

**Piedmont Virginia
Community College Biology
Laboratory Safety Manual**

**Guidelines for Biology,
Anatomy, and Microbiology**

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Services
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I. Introduction

Piedmont Virginia Community College is committed to providing a safe and healthful learning, teaching, and research environment. The goals of the College's biological safety program are to:

- Protect staff and students from exposure to infectious agents
- Prevent environmental contamination
- Protect experimental materials
- Comply with federal, state, and local regulations

This manual provides college-wide safety guidelines for those working in the Biology labs (Biology, Microbiology and Anatomy & Physiology). It outlines general policies and procedures for using and disposing of infectious or potentially infectious materials. It also discusses emergency procedures, spill clean up, and fire safety associated with working in the Biology laboratories.

As faculty and staff we are entrusted with the safety of the College's students as soon as they walk through the door of the laboratory. It is our duty to make sure that while they are in the lab they are following procedures in a safe manner while learning the curriculum. We all must be vigilant to avoid unnecessary accidents in the lab and to ensure that the students have an enjoyable learning experience.

II. Program Administration: Responsibilities and Accountability

A. The Safety Committee:

The role of the Safety Committee is to:

- Monitor compliance with college safety policies and procedures regarding potentially infectious and biohazardous materials.
- Assist the Biology Lab Manager in the selection of laboratory practices, equipment, and controls.
- Provide technical guidance to all personnel on matters related to laboratory safety.
- Develop and conduct appropriate training programs to promote techniques for the safe handling and disposal of biohazardous materials.
- Approve use of biohazardous materials and set safety criteria for the handling of those agents.
- Investigate all reported accidents that may result in personnel or environmental exposure to biohazardous materials.

B. Dean

The Dean of the Health and Life Sciences Division is responsible for the implementation of safe practices and procedures in the Biology department.

C. Biology Lab Manager

The Biology Lab Manager is responsible for:

- Identifying potentially infectious and biohazardous materials.
- Instructing the faculty and staff in the potential hazards of biologically derived materials.
- Submitting protocols involving work with potentially infectious agents to the Safety Committee for review and approval.
- Carrying out specific biohazard control procedures within the laboratories.
- Maintaining the safety equipment within the laboratories.
- Informing students of laboratory safety policies.
- Enforcing laboratory safety policies in all Biology laboratory courses.
- Training faculty and staff in safe laboratory practices.

D. Employees: Faculty, Staff and Student Workers

Employees, faculty, staff and student workers, are responsible to:

- Comply with safety guidelines and procedures required for the task(s) performed.
- Report unsafe conditions to the Biology Lab Manager, Dean, or the Safety Committee.
- Seek guidance from the Biology Lab Manager, Dean, or Safety Committee when they are uncertain how to handle, store, or dispose of any hazardous or biohazardous materials.
- Inform students of laboratory safety policies.
- Enforce laboratory safety policies in the course(s) that they instruct.

E. Students

Students are responsible to:

- Read, understand, and sign the laboratory safety consent form for the Biology course(s) in which they are enrolled.
- Comply with safety guidelines and procedures required for the task(s) performed.
- Report unsafe laboratory conditions to their instructor(s).

III. Biohazards and Potentially Infectious Materials

A. Definition

Biohazards are infectious agents or biologically derived infectious materials that present risk or potential risk to the health of humans or animals, either directly or indirectly through infection or indirectly through damage to the environment. Infectious agents have the ability to replicate and give rise to the potential of large populations in nature when small numbers are released from a controlled situation.

B. Categories of Biohazards or Potentially Infectious Materials

1. Human, animal, and plant pathogens:
 - a. Bacteria, including those with drug resistance
 - b. Plasmids
 - c. Fungi
 - d. Viruses
 - e. Parasites
2. All human blood, blood products, tissues, and certain body fluids.
3. Cultured cells (all human and certain animal) and potential infectious agents these cells may contain.
4. Allergens
5. Toxins (bacterial, fungal, plant)
6. Certain recombinant products
7. Clinical specimens
8. Infected animals and animal tissues

C. Human Blood, Blood Products, Body Fluids and Tissues

Biosafety Level 2 practices and procedures (Appendix C) must be followed when handling human blood, blood products, body fluids, and tissues because of the infectious agents they may contain. These practices are consistent with the concept known as “Universal Precautions” which requires ALL specimens of human blood or other potentially infectious materials to be treated as if they are infectious.

In 1991, the Occupational Safety and Health Administration (OSHA) promulgated a standard to eliminate or minimize occupational exposure to Hepatitis B Virus (HBV), Human Immunodeficiency Virus (HIV), and other bloodborne pathogens. This federal regulation, “Occupational Exposure to Bloodborne Pathogens”, mandates a combination of engineering and work practice controls, training, Hepatitis B vaccination, and other provisions to help control the health risk to employees resulting from occupational exposure to human blood and other potentially infectious materials which may contain these or other specified agents.

If any instructors will be using human blood, blood products, body fluids or tissues they must follow the Bloodborne Pathogen Exposure Control Plan. As of February, 2003, human blood is

used in the Anatomy and Physiology 142 laboratory, room 202. The Bloodborne Pathogen Exposure Control Plan can be found in Appendix A and a hard copy is available in room 202 and the Biology laboratory prep room.

D. Biological Agents/Biohazard Classification

Biological agents used at PVCC are classified according to risk as follows:

Class 1

Agents of no or minimal hazard under ordinary conditions of handling. Agents can be handled safely in the laboratory without special apparatus or equipment, using techniques generally acceptable for nonpathogenic materials.

Class 2

Agents of ordinary potential hazard. This class includes agents that may produce disease of varying degrees of severity from accidental inoculation or injection or other means of cutaneous penetration, but which are contained by ordinary laboratory techniques.

See Appendix B for the list of microorganisms categorized by class used at PVCC. MSDS sheets are provided for these species in the Microbiology Lab, Room 205.

IV. Principles of Biosafety and Biosafety Levels

A. Containment

The term “containment” is used in describing safe methods for managing infectious agents in the laboratory environment where they are being handled or maintained. The purpose of containment is to reduce or eliminate exposure of faculty, staff, and students working in the lab, other people, and the outside environment to potentially hazardous agents. The three elements of containment include laboratory practice and technique, safety equipment, and facility design.

Primary Containment

Primary containment, the protection of personnel and the immediate laboratory environment from exposure to infectious agents, is provided by good microbiological technique and the use of appropriate safety equipment. The use of vaccines may provide an increased level of personal protection.

Secondary Containment

Secondary containment, the protection of the environment external to the laboratory from exposure to infectious materials, is provided by a combination of facility design and operational practices. The risk assessment of the work to be done with a specific agent will determine the appropriate combination of these elements.

B. Laboratory Practice and Technique

The most important element of containment is strict adherence to standard microbiological practices and techniques. Persons working with infectious agents or infected materials must be aware of potential hazards and must be trained and proficient in the practices and techniques required for handling such material safely. The Dean of Health and Life Sciences is responsible for providing and arranging for appropriate training of faculty and staff.

