SAFETY IN SCIENCE LABORATORIES

College of Arts and Sciences
Department of Biology and Biomedical Sciences
Department of Forensic Science
Department of Physical and Applied Sciences

In an Emergency: **call 911**

For non-emergency injury: (or after calling 911)

Campus Safety: extension **5442** on any campus phone, or **734-432-5442**)

Other important numbers:
Livonia Police Department
(non-emergency): (734) 466-2470

Poison Control: 1-800-222-1222

Safety incidents and *near-misses need to be documented through the provided Student Laboratory Injury and Illness Report located in all teaching laboratory classrooms*
All Injuries and Illnesses must be reported to Campus Safety for official documentation for University use

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INTRODUCTION

- **SPECIFIC SAFETY REQUIREMENTS AND PROCEDURES** vary in different courses, and from one institution to the next.

- **RESPONSIBILITY**: It is the student's responsibility to follow all directions provided by this *safety manual*, their course laboratory manual and their instructor.

- **TASK**: Students have the right to refuse to perform a laboratory experiment that poses a risk to their health and well-being. If a student refuses, the instructor will review the hazard risks with the student to address their concerns. If necessary, the issue will be forwarded to the Department Chair or College Dean to determine the appropriate course of action.

- **INCIDENTS**: Students have a responsibility to work safely; to report all safety incidents, near-misses, spills, breakage and unsafe practices; to refrain from unsafe practices; to ask questions when they are unsure of how to proceed and to take their role in ensuring the safety of themselves and their peers seriously.

- Please note that these laboratory safety requirements are intended to apply to students in all **Madonna University Chemistry, Biology, Forensic Science, Biomedical Science, and Physical Sciences courses.** Specific courses or programs within these disciplines may have additional safety requirements. Students should consult this laboratory safety manual or instructor for more information.

ROLES AND RESPONSIBILITIES

Student

- Read and Acknowledge Safety in Science Laboratories Student Manual.
- Watch and Acknowledge Lab Safety Videos on Madonna University MyPortal before first day of Lab.
- Never work without appropriate training and permission.
- Wear appropriate attire and personal protective equipment (PPE) at all times.
- Become familiar with all safety equipment and devices in the laboratory.
- Do not perform unauthorized experiments.
- Ask questions if unsure how to proceed.
- Notify the instructor of safety hazards.
- Properly dispose of hazardous and contaminated materials.

Instructor

- Assist students with completing the Student Laboratory Safety Agreement.
- Wear appropriate attire and personal protective equipment (PPE) at all times.
- Model appropriate behavior when donning and wearing PPE, including removal before exiting the laboratory.
- Assist students to become familiar with all safety equipment and devices in the laboratory.
- Assist students to safely perform experiments in the laboratory
- Answer any questions if students are unsure how to proceed.
- Notify the Dean and Associate Dean of incidents, accidents, potential chemical exposures and near miss situations.
- Assist students to properly dispose of hazardous and contaminated materials.

Dean and Associate Dean of the College of Arts and Sciences

- Should be contacted with information on all Lab Safety Incidences
- Conduct limited laboratory safety inspections annually with Laboratory Safety Committee
- Participate in the development and maintenance of the Laboratory Safety Manual

Laboratory Safety Committee

- Review the Safety in Science Laboratories Student Manual Annually

Laboratory Student Worker

- Complete annual laboratory safety training program
- Review the Safety in Science Laboratories Student Manual
- Follow procedures and laboratory practices outlined in the Student Manual
- Report all incidents, accidents, potential chemical exposures and near miss situations to the Instructor, Department Chair, Dean, and Associate Dean (Contact Science and Math Coordinator for assistance)

GENERAL SAFETY RULES FOR STUDENT SAFETY IN THE LABORATORY

1. **Students:** Students should never work in a teaching laboratory or laboratory preparation room without appropriate training and permission. Students working outside normal class times must obtain prior approval from the appropriate Science faculty member and ensure that MU Campus Safety has been notified.

   During normal business hours, notification and access are obtained through the

   a. Science & Math Coordinator.

   Outside of normal business hours, the student can request access through

   b. MU Campus Safety

      - **Note** that MU Campus Safety will only grant access to students who have obtained prior written approval from their faculty member.

2. Students must follow the directions provided by this *safety manual*, their course laboratory manual and their instructor.

