TABLE OF CONTENTS

A. Safety and Chemical Hygiene Plan Description

   Purpose
   Introduction

B. Argires Science Complex (Caputo/Roddy Halls) Resources and Procedures

   Safety Information
      1. Safety Books and Manuals
      2. Safety Signs/Posters
      3. Labels
      4. Accident/Incident Report Form
      5. Safety Data Sheets (SDS)

   Emergency Response & Preparedness
      1. Emergency Phone Numbers
      2. Evacuation/Fire Drills
      3. Emergency Exit Routes and Assembly Points
      4. Proficiency of Lab Personnel in Use of Emergency Equipment

   Emergency Response & Preparedness Equipment
      1. Fire Extinguishers
      2. Smoke Detectors/Sprinklers/Fire Alarms
      3. Eyewash and Safety Showers
      4. First Aid Kits
      5. Spill Clean-up Kits
      6. Spill Clean-up Cart - Contents and Location

   Personal Protective Equipment
      1. Protective Eyeware
      2. Protective Apparel (clothing, shoes, gloves)

   Mechanical/Physical Safety
      1. Lighting
      2. Indoor Air Quality
      3. Vacuum Systems
      4. Fume Hoods
      5. Faucets/Drains
      6. Floors
      7. Electricity
Chemical Safety

1. Chemical Storage

2. Chemical Hazards
   a. Explosives
   b. Gases (flammable, non-flammable, toxic)
   c. Flammable and Combustible Liquids
   d. Flammable Solids
   e. Oxidizers and Organic Peroxides
   f. Poisonous or Infectious Substances
   g. Radioactive Materials
   h. Corrosive Materials
   i. Miscellaneous Hazardous Materials

3. Chemical Transportation

Radiation/Magnetic Safety

1. Radioactive Materials
2. Lasers
3. Radio frequency (RF)
4. Magnetic Fields

Biosafety

Hazardous Waste

Lab Safety Training

1. General Safety Training Guidelines & Safety Culture
2. Student Safety Training
3. Additional Safety Training Responsibilities & Resources

Lab Inspection Programs

1. Inspections
2. Lab Self-Inspection Checklist

Safety Responsibility of Science and Math Faculty and Staff

1. Safe Practices of Lab Workers
2. Safety Training of Students

APPENDIX I

- Emergency Telephone Numbers Sign
- Accident Report Form

APPENDIX II

- Argires Science Complex (Caputo/Roddy Halls) – Floor maps: 1st through 4th floors
APPENDIX III - DIRECTORY.......................................................................................................................... 28-30
  - Room Number Directory.......................................................................................................................... 28
  - Life Threatening Emergency and Incident Report - Phone Number Directory................................. 28-29
  - Other Assistance for Millersville University (MU) - Phone Number Directory............................... 29
  - Argires Science Complex (Caputo/Roddy Halls) - Telephone Directory - Important Offices
    & Telephone Extensions......................................................................................................................... 29-30

GLOSSARY/ABBREVIATIONS......................................................................................................................... 31

REFERENCES.................................................................................................................................................. 32
A. CHEMICAL HYGIENE PLAN DESCRIPTION

Purpose
The Chemical Hygiene Plan (CHP) prepared by the Millersville University Chemistry Department Safety Committee aims to provide information to employees (faculty and staff), students and visitors about the necessary work practices, procedures and policies in order to ensure that all are protected from any potentially hazardous chemicals and processes found in a laboratory or work area.

Introduction
The Chemical Hygiene Plan is addressing all laboratory users (faculty, staff, students and visitors) engaged in handling or using hazardous chemicals. This CHP implementation intends to comply with the Occupational Safety & Health Administration (OSHA) Laboratory Safety Standards as indicated in: OSHA LAB STANDARD 29 CFR 1910.1450 (https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10106) and the Pennsylvania (PA) Occupational & Industrial Safety Standards as indicated in the: (http://www.dli.pa.gov/Individuais/Labor-Management-Relations/bois/Pages/default.aspx#.V1mlD- TF_pl) which requires that exposures to hazardous chemicals be maintained at or below the permissible exposure limits (PELs). In order for this CHP to be effective, users of laboratory areas must have read and understood this plan as well as engage in the safety practices indicated by the plan.

B. ARGIERES SCIENCE COMPLEX (CAPUTO/RODDY HALLS) RESOURCES AND PROCEDURES

Safety Information

1. Safety Books and Manuals
   Safety books and manuals are available to all chemistry employees (faculty and staff). Those are located in the Chemistry department main office (see directory – Appendix III) and the General Chemistry preparatory area (see directory – Appendix III).

2. Safety Signs/Posters
   All Chemistry laboratories have the following safety features: Exhaust/ventilation (fume hoods) for chemical usage. Chemical storage areas and cabinets (chemical waste area, compressed gas cylinder racks, storage cabinets for flammable liquids, acids and bases), laboratory sinks, emergency eyewashes and showers, fire extinguishers, and access to spill kits. Safety signs and posters are used to alert employees (faculty and staff) as well as students to hazards that exist in their working laboratory area. Employees and students have the right to know of any hazards that exist along with any toxic substances found in their workplace.