C. Safety Equipment (Primary Barriers)

Safety Equipment includes enclosed containers and other engineering controls designed to remove or minimize exposures to hazardous biological materials. Safety equipment also includes items for personal protection such as gloves, personal protective clothing, face shields, and safety glasses or goggles. Personal protective equipment is often used in combination with other safety equipment when working with biohazardous materials. In some situations, personal protective clothing may form the primary barrier between faculty, staff, or students and infectious materials.

D. Facility Design (Secondary Barriers)

The design of a facility is important in providing a barrier to protect people working inside and outside the laboratory, and to protect people or animals in the community from infectious agents that may be accidentally released from the laboratory. Facilities must be commensurate with the laboratory’s function and the recommended biosafety level for the agent being manipulated.

The recommended secondary barrier(s) will depend on the risk of transmission of specific agents. For example, the exposure risks for most laboratory work in Biosafety Level 1 or 2 facilities will be in direct contact with the agents, or inadvertent contact exposures through contaminated work environments. Secondary barriers in these laboratories may include separation of the laboratory work area from public access, availability of a decontamination facility (e.g., autoclave), and handwashing facilities.

As the risk for aerosol transmission increases, higher levels of primary containment and multiple secondary barriers may become necessary to prevent infectious agents from escaping into the environment. Such design features could include specialized ventilation systems to assure directional airflow, air treatment systems to decontaminate or remove agents from exhaust air, controlled access zones, airlocks at laboratory entrances, or separate buildings or modules for isolation of the laboratory.

E. Biosafety Levels

Biosafety levels (BL) consist of combinations of laboratory practices and techniques, safety equipment, and laboratory facilities. Each combination specifically appropriates for the operations performed, the documented or suspected routes of transmission of the infectious agents, and for the laboratory function or activity. The recommended BL for an organism represents the conditions under which the agent can be ordinarily handled safely. The highest Biosafety Level at the College is Biosafety Level 2.

Biosafety Level 1

Level 1 is appropriate for work done with defined and characterized strains of viable microorganisms not known to cause disease in healthy adult humans and of minimal potential hazard to laboratory personnel and the environment. It represents a basic level of containment that relies on standard microbiological practices with no special primary or secondary barriers recommended, other than a sink for handwashing.

In Biosafety Level 1 the laboratory is not necessarily separated from the general traffic patterns in the building. Work is generally conducted on open bench tops using standard microbiological practices. Special containment equipment or facility design is not required nor generally used. Laboratory personnel and students have specific training in the procedures conducted in the laboratory and are supervised by a scientist or an instructor with general training in microbiology or a related science.

Please see Appendix C for the standard and special practices, safety equipment, and facilities that apply to agents assigned to Biosafety Level 1.

Biosafety Level 2

Biosafety Level 2 is similar to Level 1 and is suitable for work involving agents of moderate potential hazard to personnel and the environment. It differs in that
(1) laboratory personnel have specific training in handling pathogenic agents

- (2) access to the laboratory is limited when work is being conducted
- (3) extreme precautions are taken with contaminated sharp items
- (4) certain procedures in which infectious aerosols or splashes may be created are conducted in biological safety cabinets or other physical containment equipment

Please see Appendix C for the standard and special practices, safety equipment and facilities apply to agents assigned to Biosafety Level 2.

V. Biology Laboratory Practices and Procedures

A. Pipettes and Pipetting Aids

Pipettes are used for volumetric measurements and transfer of fluids that may contain infectious, toxic, or corrosive material. Laboratory associated infections have occurred from oral aspiration of infectious material, mouth transfer via a contaminated finger, and inhalation of aerosols. Exposure to aerosols may occur when liquid from a pipette is dropped onto a work surface, when cultures are mixed by pipetting, or when the last drop of an inoculum is blown out. A pipette may become a hazardous piece of equipment if improperly used. The safe pipetting techniques which follow are required to minimize the potential for exposure to hazardous material.

1. Never mouth pipet. Always use a pipetting aid.
2. Always use cotton-plugged pipettes when pipetting biohazardous or toxic materials, even when safety pipetting aids are used.
3. Do not prepare biohazardous materials by bubbling expiratory air through a liquid through a pipette.
4. Do not forcibly expel biohazardous material out of a pipette.
5. Never mix biohazardous materials or toxic materials by suction or expulsion through a pipette.
6. Use “to deliver” pipettes rather than those requiring “blowout”.
7. Do not discharge materials from a pipette at a height. Whenever possible allow the discharge to run down the container wall.
8. Place contaminated, reusable pipettes horizontally in a pan containing enough liquid disinfectant to completely cover them. Autoclave the pan and pipettes as a unit before processing them for reuse.
9. Discard contaminated disposable pipettes in an appropriate container. Autoclave the container when it is 2/3 full and dispose as infectious waste.

B. Personal Protective Equipment (PPE)

PPE is used to protect faculty, staff, and students from contact with hazardous materials and infectious agents. Appropriate clothing may also protect experiments from contamination. PPE must be provided without cost to personnel. The following PPE is recommended for regular use in the Biology labs.

Face Protection

Goggles or safety glasses with solid side shields in combination with masks, chin length face shields, or other splatter guards are required for anticipated splashes, sprays, or splatters of infectious or other hazardous materials to the face. The wearing of contacts is permitted in the laboratory.

Laboratory Clothing

This category includes laboratory coats, smocks, gowns, or aprons. Long sleeved garments should be used to minimize the contamination of skin or street clothes and to reduce the

shedding of microorganisms from the arms. Additional criteria for selecting clothing are: comfort, closure types and locations, and durability.

Protective clothing must be removed and left in the laboratory before leaving for non-laboratory areas. Disposables should be available for visitors, maintenance, and service workers in the event it is required. All protective clothing should either be discarded in the laboratory or laundered by the facility. Personnel must not launder laboratory clothing at home.

Gloves

Gloves must be worn when working with biohazards, toxics, and other physically hazardous agents. Temperature resistant gloves must be worn when handling hot materials or dry ice. Protection from contact with toxic or corrosive chemicals may also be required. In some instances, double gloving may be appropriate. Gloves must be disposed of when contaminated, removed when work with infectious materials is completed, and not worn outside the laboratory. Disposable gloves must not be washed or reused.

C. Loop Sterilizers and Bunsen Burners

Sterilization of inoculating loops or needles in an open flame generates small-particle aerosols which may contain viable microorganisms. The use of a shielded electric incinerator minimizes aerosol production during loop sterilization. Alternatively, disposable plastic loops and needles may be used for culture work where electric incinerators or gas flames are not available.

Bunsen burners present a fire hazard. Long hair must be tied back when using a Bunsen burner. The Bunsen burner should only be used with the tubing away from the flame. Bunsen burners should not be used in the presence of flammable chemicals. Faculty, staff, and students must make sure the gas is completely turned off when they are done using the Bunsen burner. The Bunsen burner should be turned off at the gas valve only.

