <li>• altering, falsifying or withholding a relevant document</li> <li>• misrepresentation</li> <li>• obstruction or interference</li> <li>• misconduct in research including breach of ethics regarding human or animal testing</li> <li>• contravention of statute (e.g., Copyright Act)</li> </ul>	<ul style="list-style-type: none"> <li>• infringing unreasonably on the work of others</li> <li>• violation of instructor’s communicated rules, such as prohibition of recording lecture</li> <li>• violation of safety regulations in a laboratory or other setting</li> <li>• unauthorized use of equipment, material or a facility or service</li> <li>• unethical behaviour</li> <li>• contravention of statute (e.g., Liquor License Act; Criminal Code)</li> </ul>
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**4. PENALTIES**

At the conclusion of an investigation where misconduct has been found, the student will be given at a minimum a letter of reprimand. Other penalties may be imposed as the situation warrants. University departments (e.g. Co-operative Education, Graduate Studies Office, UW Police) shall be sent a copy of the decision as appropriate. A copy of a decision will be placed in the student’s discipline record by the associate dean of the home faculty.

Penalties (other than removal of privileges and expulsion) are normally not in force while an appeal is being decided. In exceptional circumstances (such as when the continued presence of the student would unduly affect scholarly activities), on a case-by-case basis and after consultation (e.g. with the associate dean, UW Police), the chair of the University Committee on Student Appeals (UCSA) may order that a penalty be enforced while an appeal is in process. Such a decision of the UCSA chair is final.

A student may not graduate while under suspension, nor will the University verify that degree requirements have been met until the end of the suspension.

One or more of the following penalties may be imposed:

<i>Academic</i>	<i>Non-academic</i>
<ul style="list-style-type: none"> <li>• letter of reprimand</li> <li>• disciplinary probation</li> <li>• grade penalty on an assignment, test, examination, or course; or, where applicable, failed standing in a term or modification of final grade</li> <li>• failed work term</li> <li>• extra academic work</li> <li>• removal of privileges</li> <li>• additional course(s), possibly taken as Degree Requirement, Not in Average</li> <li>• community service</li> <li>• suspension</li> <li>• expulsion</li> </ul>	<ul style="list-style-type: none"> <li>• letter of reprimand</li> <li>• disciplinary probation</li> <li>• restitution</li> <li>• community service</li> <li>• fine</li> <li>• eviction from UW student residence / housing</li> <li>• ban from a University facility or sponsored event, or from the campus</li> <li>• removal of privileges</li> <li>• suspension</li> <li>• expulsion</li> </ul>

<ul style="list-style-type: none"><li>• revocation of degree, diploma, certificate, standing or credit</li></ul>	
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– such other remedial or disciplinary action or order as appropriate in the circumstances –

### **Factors to be considered when imposing academic penalties**

The circumstances surrounding each case of academic misconduct may vary to a significant degree. The penalty imposed should reflect these circumstances. The Guidelines for the Assessment of Penalties are not intended to restrict the authority or flexibility of associate deans in imposing penalties. In each case the associate dean shall exercise his/her discretion, taking into consideration the relevant factors as outlined below. For the benefit of the student the associate dean shall provide an explanation in the written decision of the major reasons(s) the penalty imposed was deemed warranted.

Factors to be considered by associate deans when imposing a penalty include, but are not limited to:

- The severity of the offence, including its impact on others (UW students, faculty or staff; other students, members of the community)
- Relative weight of the assignment
- The level of the student's academic experience
- Whether the student admits guilt, accepts responsibility for his/her action and is amenable to educative remedies
- Extenuating circumstances that may help explain the action taken by a student
- Any aggravating factors
- Any record of previous offences
- For graduate students, whether the work in which the offence has been committed is one of the major milestones of the graduate program

## **5. REPORTING**

At the conclusion of an investigation the person investigating will advise the student in writing of the determination. Normally the person who reported the incident will be advised that the matter has been dealt with.

A report on any discipline action taken is to be filed in the Secretariat by the associate dean. A summary of cases is to be posted to the Secretariat website annually.

The University Committee on Student Appeals will report cases annually to Senate.

Information related to a discipline decision will be retained in compliance with the University's records retention schedule.