The following must be indicated and signs must be posted wherever required:
a. Emergency Equipment and Exit and Evacuation Route Signs
Employees must be aware of the emergency equipment location (e.g., chemical storage and waste areas, eyewash stations, safety showers, fire extinguishers) and they also must make students aware of their location during class. Signs indicating the exits from a laboratory space, in case of an emergency, as well as evacuation routes must be posted on all exit doors of each laboratory.

b. Emergency Telephone Numbers
Signs indicating emergency telephone numbers are posted on all exit doors of each laboratory, and next to the nearest phones, as well as next to fire alarm locations and automated external defibrillators (AED). (Appendix I includes the sign with the emergency telephone numbers)
Telephone numbers of faculty and staff associated with each laboratory, storeroom or stockroom area are shared with the Office of the Dean of the College of Science and Technology, the Environmental Health and Safety (EHS) Director as well as the Millersville University police.

c. No Eating/Drinking/Smoking
Signs to indicate that there is no eating or drinking in the laboratories should be posted outside the door of each teaching and research laboratory. Smoking is not permitted in any area of Millersville University. It is the policy of Millersville University to comply fully with the Pennsylvania Clean Indoor Air Act, which prohibits smoking in all buildings, indoor areas, and in open or partially open space such as sports or recreational facilities, theaters or performance establishments.

d. Eyewear and Eye Protection
All laboratories must have signs indicating that proper eye protection (safety glasses or goggles) must be worn before entering and working in any chemistry laboratory.

e. Acid and Flammable Storage Cabinets and Refrigerators
Signs must be posted outside of storage cabinets indicating acid or flammable storage. A sign should be posted to indicate that no flammable materials should be stored in refrigerators that are not flammable-rated.

3. Labels
a. Labels on all commercial chemical containers will be maintained and not defaced. Labels must include the following information:

   i. The common name of the chemical
ii. Name of the company responsible for the product
iii. A hazard warning indicating the most serious health or safety hazard the chemical poses (e.g., corrosive, carcinogen, water-reactive, flammable)

b. Containers of chemicals synthesized in the laboratory must also be labeled to indicate the contents of the container.

c. Unlabeled containers, if unidentifiable, will be disposed of according to the Environmental Protection Agency regulations and this institution's hazardous waste disposal policy. Waste of unknown or incorrectly described composition presents difficult handling and disposal problems and may require costly analysis before removal and disposal can be accomplished. The cost of this analysis and disposal is the responsibility of the generator.

d. Any laboratory employee finding a container without the minimum required information, an unlabeled container, or a label that is torn or illegible must report it immediately to their supervisor.

4. Accident/Incident Report Form
In case of an accident involving faculty members, staff, or students, an accident report must be filled out for injuries occurring during laboratory or classroom instruction - (the Accident Report Form can be found in Appendix I). If faculty or staff are injured in the workplace, they should fill out a workers’ compensation form available in the Human Resources website. All accident reports are collected and filed by the Chair of the College Safety Committee and shared with the College Safety Committee as well as the Department Chair, the Dean, the Health Services Doctor, the Chief of University Police and the Environmental Health & Safety Director. Actions are then taken to prevent recurrence of the accident.

5. Safety Data Sheets (SDS)
a. The Chemistry Department is responsible for maintaining and updating a master inventory of all chemicals used and stored in all chemistry teaching laboratories and preparation areas. Each chemistry faculty is responsible of maintaining and updating the chemical inventory in their own research laboratories. Each research laboratory chemical inventory must also be part of the master inventory of the Chemistry Department. The master chemical inventory must be shared with the Environmental Health & Safety Director. The Environmental Health & Safety Director will maintain a master inventory of all chemicals used and stored at Millersville University (paper or electronic format).
b. Safety Data Sheets (SDS) must be maintained in the Chemistry department to ensure that all chemistry employees (faculty, staff) as well as students have access to them. A copy of each SDS must be forwarded to the Environmental Health & Safety Director.

Emergency Response & Preparedness

1. Emergency Phone Numbers
   Telephone numbers of faculty and staff associated with each laboratory, storeroom or stockroom areas are shared with the Office of the Dean of the College of Science and Technology, the Environmental Health & Safety Director as well as the Millersville University Police.
   Additional Emergency Numbers are indicated in the directory – Appendix III.

2. Fire Drills/Evacuation/Fire Safety Training
   Practice fire drills are conducted semi-annually for each Millersville University academic and administrative building. Practice fire drills are performed to ensure fire safety systems are functioning properly, and to educate students, faculty and staff how to safely evacuate a building in case of a fire or emergency. The Environmental Health & Safety Office offers fire safety training programs such as fire safety awareness and fire extinguisher training.

3. Emergency Exit Routes and Assembly Points
   Emergency exit route signs are posted in all laboratories, offices, and hallways. In case of a fire or emergency, faculty, staff and students are to safely evacuate the building using the route leading to the closest exit. Once outside the building, individuals are to keep 100 feet away from the building (assembly points are located at the north, south, west and east of the science complex) and remain there until an official (Fire Chief, police officer, EHS Director) indicates that is safe to return to the building.

4. Proficiency of Lab Personnel in Use of Emergency Equipment
   Laboratory personnel should be proficient on how to use and operate emergency equipment such as eyewash stations, safety showers, spill kits and fire extinguishers. Laboratory personnel should also be aware of the location of first aid kits and closest evacuation route in case of an emergency.

Emergency Response & Preparedness Equipment

1. Fire Extinguishers
   All laboratories are equipped with at least one fire extinguisher, which is fastened to the wall closest to the laboratory exit. Fire extinguisher type “ABC” is the most common type of fire
extinguisher one can find in the chemistry laboratories. This is a combination fire extinguisher, which will put out fires involving combustible materials like paper, flammable liquids like gasoline, and electrical fires. The fire extinguishers are inspected annually by the office of EHS.

2. **Smoke Detectors/Sprinklers/Fire Alarms**
   All laboratories and offices as well as classrooms are equipped with smoke detectors and a sprinkler system. The office of EHS inspects those annually. Fire alarms are located throughout the Argires Science Complex and are visual as well as audible when activated. The office of EHS inspects those annually.