D. Electrical Equipment

Proper use of electrical equipment in the lab is essential to avoid potential fires or electrocution. Only electrical equipment with grounded, three prong plugs should be used in the laboratories and the equipment should only be plugged into grounded, three prong outlets. Extension cords are only used when necessary. Electrical equipment needs to be turned off before it is plugged in and before it is unplugged. Do not unplug any apparatus by pulling from the cord. Electrical equipment cannot be used near flammable chemicals or near water. The lab area surrounding the electrical apparatus and the operator's hands must be dry.

If electrical cords are fraying please inform the Biology Lab Manager. They should not be used but rather replaced.

Microscopes

Microscopes are electrical equipment used in all the Biology laboratories at the College. Faculty, staff, and students must exercise caution when carrying microscopes as to not drop

them. Electrical cords must be secure. Microscopes should not be used near areas of water, flame, or flammable chemicals.

Microscopes need to be thoroughly cleaned at the end of each use with lens paper and lens cleaning fluid. When oil is being used it must be removed from all objectives.

See Appendix E for Microscope Dos and Don'ts

Centrifuges

Centrifuges are important tools in the Biology lab but can be very dangerous if not used properly. The centrifuge can only be used if the samples are balanced. Avoid overfilling sample tubes or bottles. The centrifuge cover must always be in place when the rotor is in motion. Hand stopping of the centrifuge or moving the centrifuge while it is turned on are prohibited. The operator of the centrifuge should not leave the apparatus until full operating speed is obtained. If the centrifuge starts to vibrate, stop it immediately and check the balance.

Maintenance of the centrifuge is essential for quality operation. If you notice cracks, spots, or discoloration on the centrifuge rotor please notify the Biology Lab Manager.

Refrigerators and Microwaves

The refrigerators located in the Biology laboratories are for laboratory materials only. No food for personal consumption may be stored in these refrigerators. No flammable chemicals can be stored in these refrigerators.

The microwave located in the Biology prep room is for use with laboratory materials only. No food for personal consumption may be used in this microwave.

E. Chemicals

The four hazardous properties of chemical reagents are flammability, corrosiveness, reactivity, and toxicity. Improper handling of chemicals can result in explosions, fires, poisonings, burns and other bodily injury.

Faculty, staff, and students should not work alone in the laboratories or the prep room when handling hazardous chemicals. When working with specific chemicals, faculty, staff, and students should avoid ingestion, inhalation, and absorption of the chemicals. They also need to be aware of the following:

1. The hazards of the chemical as determined from SDS sheets.
2. Safeguards associated with using the chemical, including personal protective equipment.
3. How to properly store the chemical when it is not in use.
4. How to properly transport the chemical.
5. How to handle the chemical in an emergency situation.

All chemicals used must be properly labeled. Chemical containers should be closed at all times except when removing contents. Excess amounts of chemicals should not be kept in the laboratory but returned to the Biology prep room at the end of the experiment.

Flammable chemicals with a flash point below 200 F are stored in the Flammables Cabinet located in the Biology prep room. Flammable chemicals cannot be stored in the laboratory refrigerators. Quantities of flammable chemicals exceeding 500 mL should not be stored in the Biology laboratories or the Biology prep room. Flammable chemicals can only be used away from sources of ignition such as Bunsen burners. The most commonly used flammable chemical in the Biology laboratories are ethanol and acetone in small quantities.

Hazardous chemicals should be used under a well-vented fume hood to avoid the accumulation of chemical vapors. Fume hood windows should be closed at all times except when necessary to open them to adjust the apparatus inside the hood. The hood fan should be on whenever a chemical is inside the hood.

Respirators can only be used by trained personnel.

A copy of the College's Chemical Hygiene Plan is available in the Biology prep room. SDS sheets for all chemicals are located in the Microbiology Lab, room 205.

F. Glassware

Glassware should be handled and stored properly to minimize the risk of breakage. Glassware should be stored in well lighted areas with the lighter, smaller items on the upper shelves.

Glassware should be thoroughly cleaned both before and after use. Cleaning procedures depend on the material that the glassware contained. If the glassware did not contain hazardous or infectious material it can be cleaned with soap and water. If the glassware contained hazardous or infectious material it must be decontaminated, preferably by autoclave, before being washed.

G. Radiation

The only type of radiation used in the Biology laboratories is ultraviolet light, non-ionizing radiation from the 180-400 nanometer wavelength region of the electromagnetic spectrum. The UV transillumination box is located in the Microbiology lab, room 205.

Exposure to UV radiation can cause both skin and eye injury. Appropriate personal protective equipment including eye protection and protective clothing must be worn when using the UV box. The shield must be in place at all times.

VI. Safety Warning Signs and Posting

Each biology laboratory must have a room sign that provides information regarding safety standards and emergency procedures for visitors and service personnel. Room signs must contain designations for all laboratory hazards in use within the laboratory. All areas and laboratories which contain biohazardous agents, hazardous or flammable chemicals, or biohazardous wastes must be posted with an appropriate sign stating: “NO FOOD OR DRINKS PERMITTED IN THE LABORATORY”. Biohazard signs must be red/orange with the biohazard symbol and lettering in black.

All biohazard waste containers in the Biology laboratory must be labeled with a biohazard sign as well as what type of waste belongs in the container. These waste containers should be separated from work areas where experimental procedures occur.

All refrigerators and microwaves that contain or are used for the processing of biohazardous agents or hazardous chemicals must be clearly labeled.

VII. Cleaning, Decontamination, and Disposal

A. Housekeeping

Good housekeeping in the Biology laboratories is essential to reduce risks and protect the integrity of biological experiments. Routine housekeeping must be relied upon to provide work areas free of significant sources of contamination. Housekeeping procedures should be based on the highest degree of risk to which faculty, staff, and students may be subjected.

Additional laboratory housekeeping concerns include:

- Keeping the laboratory neat and free of clutter. Surfaces should be clean and free of infrequently used chemicals, glassware, and equipment. Access to sinks, eyewashes, emergency showers, and fire extinguishers must not be blocked.
- Proper disposal of chemicals and wastes. Old and unused chemicals should be disposed of promptly and properly.
- Providing a workplace that is free of physical hazards. Aisles and corridors should be free of tripping hazards.
- Removing unnecessary items on floors, under benches, and in corners.
- Never using fume hoods for storage of chemical or other materials.

B. Decontamination

Decontamination is a term used to describe a process or treatment that renders a medical device, instrument, or environmental surface safe to handle. A decontamination procedure can range from sterilization to simple cleaning with soap and water.

Laboratory personnel and students are responsible for decontaminating benches and equipment both before and after laboratory experiments. Neutral Q spray disinfectant for cleaning lab benches and germicidal disposable cloth for cleaning computer components are the preferred methods for microbiology work. A dilute bleach solution is used to clean the laboratory benches before and after experiments involving bloodborne pathogens. For most other laboratory experiments soap and water or a wet paper towel will be sufficient.