3. Safety Data Sheets (SDS) and the Right to Know

   a. Students need to be aware of the hazards involved in their laboratory exercises as well as the appropriate steps to take to minimize risk. Instructors will clearly communicate all hazards to students and ensure that students understand and follow safety procedures in their laboratories. Students have a responsibility to follow directions and to ask questions if they do not understand how to proceed.
   b. Students may also obtain a copy the Safety Data Sheet (SDS) for the substances they are handling upon request. These sheets are available online.
   c. The Right to Know station is located in room S206.
   d. The State of Michigan Right to Know Law is located at: https://www.michigan.gov/documents/CIS_WSH_part_42__47164_7.pdf

4. Students should alert their instructor if they have a health condition which might affect their ability to work safely (e.g., no sense of smell) or which might place them at additional risk for harm due to exposure to hazardous substances (e.g., immune deficiency, pregnancy or nursing). The instructor will respect student confidentiality and work with them to provide a suitable solution.

SAFETY INCIDENTS AND EMERGENCIES

1. **There are wall phones located throughout the building.**

In the event of an emergency, first dial 9-1-1 from any phone,
and then reach out to MU Campus Safety by dialing 5-4-4-2 from any wall phone
(or dial (734) 432-5442 from a cell phone).

2. In the event that students need to evacuate a laboratory, they should proceed to the hallway door immediately and exit the building. If the hallway door is inaccessible, an alternate emergency exit should be used.

3. OSHA approved first aid kits are located in each teaching lab for treatment of minor injuries. Instructors and students assisting others need to wear proper PPE. An injury report needs to be filed for all injuries.

4. Students are to **report all *safety incidents* and *near-misses***, to their instructor if they feel ill during or immediately after a lab session. Instructors must complete the Student Laboratory Injury and Illness Report (see Appendix B).

5. ***Safety incidents*** include all laboratory-related injuries or illnesses involving students which require first aid measures or involve loss of consciousness, inability to complete the class session, days away from class, inability to complete the course, permanent injury or death. Laboratory-related injuries and illnesses that are diagnosed by a physician or licensed health care professional must also be reported.

6. ***Near-misses*** are unplanned events which did not result in injury, illness or damage, but had the potential to do so.

7. The instructor and/or MU Campus Safety will collect information relating to the incident and may need to ask questions regarding the student's health. The information collected will be kept confidential.

8. The instructor or campus safety need to take steps to document or preserve the scene of the incident, as well as, identify any ***Witnesses*** in order to facilitate the subsequent investigation, when there is a serious injury. (see Appendix D)

9. If the potential exists that students in another lab course are at risk of a similar hazard requiring additional safety measures be taken, the instructor or Department Chair will notify other faculty immediately.

10. The instructor will complete a Student Laboratory Injury and Illness Report Form within 24 hours and submit it to MU Campus Safety and to the Dean's office via the Science and Math Coordinator. The student will be provided with a complete copy of the report.

SPECIFIC SAFETY RULES FOR STUDENT SAFETY IN THE LABORATORY

1. **Laboratory Supervision:** Students will complete their work during the assigned laboratory hours. When students are required to conduct lab work outside of normal hours to complete a course assignment, they are required to ensure that the appropriate faculty member and MU Campus safety have been notified. The faculty member has responsibility to ensure that the student is ready to work independently, has adequate instruction and is monitored appropriately. Students working outside normal lab session hours without direct supervision are permitted to perform low-risk activities only. (See Appendix A for examples of low-risk activities).

   Student Lab Assistants and Student Researchers Only: Where there is low or moderate risk for hazard (see Appendix A), student lab assistants and student researchers may work in the laboratory outside of regular business hours with prior approval from the appropriate faculty member and appropriate notifications are made to Madonna University Campus Safety. The instructor is responsible to insure the student is ready to work independently in the laboratory. Student employees will not engage in activities of high risk without a responsible faculty member physically present in the laboratory. Student Lab Assistants or Researchers engaging in risky behaviors will face disciplinary action, and possible expulsion from the university.