3. **Eyewash and Safety Showers**
   All laboratories are equipped with eyewash stations and safety showers. The eyewash stations and safety showers should be free of any obstructions. Eyewash stations and safety showers are inspected annually.

4. **First Aid Kits**
   All laboratories have access to first aid kits for simple injuries. When injuries require medical assistance, people are directed to the Millersville Health Services or the nearest hospital (see directory – Appendix III).

5. **Spill Clean-up Kits**
   All laboratories have access to laboratory appropriate spill clean-up kits.

6. **Spill Clean-up Cart - Contents and Location**
   A spill clean-up cart is available (see directory – Appendix III). The cart contains a biohazard kit as well as spill kits for large spill containment (mercury, acid, base) and personal protective equipment (different types of gloves, goggles, face shield, respirators and rubber boots).

### Personal Protective Equipment

Personal Protective Equipment (PPE) includes, but is not limited to protective eyewear (safety glasses, goggles) and protective apparel (clothing (lab coat, chemically-resistant apron) closed-toed shoes, gloves).

1. **Protective Eyewear**
   a. To minimize the risk of eye injury, the Chemistry Department requires that all faculty, staff, students and visitors, wear eye protection at all times while in laboratories.
b. Eye protection is required when an operation or activity has the potential of an eye injury from liquids, impact, glare, or any other foreign object entering the eye. Eye protection is required whether or not one is actually performing a "chemical operation".

c. Contact lenses offer no protection against eye injury and cannot be substituted for safety glasses and goggles. Wearers of contact lenses must also wear appropriate eye protection in a hazardous environment.

d. Prescription glasses do not provide adequate protection against injury, and their use should be limited to providing minimal protection when one is present in the laboratory but not carrying out a chemical operation.

e. Safety glasses with side shields and goggles provide the minimal level of acceptable protection when working in a chemical laboratory. Those should be worn when carrying out operations in which there is reasonable danger from splashing chemicals, flying particles, etc. Eye protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.

f. In some instances "safety shields" should be set up around experiments for additional protection. Since goggles offer little protection to the face and neck, full-face shields should be worn when conducting particularly hazardous laboratory operations. In addition, the use of laser or ultraviolet light sources requires special glasses or goggles.

2. Protective Apparel (clothing, shoes, gloves)

   The specific hazardous substances being used in an experiment determine the choice of protective apparel. However, certain general guidelines should be observed at all times in the laboratory.

   a. Skin contact with any potentially hazardous chemical should always be avoided. If skin comes in contact with the chemical, immediate flushing of the affected area with water for 10-15 min is required. If further medical attention is required, one should be directed to the MU Health Services or the nearest hospital (see directory – Appendix III).

   b. Certain chemicals and classes of chemicals require that protective apparel be worn, such as a lab coat or a chemical-resistant apron.

   c. Bare feet, sandals, or open-toed shoes should be avoided. Closed-toed shoes should always be worn in the laboratory. Long hair and loose clothing should be confined when present in the laboratory.
d. Suitable gloves must always be worn when working with hazardous substances. Gloves made of material known to be resistant to permeation by the substance in use must be chosen. In some cases, two gloves should be worn on each hand to ensure that no exposure will occur in the event of damage to the outer glove. More information about the appropriate gloves to be used (e.g. latex, nitrile, neoprene, etc.) when handling a chemical substance is included in the individual chemical’s SDS.

Always inspect gloves for small holes or tears before use. In order to prevent the unintentional spread of hazardous substances, always remove gloves before handling objects such as doorknobs, telephones, pens, etc.

References
Occupational Safety & Health Administration (OSHA) Laboratory Safety Standards: OSHA LAB STANDARD 29 CFR 1910.1450

Pennsylvania (PA) Occupational & Industrial Safety Standards:
http://www.dli.pa.gov/Individuals/Labor-Management-Relations/bois/Pages/default.aspx#.V1mlD-TF_pl

Lock Haven University Chemical Hygiene Plan: http://www.ehs.wisc.edu/chemicalhygieneplan.htm

University of South Carolina Chemical Hygiene Plan:
http://www.chem.sc.edu/faculty/morgan/safety/

Mechanical/Physical Safety

1. Lighting
   a. Lighting should be adequate to perform tasks. Expired lamps in lab spaces should be replaced immediately or as soon as possible.

   b. Workers should observe caution with the heat created by lights. Lights should be allowed to cool before they are touched or moved.

   c. Light stands must be stable. Loose cables should be bundled or attached to the floor.

   d. Electrical power overload should be avoided.

   e. All lights should have adequate ventilation. Incandescent lamps should not be covered.
2. **Indoor Air Quality**
   a. General laboratory ventilation must comply with Pennsylvania state building codes and OSHA standards.
   b. General laboratory ventilation must operate continuously during working hours to provide a source of air for input to local ventilation devices.
   c. Doors to laboratories should be kept closed, as containment of hazardous materials is partially dependent on proper balance of airflow. Disruption of the positive pressure in the corridor by a laboratory door opened for an extended period of time may result in transmission or airborne materials from the laboratory to the corridor. Laboratory fume hoods will also function more efficiently when the door is kept closed.
   d. General laboratory ventilation should not be relied on for protection from toxic substances. The ventilation system shall direct airflow into the laboratory from non-laboratory areas and out to the exterior of the building.