All infectious materials and all contaminated equipment or apparatuses should be decontaminated before being washed, stored, or discarded. Autoclaving is the preferred method. Infectious materials should be disposed of in appropriate containers to be autoclaved. Untrained personnel should not operate autoclaves. The exhaust fan must be turned on when running the autoclave. Special precautions should be taken to prevent accidental removal of material from an autoclave before it has been sterilized. Autoclaves should never be opened until both the temperature and the pressure are down to zero.

C. Treatment and Disposal of Biological Materials

Proper treatment and disposal of cultures and items contaminated by potentially biohazardous agents is a vital step toward protection of laboratory and service personnel from infectious disease. The waste handling process is also necessary to prevent the release of potentially

infectious agents in the community at large. Treatment and disposal of biological waste is regulated by several federal and state agencies. General guidelines for handling this waste stream are provided below.

Sharps

Sharps are generally agreed to be the most hazardous items in the potentially infectious waste stream. A high degree of precaution must always be taken with any sharp item, contaminated or not. Sharps include but are not limited to pasteur pipettes, scalpel or razor blades, glass test tubes, microscope slides and coverslips, and any other laboratory glassware. All contaminated sharps must be disposed of immediately in a sharps disposal container. Never place anything in the sharps container that isn't considered a sharp such as plastic items, paper items like paper towels or swab wrappers, disposable gloves, or pipette tips.

In the case of broken glassware that is contaminated with a harmful biological substance such as a microorganism, infectious agent, or human blood or bodily fluids, the glassware must be placed on a broken glassware tray to be autoclaved before disposal in a sharps disposal container.

Blood Contaminated Sharps

All sharps that have come in contact with infectious agents and/or human blood must be disposed of in the red sharps bag located in a puncture resistant container located in the Anatomy and Physiology lab, room 202. All sharps should be discarded into the container immediately after use. Nothing else should be placed in this container, such as paper towels or disposable gloves. Placing infected sharps in the non-biohazard sharps container poses a risk to the person responsible for disposing of the waste.

Cultures, Stocks, and Disposable Labware

All non-sharp laboratory materials used with biohazardous materials, such as microorganisms, must be treated by autoclaving prior to disposal. Plates, microcentrifuge tubes, pipette tips and other disposable contaminated materials should be collected in an autoclave bag marked with the international biohazard symbol. This autoclave bag should be kept in another container with a lid in case of leaks and to minimize aerosols or other hazardous exposure. The waste container should be closed at all times except when adding or removing waste. Glass and other sharps should not be placed in these containers.

After autoclaving, the autoclave bag must be over-bagged with an opaque trash bag and sealed prior to disposal in the regular waste stream. Clear autoclave bags do not require overbagging and may be sealed and placed in the regular waste stream. Bags with the biohazard symbol, regardless of use, must not be placed in the regular waste stream without over-bagging.

Test tube with biohazardous materials should be consolidated into one or two racks and placed on the cart by the Biology prep room along with any other contaminated glassware to be autoclaved. After autoclaving the glassware will be washed with soap and water.

Other methods of decontamination exist such as by bleach or ethanol. Autoclaving may not always be a suitable method.

Dissection Waste

Non-human animal dissection waste is to be placed in the labeled white buckets available in the Anatomy and Physiology laboratory, room 202. These waste containers must be kept closed at all times except when adding or removing waste. Whole animals should be placed back in the dissection bins until disposal. The Biology Lab Manager is responsible for packing this material correctly, contacting the disposal company for pick up of the material, and arranging for the waste to be picked up.

Materials for incineration must be packaged and labeled. Place no more than thirty pounds of pathological waste in a thick (3-4 mm) black or brown opaque bag. Twist the top closed, fold it over at the top, and tape securely with nylon filament or duct tape. Waste should be double-bagged to prevent leakage and/or protrusion of sharp edges. Materials not packaged or labeled properly or leaking containers may be refused.

Human Dissection Waste

The Instructor of the Gross Anatomy course is responsible for disposal of the cadaver at the end of the academic year. Waste produced throughout the year is to be placed in large boxes lined with red biohazard bags located in the Gross Anatomy lab, room 200. Keep the container closed at all times except when adding or removing waste. Cadaver waste should never be mixed with the other animal waste. The cadaver and waste are picked up at the end of the academic year and cremated.

D. Treatment and Disposal of Chemical Wastes

Most of the chemicals and stains that are used in the Biology labs at PVCC are in a diluted form, used in very small quantities, or are not toxic. Unless otherwise noted, they can be washed down the sink.

Hazardous chemicals should be disposed of in properly labeled chemical waste containers located in the Chemistry Lab prep room. Chemical stains containing heavy metals should not be washed down the sink but returned to the container marked “used stain.” It is the responsibility of the Biology Lab Manager to make the arrangements to have these chemicals disposed of in a timely fashion.

E. Laundry

All personal protective clothing must be cleaned, laundered, and disposed of by the College at no cost to faculty, staff, or students. Apparel contaminated with blood or other potentially infectious materials should be handled as little as possible and decontaminated, preferably by autoclaving, before being sent to the laundry for cleaning. Appropriate PPE must be worn by employees who handle contaminated laundry.

VIII. Emergency Procedures

A. General Procedures

In accordance with the College's Emergency Procedure Plan, in the event of any circumstances requiring immediate emergency assistance, the person on the scene should first call "911" and then contact the security officer by dialing 961-5319 (office) or 981-6362 (cell). There is a campus phone located in each Biology laboratory. To dial either 911 or 981-6362 from a college telephone you must first dial "9" followed by the phone number. To dial 961-5319 from a campus phone, simply dial -5319.

For situations that do not require immediate emergency assistance, the security officer should be contacted first. The security officer will summon emergency personnel if needed and notify appropriate persons at the college.

B. Medical Emergencies

In accordance with the College's Emergency Procedure Plan, contact the receptionist or security officer and/or call "911" depending on the severity of the medical emergency. Only employees with proper training should attempt to administer first aid. First aid kits are available in each laboratory. The first aid kits in the Biology laboratories are located by several of the sinks in the rooms.

C. Fire or Gas Leak

In case of a gas leak, evacuate the building immediately and call security as described above.

There are fire extinguishers located in biology and microbiology lab that are checked annually. They are Class ABC dry chemical extinguishers that can be used for paper/wood, boiling liquids, or electrical fires. They will not work on a metal fire. A class D fire extinguisher is located in the chemistry prep room. If it is possible to put out a fire with an extinguisher make sure to put the door between you and the fire. You do not want to get trapped in the laboratory.

In accordance with the College's emergency procedure plan, when the fire alarm sounds or when verbally instructed, all persons should immediately leave the building by the nearest exit. All persons must remain at least 500 feet from the building until authorized to return to the building.