2. Individual Personal Safety Standards

a. Long hair must be tied back. Dangling jewelry or clothing items must be secured. .
b. Head coverings for religious or medical reasons need to be covered with a disposable bouffant cap during the lab session.
c. Closed toe shoes must be worn in the lab.
d. Do not apply makeup, lip balm, eye drops or handle contact lenses in the lab.
e. Where cellphones use is incorporated into lab activities (e.g., taking photos of results, researching information) students should not be handle with gloves or placed onto benchtops or other contaminated surfaces. Personal phone calls, texts and other communications should not take place during lab sessions.
f. Food or drink are not allowed in any laboratory.
g. Never smell or taste lab substances.
h. Students must wash their hands with soap and water before exiting the laboratory.
i. Lab coats and eye protection are required.
j. Lab coats and gloves are not to be worn outside of the laboratory

3. Personal Protective Equipment (PPE)

a. Always wear task appropriate goggles or safety glasses when working in the laboratory.
b. A closed (buttoned) lab coat must be worn when working in the laboratory
c. Gloves should be worn when handling biological substances. Latex and/or nitrile gloves are available. If you develop a skin rash or other symptoms associated to wearing gloves, notify your instructor immediately.
d. Chemical resistant gloves should be worn when handling organics, concentrated acids or bases and any unknown substances. The need for gloves can be determined by consulting the Safety Data Sheet for that substance.
e. Students should wash their hands after removing gloves.
f. Masks or respirators must be worn when hazardous particulates or fumes may become airborne and/or as a barrier to biological contamination of the nose and mouth. Hazardous substances that can potentially become airborne should be processed inside a ventilation hood or containment chamber wherever feasible. Students should work with their instructor to select the appropriate mask/respirator and to ensure that it is worn properly. Biological masks are appropriate protection from contamination, but provide no protection from chemical fumes.

4. Safety Stations and Equipment

a. Safety stations (eye wash and safety shower) are located in all biological and chemistry science teaching laboratories. There is a handheld eyewash device located in the sinks in room S209.
b. Lab activities involving the use of hazardous substances must not be conducted when the safety station for that lab is not functional
c. No obstacles or storage are allowed to block the path to a safety station.

d. If a student is splashed in the face they should proceed immediately to the eyewash station to flush their eyes. Place your face above the eyewash station and press the lever to activate the flow of water. Water will flow from 2 or 4 jets, allowing both eyes to be rinsed simultaneously.
e. Hold open the eye lids and flush the eye(s) for ten minutes. Contact Livonia Emergency Services/Livonia Fire Department by calling 911.
f. If the student is soaked with an substance, they should proceed immediately to the safety shower. Stand underneath and pull the handle down fully to drench the affected area. If hazardous substances are on lab coats or clothing, they should be removed immediately. Stay under the safety shower for at least ten minutes. Contact Livonia Emergency Services/Livonia Fire Department by calling 911.

5. Ventilation Hoods

a. Ventilation hoods are be used when hazardous fumes or particulates may become airborne.
    i. Examples of hazardous fumes and particulates include (but are not limited to) concentrated acids and bases, flammable and/or toxic organics, harmful or noxious vapors produced during the course of a reaction, or whenever the outcome of a reaction is unknown.
b. Hoods are not to be used for storage.
c. Students should not raise the vertical sash higher than 15 inches (marked with an arrow).
d. Students using the horizontal sash must not stand in front of the open space Students using the horizontal sash should stand with their arms reaching around the sash on both sides to provide maximum protection.
e. Hazardous substances should be kept at least 6 inches inside the hood to minimize turbulence.
f. Students should not crowd around the ventilation hood while working, as this creates turbulence which could cause hazardous vapors to enter the laboratory.
g. The control panels on the ventilation hoods are equipped with an alarm to notify users when the air flow is insufficient for safe operation.

6. Waste and Hazardous Substance Disposal

a. All biological and medical waste must be disposed in the appropriate containers. Red containers marked 'Biohazard' are available in areas where these materials are handled.
b. Gloves and other items directly contaminated with biological or medical hazards should be disposed as biological/medical waste as well.
c. Chemical waste should be placed in a labeled waste container only.
d. Each laboratory where chemicals are used contains an Eco-Funnel system inside a ventilation hood to contain organic chemical waste. Please notify the instructor if the bottle is full.
e. If solid organic waste is generated, it should be placed in the labeled waste container.
f. Inorganic liquid waste should be disposed in a labeled container as provided by your instructor.
g. Substances (e.g., ethidium bromide) have special disposal requirements are to be placed in labeled disposal containers.
h. Water-soluble neutral substances may be flushed down the lab drain with copious amounts of water. The appropriate Safety Data Sheet (SDS) should be consulted prior to this type of disposal.