3. **Vacuum systems**
   a. Local vacuum pumps, when used, should have exhaust ventilation, such as a spot exhaust.
   b. Vacuum pump oil should be changed regularly. Any worker changing pump oil should wear protective clothing such as gloves and eye protection. Used pump oil should be treated as hazardous waste.
   c. Local exhaust ventilation systems must be used after every effort has been made to control the contaminant by isolation, a change in the process, or by substitution of a less harmful material.
   d. The following activities must be conducted in a laboratory fume hood or under vacuum:
      i. Chemical reactions
      ii. Heating or evaporating solvents
      iii. Work involving explosive or reactive chemicals
      iv. Working with 100 milliliters or more of a substance, which is known to be a fire hazard

4. **Fume hoods**
   a. Fume hoods should be used when chemicals or process reaction byproducts are considered to be carcinogens, reproductive toxins, allergens, or highly toxic and the breathing zone air concentration (if no hood is present) exceeds the substance’s permissible exposure limit (PEL), threshold limit value (TLV), or other safe limit.
   b. The ventilation flow rate must be commensurate with federal and state regulations. Fume hoods should be maintained in working order.
5. **Faucets/Drains**

Faucets and drains should be inspected annually by the method of turning on water at maximum capacity and allowing it to drain into the basin for five minutes.

6. **Floors**

Floors must be kept clean and uncluttered in order to allow egress and to prevent accidental tripping over equipment. Spills of hazardous materials should be cleaned immediately. (see sections 5 and 6 of *Emergency Response & Preparedness Equipment*)

7. **Electricity**

   a. Electrical hazards should be minimized. Equipment or lab apparatus should be inspected for damage before use. Damaged equipment or equipment with frayed electrical wiring, should never be used.

   b. Rubber-soled shoes should be worn when working with high voltage or high current.

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**Chemical Safety**

This section defines criteria and procedures for safe handling of chemicals.

1. **Chemical Storage**

   a. An organizational scheme must be adopted in each laboratory to ensure that incompatible chemicals are not stored in close proximity. For example, strong acids and bases must not be stored close to one another and strong oxidizers must be kept away from flammable materials.

   b. Proper labeling of stored chemicals must be maintained. Labels that are falling off of bottles or are becoming difficult to read must be replaced with new labels that fully document the contents.

   c. Working containers of chemicals should not be kept on benches for extended periods of time. Working containers must be labeled to indicate their contents.

   d. Storage of chemicals in fume hoods should be minimized to prevent interference with airflow and reduce the risk of accidents while working in the hoods.

   e. Proper attention must be paid to acceptable storage conditions for chemicals as noted in the SDS, e.g. temperature, light exposure, etc.

   f. Secondary containment trays should be used to minimize the effects of spilled or broken containers.

   g. For any chemicals that have the potential to undergo hazardous reactions (e.g. peroxide formation) over time, the date of opening must be noted on the container.
Such chemicals must be tested for hazardous condition or disposed of no later than the expiration date specified by the manufacturer. If no expiration date is provided, the recommendations provided in [1] should be followed.

h. A stockroom or storeroom in which large quantities of chemicals are stored must have access restricted to authorized persons and must be locked when such persons are not present.

i. Shelving for chemical storage must be secured to the building structure to prevent tipping. Shelving should be composed of corrosion resistant materials and include “lips” to prevent items from sliding off.

j. Chemical storage areas must meet all applicable fire codes.

k. Flammable materials must be stored in cabinets designed for that purpose that meet applicable OSHA and NFPA specifications. Container size and composition for these materials must likewise meet OSHA and NFPA requirements.

l. Gas cylinders must be clearly labeled in regard to contents. Cylinders must be restrained by suitable brackets or chains secured to the building structure. Cylinder caps should be installed on all cylinders not in active use. When moving gas cylinders, a hand truck designed for that purpose must always be used.

m. Laboratory refrigerators and freezers suitable for storage of flammable materials should be clearly marked as such. Refrigerators and freezers that are not specifically designed for flammable materials must bear signage indicating that storage of class I flammable materials is forbidden. Under no circumstances may food intended for consumption be stored in laboratory refrigerators or freezers.

2. Chemical Hazards
Investigators (faculty, staff, students and visitors) must understand the hazards associated with all chemicals with which they work. The primary resource in this endeavor is the chemical's Safety Data Sheet (SDS), which should be obtained from the vendor for any purchased chemical. The SDS describes the hazards associated with a chemical, suitable storage conditions, and incompatibilities with other materials. This information must be understood before any work with a chemical begins.

Other resources for gathering information about hazardous chemicals are the regulations promulgated by the US Department of Transportation (DOT) and the US Environmental Protection Agency (EPA).

These regulations can be accessed online through the Government Publishing Office portal at: https://www.gpo.gov/fdsys/search/home.action

The US Department of Transportation defines nine hazard classes for materials:
a. Explosives. This class is defined at 49 CFR 173.50

b. Gases (flammable, non-flammable, toxic). This class is defined at 49 CFR 173.115

c. Flammable and Combustible Liquids. This class is defined at 49 CFR 173.120

d. Flammable Solids. This class is defined at 49 CFR 173.124

e. Oxidizers and Organic Peroxides. This class is defined at 49 CFR 173.127 and 173.128

f. Poisonous or Infectious Substances. This class is defined at 49 CFR 173.132 and 173.133

g. Radioactive Materials. This class is defined at 49 CFR 173.134

h. Corrosive Materials. This class is defined at 49 CFR 173.136

i. Miscellaneous Hazardous Materials. This class is defined at 49 CFR 173.140

At 49 CFR 172.101, The Department of Transportation publishes the Hazardous Materials Table, which identifies the hazard classes for many substances. Although this is primarily intended for use in meeting shipping regulations, it is a useful resource for those who wish to use a listed material.

EPA regulations have the primary goal of preventing hazardous waste from causing environmental damage and, as such, are mainly of concern to personnel who manage the waste stream. It is nonetheless incumbent upon investigators (faculty, staff, students and visitors) to have some familiarity with these regulations, as there is considerable overlap between laboratory safety and environmental risk. The most relevant EPA regulations for purposes of laboratory work can be found at 40 CFR 260 and 261 where general definitions and criteria are given.