D. Chemical Spills

Personal Chemical Contact

In the event that a hazardous chemical spill that comes in contact with the skin, the area of contact should be washed promptly with large quantities of water. All Biology laboratories and the prep room are equipped with eye wash facilities and emergency showers. All eyewashes and emergency showers are checked weekly.

If chemicals or other foreign objects enter the eyes, immediately flush the eyes in the eyewash with large amounts of water while holding the eye open for fifteen minutes. Have someone call for emergency assistance.

Chemical Spills

Faculty, staff, or students should never attempt to clean up a chemical spill if unsure of the hazards associated with the chemical, how to clean up the chemical, or if the chemical spill is large. In this situation the area of the spill should be evacuated in accordance with the College's Emergency Procedures Plan.

A chemical spill kit (bright yellow) is located in the laboratory prep room. Appropriate personal protective equipment must be worn when cleaning up a chemical spill.

The following steps should be used to clean up a liquid chemical spill.

1. Place absorbent socks or particulate around the outside of the spill to prevent the liquid from spreading.
2. Cover the entire spill with pads, pillows or particulate absorbent. They may be turned over or replaced as needed until the majority of the spill is absorbed.
3. Apply particulate absorbent directly to the spill area and agitate in a circular motion with a stiff broom
4. Sweep up and repeat if necessary to thoroughly dry the contaminated surface.
5. Place the chemical soaked absorbent material in the supplied yellow disposal bag.
6. Seal the disposal bag and place it in chemical disposal containers.

The following steps should be used to clean up a solid chemical spill.

1. Using the plastic scoop, place the spilled chemicals into the yellow disposal bag being careful as not to create dust.
2. Wet a spill pad and wipe down the contaminated area.
3. Wipe down the contaminated area with a wet paper towel.
4. Dispose of the spill pad and paper towel in the disposal bag.
5. Seal the disposal bag and place it in chemical disposal containers.

E. Spill Clean-up Procedures for Biosafety Level 2 Spill

Faculty, staff, or students should never attempt to clean up a biohazard spill if unsure of the hazards associated with the spill, how to clean up the spill, or if the biohazard spill is large. In this situation the area of the spill should be evacuated in accordance with the College's Emergency Procedures Plan.

Appropriate personal protective equipment must be worn when cleaning up a biohazard spill. In the event of a small spill, place paper towels over the spill and spray with disinfectant. Leave for 10 minutes and place all materials in biohazard container. Clean surface with a suitable disinfectants.

The following procedure should be used to clean up larger spills.

1. Notify other individuals in the laboratory to evacuate.
2. Notify the Division Dean.
3. Close the door behind you after exiting the laboratory.
4. Remove any contaminated clothing and place it in an autoclave bag.
5. Wash all exposed skin.
6. Place a sign on the door to the laboratory warning individuals that a spill has occurred and access is denied.
7. Allow aerosols to settle for 30 minutes before re-entering the lab.
8. Assemble clean-up supplies before entering the lab.
9. Put on appropriate personal protective equipment.
10. Clean up spill with a suitable disinfectant as follows:
 - a. Surround spill area with disinfectant or diking material that is soaked in disinfectant.
 - b. Place paper towels soaked in a disinfectant over the entire spill area. Allow 20 minutes contact time with the disinfectant to ensure adequate germicidal action.
 - c. Wipe down non-autoclavable materials with germicidal disinfectant.
 - d. Place sharps in an appropriate container and process as infectious waste.
 - e. Place contaminated autoclavable items in a biohazard bag and sterilize.

F. Blood or Bodily Fluid Spill

A Vital Emergency Response Kit is located in the Biology prep room in the event of a blood or bodily fluid spill. Personal protective clothing must be worn by persons cleaning up a blood or bodily fluid spill and the following procedure should be utilized.

1. Cover the spill with the absorbent beads.
2. When a semi-solid forms, use the pick up shovel to place the waste into the white bag.
3. Seal the white bag with the provided ties.
4. Wipe the contaminated area with the germicidal cleaning wipe.
5. Dispose of all contaminated materials in the red biohazard bag and secure with a tie.
6. Discard the red bag in the appropriate container for infected waste.

G. Accident Reporting Procedures

According to the College's policies, for accidents involving students or the general public a PVCC Accident Report form should be completed by the supervising faculty or staff member, or by the person involved, as appropriate. Please see Appendix E for a copy of the PVCC Accident Report Form. The form should be submitted to the Vice President for Finance and Administrative Services.

For accidents involving PVCC employees, including student employees, the employee should contact the Human Resources Office and complete a First Report of Accident form.

H. Emergency Phone Numbers

Receptionist	“0”
Not a medical emergency call Security – speed dial “1”	981-6362 (cell) 961-5319 (office)
For medical emergency call (from campus phone, security will be notified)	9-911
HLS Admin offices	961-5445 961-5431 961-5446 (Dean)
Blue Ridge Poison Control	1-800-451-1428
Charlottesville Gas Department	293-9164
National Response: Center Oil and Toxic Spills	1-800-424-8802
Martha Jefferson Hospital	982-7150
University of Virginia Hospital	924-2231

IX. Legal Aspects

In a court of law a plaintiff may not be able to recover injuries caused by another's negligence if it can be shown that the plaintiff knew the activity involved the taking of a risk and voluntarily assumed that risk. Therefore, we must make our students aware of the risks associated with both the overall course and each individual lab activity. Safety should be part of the pre-lab lecture for every lab taught and students must be supervised during the course of the activity. As the instructor you are immediately responsible for the safety of your students. Do not leave students unattended in the laboratories.

The policies and procedures of the employer may be considered by a court to be a binding part of the employment contract or condition of employment even if not written in the contract.

Your duties as an instructor:

- Supervise
- Instruct/Train
- Document
- Obey rules and follow procedures
- Read labels and MSDS's (if needed)
- Report all accidents
- Maintain the lab
- Exercise good judgment

Immunity

Very few states, if any, provide immunity to the teacher, supervisor or employer.

Negligence

Injury: The plaintiff must show that harm was caused by the action (or lack of action) of the defendant.

Duty: Plaintiff must show the existence of a responsibility of the defendant to the plaintiff and a standard of care and how this standard of care was not met by the defendant.

As stated in Proximate Cause, there must be a direct connection between the defendant's action (or lack of action) and the plaintiff's injury.

Types of Negligence

1. Malfeasance: Doing that which should be done
 - a. Example: forcing someone to assume an unnecessary risk
2. Misfeasance: Improper performance of a lawful act
 - a. Example: Improper instruction
3. Nonfeasance: Failure to perform a required act
 - a. Example: Not enforcing the wearing of gloves
4. Comparative negligence: compares the plaintiff's negligence with that of the defendant. Under this principle the person causing the injury is held fully liable.
 - a. Example: Doing a lab demonstration without proper safety precautions

Appendix A: Bloodborne Pathogen Exposure Incident Procedures

In the event of an exposure incident (a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials), the following procedures shall be followed.