7. **Spills and Breakage**

a. All spills, glass breakage and equipment damage must be reported to the instructor immediately. If the spill is hazardous, nearby lab activities must stop temporarily while the cleanup is in progress. Students should not engage in any clean up activity without direction from the instructor.
b. Small spills can be readily handled in the laboratory. However, if a large spill of a hazardous substance occurs (e.g., concentrated acids or bases, volatile organics) it will be necessary to evacuate all students in the lab immediately.
c. For large spills, evacuate the lab and contact Campus Safety and Livonia Fire Department by calling 911. The control panels on the ventilation hoods possess a button marked "Purge/Emergency." Pressing this button causes the hood to create maximum air flow.
d. Small acid spills can be neutralized using sodium bicarbonate, which is located throughout the Chemistry labs. Once the acidity is neutralized (as evidenced by a lack of bubble formation), the solid material can be

disposed as solid waste and the surface washed clean with copious amounts of water. Large acid spills, especially those involving concentrated acids, may produce hazardous fumes.

e. Chemical spill kits available for large spills, as well as spills of bases and organic substances. These kits are located in rooms S104 (Biology Prep), S202 (Chemistry Prep), S208 (Physical Chemistry Lab) and S210 (Genetics lab). These kits contain neutralizing compounds for acids and bases, as well as loose inert absorbent materials, absorbent pads and pillows for all manner of substances, including organic solvents. They also contain thick rubber gloves, googles and an N95 respirator.
    i. Note that N95 respirators protect from airborne particulates, but not from corrosive fumes or volatile organics. When high concentrations of hazardous fumes or particulates are present, the area must be evacuated immediately. If the space cannot be readily ventilated to allow prompt clean up, call Livonia Fire Department by dialing 9-1-1 and then notify MU Campus Safety.
    ii. The absorbent pads can be used to soak up small spills. The absorbent pillows can be used to prevent large spills from spreading further.
    iii. Before pouring any neutralizing compound or inert absorbent powder, the N95 respirator, thick gloves and lab coat should be donned.
    iv. Acid/base spills can be neutralized with the appropriate neutralizing compound. Organics can be absorbed by the loose inert absorbent material
    v. After the spill has been neutralized and/or absorbed, it should be swept up with the broom and dust pan provided. All recovered waste should be placed in the bag provided, returned to the orange bucket and sealed. The bucket should be placed in a ventilation hood for safe storage.

f. Broken glass which is contaminated with hazardous chemicals (e.g., heavy metals) require special disposal methods. The instructor will perform these cleanup activities.

8. Handling and Transporting Hazardous Chemicals

a. Students will not hand carry bottles of hazardous liquids between rooms.
    i. Carts and bottle carriers are available for safe transport of hazardous liquids.
b. It is acceptable to hand carry small quantities (1 liter or less) of hazardous liquids within the same room.
c. When hand carrying small bottles of hazardous liquids, grip the bottle with both hands, including one hand underneath. Gloves and other PPE must be worn. Never handle any bottle by its top as it may come loose.
d. Students should not attempt to pour hazardous liquids from a large bottle (~ gallon) directly into a small container, even with a funnel. Small amounts of liquid should be poured into a medium-sized beaker then transferred to the smaller container.
e. Label every primary and secondary container. Never use a chemical whose identity you do not know.

9. Electrical Hazards

a. Hotplates, stirrers, water baths and other electrical devices should not be used if there is damage to the electrical cords. If damage is observed, please notify your instructor immediately.
b. Please unplug the hotplate when finished. Allow it to cool fully before placing it on the cart. If you are at the end of your lab session, simply leave it in place, unplugged.

10. Gas Cylinders

a. All gas cylinders must be secured to the wall.
b. Never transport a gas cylinder by rolling or dragging it. Always transport cylinders on a the two-wheel cart designed for this purpose Once in place, cylinders must be strapped or chained to the appropriate wallmount.
c. Before operating a gas cylinder, ensure that you understand the operation of the valves and gauges. Never open a gas cylinder without verifying that the outlet valve is closed.

11. Fire Extinguishers

a. Fire extinguishers are located in every laboratory as well as in the hallways.
b. Students should not attempt to extinguish a fire, but should evacuate the room immediately, call Livonia Fire Department at 9-1-1, and notify MU Campus Safety.
c. Most fire extinguishers contain sufficient extinguishing agent for 10 seconds. If the fire is not extinguished in this time, or if the smoke becomes excessive, retreat immediately.
d. Do not resume activities until the Livonia Fire Department has determined and notified MU Campus Safety that it is safe to return.