Of particular concern are “acutely hazardous” chemicals on the “P-list” at 40 CFR 261.33(e). Aside from their highly hazardous nature, the presence of these materials in the waste stream in significant quantity can affect the University's waste generator classification. The Chemistry Department Safety Committee should approve use or generation of these materials.

3. Chemical Transportation

In general, the transportation of chemicals by university personnel is discouraged due to safety and legal considerations. Exceptions may be made for purposes of chemical demonstrations for off-campus outreach activities. In such cases, the department chair and the safety committee must approve the transport. Requirements described in ACS publication “Safe Transportation Recommendations for Chemicals Used in Demonstrations or Educational Activities” [https://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/safetypractices/transporting-chemicals.pdf] must be followed.
References

Radiation/Magnetic Safety

1. Radioactive Materials
   The use of radioactive materials entails a unique set of requirements. Before any radioactive materials are procured, a detailed plan must be drawn up indicating that state and federal licensing requirements have been met, how the materials will be stored and secured, used, and disposed of when no longer needed. The Department Chair, the Chemistry Department Safety Committee and the University Director of Environmental Health & Safety must approve this plan.

2. Lasers
   Lasers are an essential component of several laboratory instruments. In such systems, to prevent inadvertent exposure to the beam, the instrument manufacturer will generally provide interlocks. Should a situation arise in which the proper operation of such an interlock is in question, the instrument must be taken out of service until repairs can be made. Use of standalone lasers in laboratories requires engineering controls and signage pursuant to ANSI Z136.1 [https://www.lia.org/PDF/Z136_1_s.pdf].

3. Radio frequency (RF)
   Radio frequency fields may be present in the vicinity of some instruments (e.g. NMR spectrometers). Warning signs must be conspicuously posted at the entrance to laboratories in which such fields may be present.

4. Magnetic Fields
   Strong static or low frequency magnetic fields may be present in the vicinity of some instruments. These fields may present a risk to persons with medical implants as well as a projectile hazard involving magnetizable objects. Warning signs must be conspicuously posted at the entrance to laboratories in which such fields may be present.

Biosafety

As needed, the Department of Chemistry at Millersville University of Pennsylvania will work with all appropriate departments and administrative offices to help ensure that all of the following are in place throughout the instructional and research laboratories where potential biohazards are located:

- appropriate biosafety training
- standard operating procedures
- waste handling
- emergency protocols

This biosafety plan will include the use of:
• proper laboratory practices and procedures
• personal protective equipment (PPE)
• safety equipment
• containment systems
• a facility design that enables the appropriate level of containment relative to the biological hazard in use

References
Biological Safety at Penn: http://www.ehrs.upenn.edu/programs/bio/

Hazardous Waste

1. General Principles
With very few exceptions (e.g. dilute non-toxic salt solutions), all waste materials produced during laboratory work must be placed in designated hazardous waste receptacles. Such containers must be clearly labeled as to the general class of waste (e.g. “inorganic”, “non-halogenated organic”, etc.) as well as a list of the specific contents.

The College Safety/Lab Technician is responsible for collecting waste containers from laboratories as necessary, generating manifests detailing the contents and characteristics of the waste, and transporting the containers to the university's central waste accumulation site for storage. At regular intervals, a licensed waste disposal contractor will collect the waste from the central storage site for disposal in accordance with EPA regulations.

2. Work Practices
   a. The generation of hazardous waste should be minimized. Investigators (faculty, staff, students and visitors) are encouraged to develop and use validated experimental procedures that replace hazardous materials with non-hazardous materials, minimize generation of hazardous wastes, or result in effective treatment of wastes to reduce or eliminate hazardous characteristics.

   b. When adding waste to a receptacle, it is essential that the name of the waste material be added to the list of receptacle contents in a clear and legible manner. Use of abbreviations should be avoided unless such abbreviations are universally understood.

   c. Chemical waste receptacles must not be overfilled. A minimum of 10 – 15% headspace should be left in liquid waste containers to allow for thermal expansion.

   d. Designated broken glass containers are present in laboratories. If a piece of glassware is broken, any hazardous residue should be rinsed into an appropriate waste receptacle and the broken pieces should then be disposed of in the broken glass container. Other waste that presents a puncture hazard (e.g. hypodermic needles) must be placed in a
properly labeled puncture resistant container for disposal. Disposal of such items in general wastebaskets is forbidden.

e. Chemical waste should be segregated by characteristic as indicated on the container label. For example, flammable organic waste such as acetone should be disposed of in a container labeled “organic” waste as long as there are no halogenated components present. Halogenated organic waste must be placed in an appropriately labeled container.

f. The use of mercury and mercury compounds in laboratory work is strongly discouraged and should be avoided if any suitable substitute exists. If mercury compounds are used, quantities must be minimized and waste must be scrupulously confined to a waste receptacle specifically labeled for mercury bearing waste.

g. Biologically hazardous waste must be collected in special bags designed and labeled for that purpose. These bags will be collected and disposed of by a licensed contractor periodically.

Lab Safety Training

1. General Safety Training Guidelines & Safety Culture
In adherence with the 2015 ACS Guidelines & Evaluation Procedures for Bachelor’s Degree Programs all of the following groups will be responsible for reading, understanding, and adhering to all sections of this Chemical Hygiene Plan.