1. The exposed employee shall IMMEDIATELY wash the affected skin with soap and water or germicidal wipe and/or flush mucous membrane with water.
2. The scene of the incident, including any equipment, floors and sinks, shall be immediately and thoroughly cleaned and disinfected with an appropriate disinfectant.
3. The employee shall inform his/her supervisor of the incident as soon as possible.
4. The supervisor shall advise the division chair who shall notify the Human Resources Officer and the Dean of Finance and Administrative Services.
5. The Human Resources officer shall:
 - a. Arrange for the employee to receive a Hepatitis B vaccination if the employee has not received one previously. If the employee declines the vaccination, he/she shall be required to sign a declination statement.
 - b. Upon consent of the employee, arrange to have the employee's blood collected for testing at the designated healthcare facility.
 - c. Arrange to have the blood of the source individual tested, if a specimen is available or upon consent of the source individual, if the infectious status is unknown.
 - d. Assure that the employee is informed of the results of the source individual's blood test.
 - e. Arrange for the employee to have post-exposure prophylaxis, counseling, and medical evaluation if necessary.
 - f. Provide the employee with a copy of the healthcare professional's written opinion within 15 days of the evaluation.
6. The division chair will investigate the exposure incident within 24 hours and will report the results to the Dean of Finance and Administrative Services.

BIO 142 Protocol for Handling Student Blood Samples

1. Wear safety gloves at all times.
2. Handle your own freshly let blood only. Handling blood from others puts you at risk of exposure to human immunodeficiency virus (HIV) and hepatitis viruses (HBV and HBC). You are not to handle anyone else's blood.
3. Be sure that you understand the instructions and have all supplies on hand before you begin any part of the exercise.
4. Do not reuse supplies and equipment once they have been exposed to blood.
5. Keep the lab area clean. Do not let anything that has come in contact with blood touch surfaces or other individuals in the lab. Pay attention to the location of any supplies and equipment that come into contact with blood.
6. Dispose of lancets, slides, and capillary tubes immediately after use in a designated disposal container (red sharps container). Do not put them down on the lab bench, even temporarily.
7. Dispose of all used paper towels, alcohol swabs, gloves and anything that has come into contact with blood in the appropriate container (biohazardous waste container).
8. Wipe down the lab bench with bleach solution when you are finished.

I agree to adhere to the above protocols while participating in the BIO 142 Blood Tests Lab:

Name (print): _____

Signed: _____

Appendix B: PVCC Microorganisms

Class 1:

Bacillus subtilis
Bacillus cereus
Candida albicans
Micrococcus luteus
Saccharomyces cerevisiae
Staphylococcus epidermidis
T4 Bacteriophage

Class 2

Escherichia coli
Escherichia coli B
Enterobacter aerogenes
Klebsiella pneumoniae
Proteus mirabilis
Pseudomonas aeruginosa
Salmonella typhimurium
Serratia marcescens
Shigella flexneri
Shigella sonnei
Staphylococcus aureus
Streptococcus mutans
Streptococcus pneumoniae
Streptococcus pyogenes
Streptococcus viridans

Appendix C: Standard and special practices, safety equipment and facilities assigned to Biosafety levels 1 and 2

Biosafety Level 1

A. Standard Microbiological Practices

- Access to the laboratory is limited or restricted at the discretion of the laboratory manual when experiments or work with cultures and specimens are in progress.
- Persons wash their hands after they handle viable materials, after removing gloves, and before leaving the laboratory.
- Eating, drinking, smoking, handling contact lenses, and applying cosmetics are not permitted in the work areas where there is a reasonable likelihood of exposure to potentially infectious materials. Food used for consumption may not be brought into the laboratory.
- Children are not allowed in the laboratory.
- Mouth pipetting is prohibited. Mechanical pipetting devices are used.
- All procedures are performed carefully to minimize the creation of splashes or aerosols.
- Work surfaces are decontaminated at the end of each laboratory session and after any spill of viable material.
- All cultures, stock, and other regulated wastes are decontaminated before disposal by an approved decontamination method, such as autoclaving. Materials to be decontaminated off-site from the laboratory are packaged in accordance with applicable local, state, and federal regulations before removal from the facility.

B. Special Practices: None

C. Safety Equipment

- Special containment devices or equipment such as a biological safety cabinet are generally not required for manipulations of agents assigned to Biosafety Level I.
- It is recommended that laboratory coats or aprons, gowns or uniforms be worn to prevent contamination or soiling of street clothes. Gloves should be worn if the skin on the hands is broken or if a rash exists. Protective eyewear should be worn for anticipated splashes of microorganisms or other hazardous materials to the face.

- Protective clothing is removed and disposed of in the laboratory or laundered by the institution; it should not be taken home by faculty, staff or students. Disposable protective gear is not to be washed and/or reused.

D. Laboratory Facilities (Secondary Barriers)

- Each laboratory contains a sink for handwashing.
- The laboratory is designed so that it can be easily cleaned.
- Bench tops are impervious to water and resistant to acids, alkalis, organic solvents, and moderate heat.
- Spaces between benches, cabinets, and equipment are accessible for cleaning.

Biosafety Level 2

A. Standard Microbial Practices

Standard microbiological practices are the same as those of Biosafety Level 1.

B. Special Practices

- Access to the laboratory is limited or restricted by the laboratory instructor when work with infectious agents is in progress. In general, persons who are at increased risk of acquiring infection or for whom infection may be unusually hazardous are not allowed in the laboratory. For example, persons who are immuno-compromised or immunosuppressed may be at risk of acquiring infections. The laboratory instructor has the final responsibility for assessing each circumstance and determining who may enter or work in the laboratory.
- Written procedures including spill cleanup are prepared or adopted. Faculty, staff, and students are advised of special hazards and are required to read and follow instructions on practices and procedures.
- Laboratory personnel receive appropriate training on the potential hazards associated with the work involved, the necessary precautions to prevent exposures, and the exposure evaluation procedures. Personnel receive annual updates, or additional training as necessary for procedural or policy changes.
- A high degree of precaution must always be taken with any contaminated sharp items, including needles and syringes, slides, pipettes, capillary tubes, and scalpels. Plasticware should be substituted for glassware whenever possible.
- Laboratory equipment and work surfaces should be decontaminated with an appropriate disinfectant on a routine basis, after work with infectious materials, and

after spills, splashes, or other contamination. Contaminated equipment must be decontaminated before it is sent for repair or maintenance or packaged for transport before removal from the facility.

- Spills and accidents, which result in potential exposures to infectious materials, are immediately reported to the Safety Officer and Division Dean. Medical evaluation and treatment are provided as appropriate and written records are maintained.