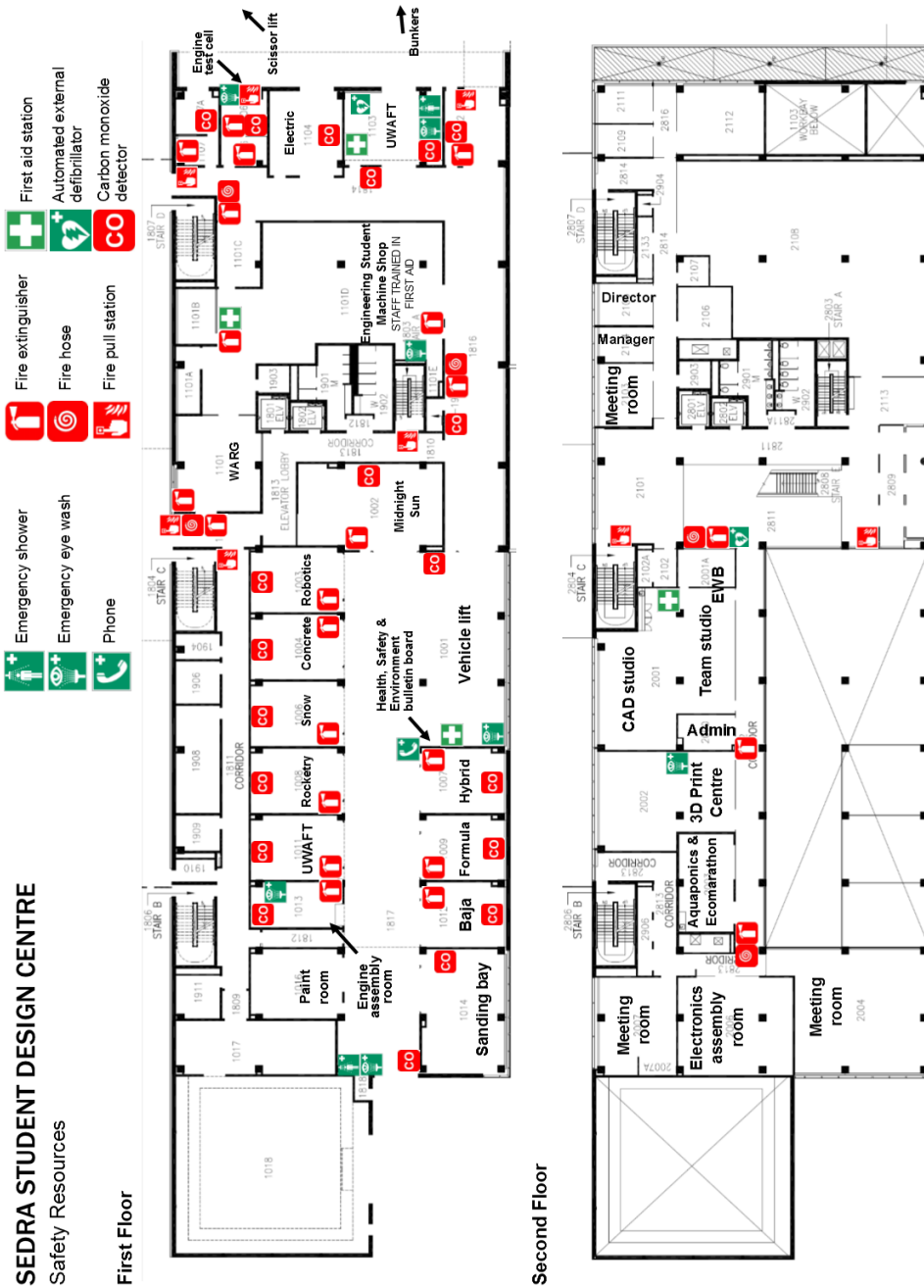
## **6. APPEAL**

A discipline decision is appealable under Policy 72 - Student Appeals provided that a ground for appeal can be established.

A decision of the vice-president, academic & provost (or delegate) is appealable under Policy 72 - Student Appeals provided that a ground for appeal can be established.

Deadline: An appeal must be started by delivering a Notice of Appeal (Form 72A) (Word doc) within 10 days of notification of the decision. See Policy 72 - Student Appeals.

## 8. APPENDIX: MAP



## 9. APPENDIX: MIDTERM REVIEW SHEET

Reviewed by \_\_\_\_\_.

Semester: Fall Winter Spring

Year: 15 16 17 18 19 20 21

Inspection: First Re-inspect

Date: \_\_\_\_\_

Team: \_\_\_\_\_

Safety captain: \_\_\_\_\_

Review...	Rating		
<b>Co-op hiring and forms</b>	7 – Complete. All forms in, training adequate.	5 – Minor omissions, small errors.	0 – Major omissions. Training is unclear. Use 0 rating if safety manual is inadequate and cannot provide job-specific training.
<b>Changes to the Safety Manual</b>	4 – Thorough, complete. Potentially, small errors in recommendations (to be fixed).	3 – Minor omissions. Some hazards unaddressed.	0 – Inadequate progress
<b>Member registry</b>	2 – Complete	1 – Minor omissions	0 – Major omissions
<b>Standard Operating Procedures</b>	2 – Thorough and complete. Potentially, small errors in recommendations (to be fixed)	1 – Minor omissions. Some hazards unaddressed.	0 – Inadequate progress
<b>MSDS Binder</b>	2 – Thorough, no visible omissions. One or two MSDS may be out of date or inadequate, but will be updated.	1 – Minor omissions, some significant but not egregious inconsistency between team and share-use binders.	0 – Inadequate progress
<b>Monthly inspection</b>	2 – Completed two inspections	1 – One missing, or one with major hazards missing	0 – Two missing, or two with major hazards missing
<b>Holistic appraisal</b>	6 – Actively participating in safety program and building it into team culture. Bay is in good condition.		0 – Combative or evasive towards the safety program.

Total score: \_\_\_ / 25 (co-ops) or \_\_\_ / 18 (no co-ops)

Rating results:

- For teams with co-ops: Scores of less than 14 will face re-inspection in one week. If score does not exceed 14 after re-inspection, team will face immediate lockout until score is raised.
- For teams without co-ops: Scores of 9 or less will face will face re-inspection in one week. If score does not exceed 9 after re-inspection, the team will face immediate lockout from their bay until the score is raised.
- If co-op hiring and forms is scored 0, the team will be ineligible to hire co-op students in the future.



**SEE BACK FOR SIGNATURE AND ACTION ITEMS.**

Action Item	Priority*	Recommendation

*All items are assigned to the team safety officer to complete, unless otherwise noted.*

**Priority\*:**

- **High:** Response required within 24 hours. Immediately dangerous to life and health.
- **Medium:** Response required within 14 days. Potential to cause injury but not immediately dangerous.
- **Low:** Response required within 14 days. May result in minor or no injury, but should be corrected.
- **Monitor:** Revisit within 90 days. Compliant, but circumstances may change or deteriorate.

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**Peter Teertstra**  
Director, Sedra Student Design Centre