- research advisors
- laboratory instructors
- chemistry department staff members

In adherence of OSHA, the state of Pennsylvania occupational and industrial safety standards, and the 2015 ACS Guidelines & Evaluation Procedures for Bachelor’s Degree Programs, research advisors and/or laboratory instructors will ensure that all individuals working with chemicals (laboratory workers: including undergraduate students, coworkers, and guests) have all of the necessary information and training to ensure that they are informed of the chemical hazards present in their work area (undergraduate research laboratories and/or teaching laboratories).

In adherence with the 2015 ACS Guidelines & Evaluation Procedures for Bachelor’s Degree Programs our program in the department of chemistry at Millersville University of Pennsylvania:

- seeks to continually ensure that that all of the students are instructed in all aspects of current chemical safety and general laboratory safety appropriate to their educational, scientific, and professional needs and aspirations.
• maintains a strong culture of safety in which students are initially trained, periodically practice, demonstrate, and consistently apply their understanding of laboratory and chemical safety practices germane to their current laboratory setting and experimental work.

• organizes curriculum so that all students’ safety training begins during their very first chemistry laboratory experience at Millersville University in their initial Chemistry 111 (Introductory Chemistry/General Chemistry) Laboratory Course.

• structures curriculum so that each student’s safety training continues, as appropriate, through every single laboratory course that they participate in during their education in the department.

• arranges safety curriculum so that important themes and concepts are intermittently reviewed and mindfully spiraled throughout our curriculum to encourage prudent long-term habits and practices of chemical and laboratory safety.

2. Student Safety Training

Prior to beginning undergraduate research within the department, students have already completed general laboratory safety training throughout their pre-requisite coursework (general chemistry I and II and organic chemistry I and II/CHEM 111, 112, 231, and 232).

Undergraduate research students also receive project specific and laboratory specific training appropriate to their individual research projects and the safety needs of their research advisor’s research group.

Students’ safety understanding and skills are developed throughout our entire curriculum and assessed throughout our curriculum.

• The entire laboratory curriculum includes ample and engaging discussion of the need for safe practices, risk assessment, and experiment specific safety considerations and concerns.

• Students develop the skills necessary to safely and responsibly segregate and dispose of all waste (chemicals, chemically contaminated, and biologically contaminated).

• Students are trained to seek out, comply with, and adhere to any and all safety regulations for any laboratory that they are working in presently and in the future.

• Students are trained on the prudent selection of and the responsible use of personal protective equipment to minimize exposure to hazards.

• Students are trained in how to seek out and understand the categories of hazards associated with chemicals (health, physical, and environmental).
• Students are trained in the use of Safety Data Sheets (SDS) and other online reference materials and databases.

• Students are trained to recognize chemical and physical laboratories. They are trained to assess the risks from these hazards.

• And they are trained in discerning how best to minimize the risks and prepare for emergencies.

3. **Additional Safety Training Responsibilities & Resources**
   As mandated by OSHA and encouraged by the Pennsylvania occupational and industrial safety standards, all laboratory workers (students, coworkers, and guests) will be educated on how to safely and responsibly work with and properly dispose of all chemicals that they are working with.

   The laboratory instructor and/or research advisor shall ensure that all new laboratory workers receive the necessary safety and waste disposal instruction, training, and education prior to working with any chemicals.

   Laboratory workers shall take an active role in their training in conjunction with other parts of this Chemical Hygiene Plan.

   Additional training resources can be found on the following sites:

   • ACS Committee on Chemical Safety:  
     [https://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety.html](https://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety.html)

   • ACS Chemical Safety Practices & Recommendations:  
     [https://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety/safetypractices.html](https://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety/safetypractices.html)

   • Creating Safety Cultures in Academic Institutions:  
     [https://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/academic-safety-culture-report-final-v2.pdf](https://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/academic-safety-culture-report-final-v2.pdf)

   • Laboratory Waste Management: A Guidebook:  

   • Safe Transportation Recommendations for Chemicals Used in Demonstrations and Educational Activities:  
     [https://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/safetypractices/transporting-chemicals.pdf](https://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/safetypractices/transporting-chemicals.pdf)
As appropriate, the following topics are covered during course laboratory specific training and undergraduate research specific training throughout the curriculum in the Department of Chemistry at Millersville University and will be available in the chemistry department office (see directory – Appendix III):

- The contents of the OSHA standard 29 CFR 1910.1450 and its appendices that shall be available to all chemistry department employees.

- Millersville University Department of Chemistry’s Chemical Hygiene Plan shall be available to all chemistry department employees.

- The location (physical and/or online) and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the department and in each specific laboratory. This may include Safety Data Sheets (SDS) and other reference sources including SciFinder.

- The existence of Standard Operating Procedures (SOP) and their applicability to each specific laboratory.

- The emergency procedures provided by Millersville University of Pennsylvania’s office of EH&S.

Additional training provided by the undergraduate research advisors should be as specific to the activities conducted in the research laboratory as possible. When applicable, it should include:

- The permissible exposure limits for OSHA regulated substances (or published exposure limits for hazardous chemicals where there is no applicable OSHA standard) for chemicals used in their lab.

- Signs and symptoms associated with exposures to hazardous chemicals used in their laboratory.

- Health risks (both chemical and physical) posed by the experimental procedures conducted in their lab.

- The existence and location of all designated safety areas (showers, eyewash stations, chemical waste, etc.) in the laboratory.

- The selection and use of personal protective equipment appropriate for laboratory tasks. See the table of contents to locate the section of this CHP containing additional information on personal protective equipment.
Lab Inspection Programs

1. **Inspections**
   Departmental Safety Committee members will hold inspections periodically. Infractions of policy will be reported to the department chair and to the owner of the lab in which the hazards were detected.

2. **Lab Self-Inspection Checklist**
   The committee will periodically develop a Lab Self-Inspection Checklist. This list is to be distributed to all teaching and research faculty members who will perform the lab self-inspection at least once every academic year.