C. Safety Equipment

Same as for Biosafety Level 1 plus the following:

- Properly maintained biological safety cabinets or other appropriate personal protective equipment or physical containment devices are used when:
 - a. Procedures with potential for creating infectious aerosols or splashes are conducted.
 - b. High concentrations or large volumes of infectious agents are used.
- Face protection is used to prevent splashes or sprays of infectious or other hazardous materials to the face when the microorganisms are used outside of a biological safety cabinet.
- Personal protective gear must be worn. It is removed and left in the laboratory before leaving for non-laboratory areas. Disposable protective gear must be disposed of after use and may not be reused after it is removed.

D. Laboratory Facilities

Same as for Biosafety Level 1 plus the following:

- An eyewash facility is readily available.

Appendix D: Student Safety Agreements

Biology 101/102/106/107

1. Do not eat, drink, smoke, chew gum, handle contact lenses, or apply cosmetics or lip balm in the lab. Do not bring open food and drink containers into the lab.
2. Closed-toed shoes must be worn in the lab. Bare feet and sandals are not allowed.
3. It is recommended that you tie back long hair to prevent it from getting in the way of lab experiments.
4. Safety glasses, aprons, and gloves must be worn when working with harmful chemicals. All personal protective equipment should be removed upon leaving the lab.
5. Do not smell or taste chemicals.
6. Do not mouth pipette.
7. Report any accidents or spills immediately to your lab instructor
8. Properly dispose of chemicals, stains and any waste according to your lab instructor's directions.
9. Do not begin any experiments until you have reviewed the procedures and special safety precautions with your instructor.
10. Wash your hands at the end of the lab.
11. Inform your lab instructor of any personal medical condition that may necessitate extra precautions for you.

Anatomy and Physiology: BIO 141-142

1. Do not eat, drink, handle contact lenses, store food, apply cosmetics or lip balm or smoke in the lab. Do not bring into the lab open drink or food containers. Wear shoes with closed-toes only in the lab, not sandals.
2. It is recommended that you tie back long hair to prevent it from getting in the way, possibly picking up chemicals in the work area, and being in danger of catching on fire should we use flame in the lab.
3. Please inform your lab instructor about any personal medical condition that may necessitate extra precautions for you.
4. If pregnant during the semester, you must present your instructor with a note from your obstetrician allowing you to perform the usual activities in the lab. Formalin, the preservative used in many of our specimens is more toxic to developing embryos/fetuses than to adults, so permission to expose the unborn is required of all pregnant women. Arrangements will be made to reduce exposure to formalin should an OB request it for a patient/student.
5. Use safety goggles when handling volatile liquids and gases.
6. The locations of all lab waste disposal and sharps containers for lancets, blades, etc. will be described during the first lab of the semester. Use these containers as indicated by your lab instructor.
7. Wear disposable gloves when handling body fluids like blood and urine and cover open wounds with a sterile bandage before donning gloves. Procedures for handling blood and urine, and equipment associated with blood test and urinalysis labs will be described in the introduction to those labs by your instructor.
8. Do not leave heat sources unattended.
9. Report all spills and accidents immediately to your lab instructor.
10. Wash hands and remove protective clothing before leaving the lab.
11. Lab models and specimens may not be taken from the lab.

I have read and understand the above information concerning lab safety regulations and I agree to abide by these and all lab safety procedures whenever I work in this laboratory.

Name (Print) _____

Signed _____

Biotech-Microbiology Lab Safety Form

Read, sign and submit to lab instructor. The signed form will be kept on file. This form can also be found on your lab Bb site. The lab exercises in this course involve the use of living organisms. Although the microorganisms we use are not considered to be highly virulent, all microorganisms should be treated as potential pathogens (organisms capable of causing disease).

Laboratory safety involves two things: 1) Knowing what hazards exist and 2) Acting appropriately to minimize those risks. In this document, general procedures are described that are designed to reduce the hazards associated with lab experiments. For experiments that involve known hazards, specific information is given within the description of that exercise.

1) Do not bring foods or drinks into the biotech- microbiology lab space. These items cannot be brought in in backpacks or purses.

2) Backpacks, purses, etc. must be placed in cubicles as students enter the laboratory. Personal items are not allowed in the lab bench area.

a. Personal notebooks and writing utensils are not to be used when working with hazardous materials.

b. Follow instructor guidelines on record keeping during experimentation.

3) Electronic devices should not be placed on bench tops. They must remain in cubicles in the off or mute position.

a. If your phone must be left on for emergency purposes, notify the instructor and leave it in the cubicle. If you need to consult your phone make sure to wash your hands properly and then move into the hallway.

b. Based on instructor discretion, phones and/ or cameras may be allowed to take pictures of experimental results. Follow instructions given by the instructor.

4) Clean your work area with appropriate cleaning solution at the beginning and end of each lab.

a. This includes wiping down the bench top with the 5% Lysol solution available and wiping down computer keyboard and mouse with Clorox wipes.

b. This lessens the chance of accidental exposure to potentially infectious material, as well as contamination of cultures.

5) Wash your hands with soap and dry with paper towels after entering and before leaving the lab.

- 6) Always wear the appropriate protective equipment when dictated by the chemical and physical hazards of the experiment.
 - a. Closed-toe shoes are to be worn in the lab.
 - b. Skirts, dresses and shorts must be knee length.
 - c. Shirts must cover the midriff while sitting and standing.
 - d. Shirt sleeves/ straps must be at least two inches wide.
 - e. Long hair must be tied back to prevent exposure to flame and contamination of cultures.
 - f. Gloves are to be worn when handling and staining microbes and handling hazardous chemicals

- 7) Do not place anything in your mouth or eyes while in the lab. This includes pencils, food, and fingers. Keep your fingers away from your mouth and eyes.
 - a. Eating and drinking are prohibited in the lab at all times. This is state law as well as PVCC policy.
 - b. This includes gum, cough drops and candy.
 - c. Do not apply cosmetics in the lab. This includes Chapstick and Blistex.
 - d. Never pipet by mouth. Use a mechanical pipetting device.

- 8) Do not remove media, equipment, or bacterial cultures from the laboratory.

- 9) Do not place contaminated instruments such as inoculating loops, needles and pipettes on bench tops. Loops and needles should be sterilized before and immediately after transfer by incineration, and pipettes should be disposed of in designated receptacles.
 - a. DO NOT move through the laboratory with an instrument containing infectious material.

- 10) Carry cultures in a test tube rack when moving around the lab or when keeping cultures on bench tops for use. This prevents accidents and contamination of your person or belongings.

- 11) If infectious materials are accidentally spilled, cover with paper towels and saturate with disinfectant solution (5% Lysol) and notify your instructor. The instructor will then clean-up the spill.

- 12) Report accidental cuts or burns to the instructor immediately.

- 13) If you splash something in your eyes, go to the eyewashes immediately and flush your eyes.
 - a. Do not test the eyewash station or shower as you will be splashed.

- 14) Special receptacles are provided for infectious materials and used glass objects on the back bench by the window. Place all discarded cultures into these receptacles. Solid growth cultures are to be placed in the receptacles with the orange or red biohazard bag on the back bench. Liquid growth cultures are to be placed on the back bench in the test tube racks also near the window. Do not place cultures/ tubes or otherwise in the regular trash.