12. Gas Leaks

a. In the event of a gas leak, evacuate the area immediately and notify Livonia Fire Department and Campus safety.
b. If adjacent classrooms are occupied, notify those occupants to evacuate as well, and pull the fire alarm for building evacuation.
c. There are gas shutoff valves located outside each laboratory.
d. Do not resume activities until the Livonia Fire Department or Consumers Energy Gas have determined and notified MU Campus Safety that it is safe to return.

13. Automated External Defibrillator (AED)

a. Automated External Defibrillators (AED) are located in the hallway on each floor.
b. Remove the AED from the cabinet and bring it to where the person is located. If available, instruct someone else to direct emergency personnel to the person needing assistance.
c. Once the lid on the device is opened, it provides audio instructions on how to proceed. Users do not need to decide whether defibrillation is necessary. It will not discharge (provide electrical shock) unless the appropriate conditions are met.

LABORATORY SUPERVISION

The following list is not exhaustive and is intended to provide examples only. Please consult with your instructor if you have any questions in determining the appropriate risk level for a laboratory activity.

LOW RISK FOR HAZARD

- Laboratory set up activities which involve handling glassware, lab equipment, casts, models, inert materials and sealed containers of dilute chemicals.
- Processing Data
- Feeding Flies

MODERATE RISK FOR HAZARD

- Aliquoting or mixing dilute working solutions.
- Working with preservatives (e.g., formalin)

HIGH RISK FOR HAZARD

- Handling known carcinogens or teratogens (e.g., ethidium bromide).
- Handling concentrated acids or bases (e.g., sodium hydroxide pellets)
- Using sharp implements (e.g., scalpels)
- Performing dissections
- Handling human body fluids, tissues or microorganisms

MADONNA UNIVERSITY
College of Arts and Sciences

If an incident is considered Illegal or Life-Threatening Call 911 *first*
For **any** injury, illness, or incident ***immediately*** **notify Campus Safety, Dean's Office, and your Department Chair**
-Complete this form within 7 days of the incident.

School Year _____/___

Laboratory Injury and Illness Report

Attention: This form contains information relating to a person's health and must be collected and used in a manner that protects the confidentiality of the person to the extent possible. This information is intended to be used to investigate health and safety incidents with the intention of preventing future occurrences.

Injured Person Information

Full Name _____

ID Number (if applicable) _____

Witness Information (if any)

Full Name _____

ID Number _____

Phone _____

Upon completion, provide a copy of the report to injured person

Completed by _____

Title _____

Phone _____ **Date** _____

Signature _____

Copy Received by (injured person) _____

on (Date) _____

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Information about the Incident

Incident Number from Log _____

Date of Injury or Illness _____/_____/_____

Time of Incident _____ **AM /**

PM Location _____

What was the student doing just before the incident occurred?

What happened?

What was the injury or illness?

What object or substance directly harmed the student?

Please add a narrative of the incident on the back side of this form. (Attach additional sheets as necessary).

Reporting requirements: Information regarding all persons injuries or illnesses in the laboratory shall be reported. This includes laboratory-related injuries or illnesses requiring first aid measures or involving loss of consciousness, inability to complete the class session, days away from class, inability to complete the course, permanent injury, or death. Laboratory-related injuries and illnesses that are diagnosed by a physician or licensed healthcare professional shall also be recorded.

Medical Treatment

Was the student treated in an emergency room?
☐ **Yes No**
☐

Was the student hospitalized overnight as an in-patient?
☐ **Yes No**
☐

If non-emergency medical treatment was provided by the student's personal physician off campus, where was it provided?

Physician _____

Facility _____

Address _____

City _____ **State** _____ **Zip** _____

Narrative Description of Safety Incident

School Year _____/____

Name _____

Attention: This form contains information relating to a person's health and must be collected and used in a manner that protects the confidentiality of the person to the extent possible. This information is intended to be used to investigate health and safety incidents with the intention of preventing future occurrences.

Please provide a narrative description of the incident, including the relevant activities before and after.