Safety Responsibility of Science and Technology Faculty and Staff

1. **Safe Practices of Lab Workers**
   Lab workers (ex. students, staff, faculty, visiting faculty) should exercise caution when working in laboratories.

2. **Safety Training of Students**
   a. All lab courses shall include safety training and chemical hygiene protocols as part of the course coverage.
   b. The instructor of record is responsible for disseminating information regarding hazards to all students.
   c. Research lab owners (principal investigators) are responsible for disseminating information regarding hazards to students involved in research.
Millersville University

**Emergency Calls**

**Medical and Life Threatening Emergencies**

In an emergency **call 911**

If the building needs to be evacuated, leave the building and **call 911** from a safe location

**Non-Emergency Calls**

**Non Life Threatening Medical or General Assistance***

In a non life threatening medical situation or for general assistance

**call the University Police: 871-4357**

*General assistance examples:

1) Requesting the opening of a campus building, 2) Reporting problems with a motor vehicle

3) Reporting an incident or unsafe condition, 4) Reporting a malfunctioning elevator
MILLERSVILLE UNIVERSITY  
College of Science and Technology  

ACCIDENT REPORT FORM  

Date of Report: ___________________________  
Report Filed by: ___________________________  Department: ___________________________  
Person(s) Involved: ___________________________  Department: ___________________________  
MU# of Person(s) Involved: ___________________________  
Accident Date: ___________  Time: ___________  Room Number: ___________  

Cause and Description of Accident:  
__________________________________________________________________________  
__________________________________________________________________________  
__________________________________________________________________________  

Action Taken:  
__________________________________________________________________________  
__________________________________________________________________________  
__________________________________________________________________________  
__________________________________________________________________________  
__________________________________________________________________________  

If the injured person is escorted to the Infirmary for medical aid, the signature of the instructor or the University Police Officer who accompanies the individual is to be given below.  

Signature of Escort: ___________________________  
Date: ___________  Time: ___________  

RETURN COMPLETED FORM TO:  
Dr. Maria Schiza  
Chair of the Safety Committee and Safety Officer for the  
College of Science & Technology  

cc  
Dr. S. Northwall, Infirmary  
Dr. M. Jackson, Dean, College of Science and Technology  
Mr. P. Weidinger, Employee Health and Safety Officer  
Chief Pete Anders, University Police  
Department Chairperson  

06/16
APPENDIX II

Argires Science Complex (Caputo/Roddy Halls) – Floor maps: 1st through 4th floors
APPENDIX III - DIRECTORY

Room Number Directory

<table>
<thead>
<tr>
<th>Room Number Directory</th>
<th>Room</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry Department Main Office</td>
<td>Caputo 234</td>
<td>(717) 871-4297</td>
</tr>
<tr>
<td>General Chemistry Preparation Area</td>
<td>Caputo 330</td>
<td></td>
</tr>
<tr>
<td>Chemical Spill Clean-up Cart Location Preparatory room</td>
<td>Preparatory room behind Caputo 210</td>
<td></td>
</tr>
</tbody>
</table>

Life Threatening Emergency and Incident Report - Phone Number Directory

<table>
<thead>
<tr>
<th>Life Threatening Emergency and Incident Report Phone Number Directory</th>
<th>Telephone</th>
<th>Address</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire, Police, Ambulance, Medical Emergency</td>
<td>911</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millersville University Environmental Health &amp; Safety Office</td>
<td>(717) 871-4950</td>
<td>P.O. Box 1002 Millersville, PA 17551-0302</td>
<td><a href="https://www.millersville.edu/hr/ehs/index.php">https://www.millersville.edu/hr/ehs/index.php</a></td>
</tr>
<tr>
<td>Lancaster General Hospital</td>
<td>(717) 544-5511</td>
<td>555 N Duke St, Lancaster, PA 17602</td>
<td><a href="http://lancastergeneralhealth.org/LGH/">http://lancastergeneralhealth.org/LGH/</a></td>
</tr>
<tr>
<td>Lancaster Regional Medical Center</td>
<td>(717) 291-8211</td>
<td>250 College Ave, Lancaster, PA 17603</td>
<td><a href="http://www.lancastermedicalcenters.com/">http://www.lancastermedicalcenters.com/</a></td>
</tr>
</tbody>
</table>
### American Association of Poison Control Centers

<table>
<thead>
<tr>
<th></th>
<th>(800) 222-1222</th>
<th><a href="http://www.aapcc.org">www.aapcc.org</a></th>
</tr>
</thead>
</table>

### PA Department of Environmental Protection (DEP)

<table>
<thead>
<tr>
<th></th>
<th>(866) 825-0208</th>
<th><a href="http://www.dep.pa.gov/About/ReportanIncident/Pages/default.aspx#.V2FTMS5v_RY">http://www.dep.pa.gov/About/ReportanIncident/Pages/default.aspx#.V2FTMS5v_RY</a></th>
</tr>
</thead>
</table>

### Other Assistance for Millersville University (MU) – Phone Number Directory

<table>
<thead>
<tr>
<th>Service</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Emergency Medical Care (MU Health Services)</td>
<td>(717) 871-5250</td>
</tr>
<tr>
<td>Non-Emergency Police</td>
<td>(717) 871-4357</td>
</tr>
<tr>
<td>Facilities and Maintenance Operations</td>
<td>(717) 871-7874 or (717) 871-7875</td>
</tr>
<tr>
<td>Environmental Health &amp; Safety Office</td>
<td>(717) 871-4950</td>
</tr>
<tr>
<td>Help Desk</td>
<td>(717) 871-7777</td>
</tr>
<tr>
<td>Information</td>
<td>(717) 871-4636 (INFO)</td>
</tr>
<tr>
<td>Student Memorial Center (SMC) Information Desk (open 24 hours/7 days a week)</td>
<td>(717) 871-4636</td>
</tr>
<tr>
<td>Threat Assessment Team (TAT)</td>
<td>(717) 871-7070</td>
</tr>
<tr>
<td>Telephone Repairs</td>
<td>(717) 871-7777</td>
</tr>
</tbody>
</table>