_____

_____

_____

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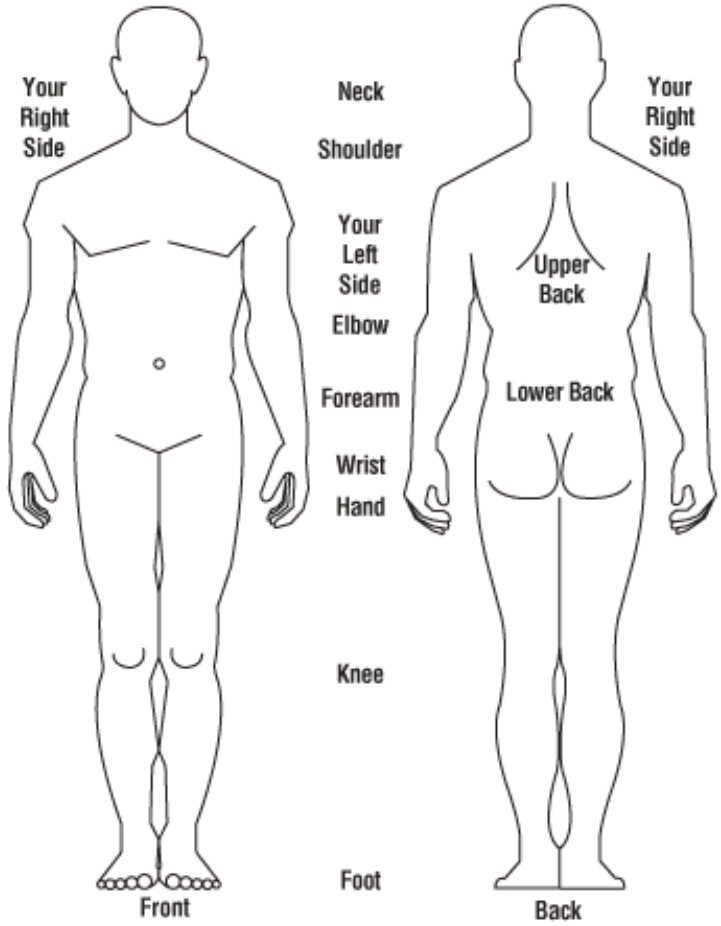

Please circle the area(s) of the injury

Person completing the narrative _____ **Signature** _____ **Date**_____

MADONNA UNIVERSITY
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If an incident is considered Illegal or Life-Threatening Call 911 *first*
For **any** injury, illness, or incident ***immediately*** **notify Campus Safety, Dean's Office, and your Department Chair**
-Near-Miss is defined as an unplanned event that did not result in injury, illness, or damage – but had the potential to do so

School Year _____/__

Near-Miss Incident

Attention: If this form contains information relating to a person's health and must be collected and used in a manner that protects the confidentiality of the person to the extent possible. This information is intended to be used to investigate health and safety incidents with the intention of preventing future occurrences.

Type of Concern

- ☐ Unsafe Act
- ☐ Unsafe Condition of Area
- ☐ Unsafe Condition of Equipment
- ☐ Safety Policy Violation
- ☐ Other:

Was anyone injured?

- ☐ No
- ☐ Yes; Fill out the Incident Report

Was property damaged?

- ☐ No
- ☐ Yes; describe:

Does property damage need to be fixed or replaced?

- ☐ No
- ☐ Yes; describe:

Information about the Incident

Date of Incident _____/_____/_____

Time of Incident_____**AM / PM**

Location _____

Incident Number _____

Describe Near-Miss
(the potential incident/hazard/concern and possible outcome)

Recommendation(s)/steps to take to prevent similar incident(s):

Information of any Persons Involved

Name _____
ID Number _____

Name _____
ID Number _____

Witness(es) to Incident

Name _____
ID Number _____

Name _____
ID Number _____

List of damages or replacement items:

_____

_____

_____

Completed by _____
Title _____
Phone _____ **Date** _____

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School Year _____/___

Witness Statement Form

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Witness Information

Full Name _____

ID Number _____

Phone _____

If more information is needed what is your preferred contact method?

- ☐ Phone
- ☐ Email
- ☐ Other: _____

_____

Information about the Incident

Incident Number from Log_____

Date of Injury or Illness_____/_____/_____

Time of Incident_____**AM / PM**

Location _____

Information about the Incident (cont.)

What happened just before the incident occurred?

_____

_____

_____

Please provide a narrative description of the event:

_____

_____

_____

_____

_____

_____

_____

_____

Signature of Witness _____**Date** _____

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