### Argires Science Complex (Caputo/Roddy Halls) - Telephone Directory - Important Offices & Telephone Extensions

(All phone number extensions start with (717) 871-)

<table>
<thead>
<tr>
<th>Department</th>
<th>Name</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIOLOGY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hoover, John (Dept. Chair)</td>
<td>7427</td>
</tr>
<tr>
<td></td>
<td>Roberts, Beth (Dept. Secretary)</td>
<td>4321</td>
</tr>
<tr>
<td><strong>CHEMISTRY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brown, Deanna (Dept. Secretary)</td>
<td>4297</td>
</tr>
<tr>
<td></td>
<td>Peurifoy, Stephen (Safety/Laboratory Technician)</td>
<td>7413</td>
</tr>
<tr>
<td>Name</td>
<td>Phone</td>
<td>Office</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>Rajaseelan, Edward (Dept. Chair)</td>
<td>7395</td>
<td>Caputo 213</td>
</tr>
<tr>
<td>Schiza, Maria (<em>Safety Committee Chair</em>)</td>
<td>7437</td>
<td>Caputo 219</td>
</tr>
<tr>
<td><strong>COMPUTER SCIENCE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hutchens, David (Dept. Chair)</td>
<td>4307</td>
<td>Roddy 132-A</td>
</tr>
<tr>
<td>Pyles, Tonya (Dept. Secretary)</td>
<td>4305/4306</td>
<td>Roddy 132</td>
</tr>
<tr>
<td><strong>DEAN'S OFFICE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frantz, Marianne (Admin. Assistant)</td>
<td>4292</td>
<td>Caputo 206</td>
</tr>
<tr>
<td>Jackson, Michael (Dean)</td>
<td>4292</td>
<td>Caputo 206C</td>
</tr>
<tr>
<td>Martin, Kevin (Storeroom Manager)</td>
<td>4302</td>
<td>Caputo 303</td>
</tr>
<tr>
<td><strong>EARTH SCIENCES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clark, Richard (Dept. Chair)</td>
<td>7434</td>
<td>Caputo 409</td>
</tr>
<tr>
<td>Devlin, Marty (Dept. Secretary)</td>
<td>4359</td>
<td>Nichols 101</td>
</tr>
<tr>
<td><strong>NURSING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kuhns, Kelly (Dept. Chair)</td>
<td>5276</td>
<td>Caputo 123</td>
</tr>
<tr>
<td>Williams, Melissa (Dept. Secretary)</td>
<td>4274</td>
<td>Caputo 127</td>
</tr>
<tr>
<td><strong>PHYSICS</strong></td>
<td></td>
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</tr>
<tr>
<td>Hendrick, Sean (Dept. Chair)</td>
<td>7446</td>
<td>Caputo 239</td>
</tr>
<tr>
<td>Brown, Deanna (Dept. Secretary)</td>
<td>4297</td>
<td>Caputo 234</td>
</tr>
<tr>
<td>AED</td>
<td>Automated External Defibrillators</td>
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</tr>
<tr>
<td>-----</td>
<td>----------------------------------</td>
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</tr>
<tr>
<td>CHP</td>
<td>Chemical Hygiene Plan</td>
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</tr>
<tr>
<td>DOT</td>
<td>Department of Transportation</td>
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</tr>
<tr>
<td>EHS</td>
<td>Environmental Health &amp; Safety</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
<td></td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
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<tr>
<td>OSHA</td>
<td>Occupational Safety &amp; Health Administration</td>
<td></td>
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<tr>
<td>PEL</td>
<td>Permissible Exposure Limit</td>
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</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
<td></td>
</tr>
<tr>
<td>SDS</td>
<td>Safety Data Sheet</td>
<td></td>
</tr>
<tr>
<td>SOP</td>
<td>Standard Operating Procedure</td>
<td></td>
</tr>
<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
<td></td>
</tr>
</tbody>
</table>
REFERENCES

- Occupational Safety & Health Administration (OSHA) Laboratory Safety Standards: OSHA LAB STANDARD 29 CFR 1910.1450

- Pennsylvania (PA) Occupational & Industrial Safety Standards:
  http://www.dli.pa.gov/Individuals/Labor-Management-Relations/bois/Pages/default.aspx#.V1mlD-TF_pL

- Lock Haven University Chemical Hygiene Plan:
  http://www.ehs.wisc.edu/chemicalhygieneplan.htm

- University of South Carolina Chemical Hygiene Plan:
  http://www.chem.sc.edu/faculty/morgan/safety/


- Biological Safety at Penn: http://www.ehrs.upenn.edu/programs/bio/


- ACS Guidelines & Evaluation Procedures for Bachelor’s Degree Programs:
  https://www.acs.org/content/dam/acsorg/about/governance/committees/training/2015-acs-guidelines-for-bachelors-degree-programs.pdf

- OSHA 1910.1450: Occupational Exposure to hazardous chemical in laboratories:

- PA occupational and industrial safety standards:
  http://www.dli.pa.gov/Individuals/Labor-Management-Relations/bois/Pages/default.aspx#.V12wWI6wXf7

- UPenn Chemical Hygiene Plan (Section II):
  http://www.ehrs.upenn.edu/programs/labsafety/chp/prepare.html