- 15) At the end of each lab session, place all cultures and materials in the proper disposal area.

16) Students should inform the lab instructor if they are immune-compromised (including those who are pregnant or may become pregnant and students living with or caring for an immune-compromised individual) as this might call for special precautions in the lab.

OSHA Information

Material Safety Data Sheets (MSDS) are located in the cabinet near the front of the room next to the board.

The first aid kit is located on the bench near the door.

There are two eyewash stations.

 The freestanding eyewash station is located at the back sink near the door.

 There is also an eyewash station on the bench near the door.

The shower is located beside the back sink near the door

The fire extinguisher is attached to the cubbies near the door.

Student Agreement on Laboratory Safety

I have read the Laboratory Safety Statement of the Health and Life Sciences Division at Piedmont Virginia Community College and I understand its content. I agree to abide by all laboratory rules set forth by this document and the instructor. I understand that my safety is entirely my own responsibility and that I may be putting myself and others in danger if I do not abide by all the rules set forth by this document and the instructor.

Course: _____

Name of Student: _____

Signature of Student: _____

Date: _____

Adapted from the Draft “Guidelines for Biosafety in Teaching Laboratories”, 2012, v3.3A issued by the American Society for Microbiology.

BIOLOGY LAB SAFETY PROCEDURES FOR STUDENT WORKERS/299 STUDENTS

1. No eating, drinking, smoking, or applying lip balm or makeup in the laboratory. No food, drink, lip balm or makeup will be brought into the lab.
2. Always wash your hands when entering the lab and before you leave.
3. Appropriate dress must be worn at all times while working in the lab rooms.
 - a. Feet shall be covered with closed toed shoes. Sandals, flip flops and bare feet are **not** allowed.
 - b. Long hair shall be securely tied back. Loose jewelry and clothing (i.e. necklaces, bracelets, and loose-sleeved shirts) will not be worn.
 - c. Clothing shall adequately cover and protect the body from accidental exposure to chemicals. Slacks or jeans are recommended. Wear clothing that you don't mind getting stained or ruined. Low cut or strapless tops, tops with spaghetti straps and outfits with bare midriffs are not allowed.
 - d. Lab coats/aprons, appropriate gloves and goggles will be worn as required by the MSDS sheets (located in the Microbiology lab) when working with chemicals.
5. Dispose of all chemicals properly. Check with your supervisor or the written preparatory notes for proper disposal for any chemicals.
6. Note the location and learn the operation of fire extinguishers, safety showers and eye wash equipment now, before an emergency occurs. Safe laboratory practices and knowing what to do in the case of an accident are the responsibility of every person in the laboratory.
 - a. To use the eye wash fountains, turn on the fountain, and place your face in the water stream. Rinse for several minutes and remove any glasses and contacts as soon as you can. Rinse your eyes for 15 minutes. Seek medical attention.
 - b. If hazardous chemicals are splashed on to your skin use either a sink or the safety shower to wash it off. If the chemical is on the hands or forearms, the sink will be sufficient, otherwise, use the safety shower. To use the shower, pull the lever turning the shower on, and rinse the affected areas of your body for at least 15 minutes. If possible, remove any affected clothing as soon as it is safe to do so. Safety showers are also useful in the event that your clothing or hair has caught fire. Stop, drop, and roll to smother the flames and then move to a safety shower.
 - c. Fire extinguishers can be operated by pulling the pin, pointing the hose at the base of the fire, and pressing the handle. The spray should be directed back and forth until the fire goes out. We currently have class ABC fire extinguishers in the lab; these extinguishers can be used for all lab fires except those involving flammable metals. Do not use a fire extinguisher unless you have been trained to so.
7. Never work in the laboratory without another person being present or within calling distance.
8. Do not taste anything in the laboratory. Do not drink from laboratory glassware. Only if instructed, note the odor of fumes by very carefully wafting the vapors to your nose and avoid breathing vapors of any kind. Do not mouth pipet any solution in the laboratory. Always use the appropriate bulb or pump to transfer solutions from one container to another.
9. **BE PREPARED.** Be clear about all instructions, tasks, and precautions *prior* to performing any work in the lab rooms. Do not perform any tasks that you are uncertain about or feel to be unsafe. If you have any questions or concerns, ask your supervisor for assistance.
10. Inform your supervisor of any mishap that occurs in the laboratory even if you have handled the situation according to safety guidelines. Do not attempt to clean up chemical spills without specific instructions from your supervisor.

11. It is your responsibility to inform laboratory staff about any known allergies or sensitivities you may have to substances that might be encountered in the laboratory. Do you have any known allergies or sensitivities to substances (i.e. sulfur, halogens, latex, peanuts, etc.)? Also list any pre-existing medical conditions such as asthma, diabetes, etc.)
12. Prior to handling a chemical for the first time consult the appropriate SDS or MSDS to familiarize yourself with the hazards of the chemical, including the exposure limits (PEL, TLV, or other appropriate values), and the appropriate precautions that you should take when handling the chemical. The MSDS books are located in the Microbiology lab.
13. No work with hazardous chemicals will be performed without the proper personal protective equipment.
14. No work with Biohazardous materials will be performed without the proper personal protective equipment and express permission of your supervisor.
15. No work with flammable chemicals will be performed in the presence of open flames.
16. Fume hoods will be used when working with any chemicals that produce hazardous vapors, strong odors, or present other inhalation or aspiration hazards.
17. If at any time you feel unwell or have reason to expect that you have been accidentally exposed to a hazardous chemical when working in the lab, immediately stop working, and take any necessary emergency response including the use of sinks, eye wash fountains, safety showers, or evacuating the room. Inform your supervisor as soon as possible.

By signing this form, you acknowledge that you understand and agree to follow the rules laid out in this document. You also acknowledge that your supervisor has gone over this form and the use of all of the safety equipment listed in this form.

NAME (printed): _____ SIGNATURE: _____

DATE SIGNED: _____

LAB SUPERVISOR'S NAME: _____ SIGNATURE: _____

DATE SIGNED: _____

BIO 299 PROJECTS MUST BE REVIEWED AND APPROVED BY THE STUDENT'S FACULTY ADVISOR LISTED BELOW.

FACULTY ADVISOR'S NAME: _____ SIGNATURE: _____

DATE SIGNED: _____

BIOLOGY LAB SAFETY PROCEDURES FOR PVCC ADJUNCTS

4. No eating, drinking, smoking, or applying lip balm or makeup in the laboratory. No food, drink, lip balm or makeup will be brought into the lab.
5. Always wash your hands when entering the lab and before you leave.
6. Appropriate dress must be worn at all times while working in the lab rooms.
 - a. Feet shall be covered with closed toed shoes. Sandals, flip flops and bare feet are **not** allowed.
 - e. Long hair shall be securely tied back. Loose jewelry and clothing (i.e. necklaces, bracelets, and loose-sleeved shirts) will not be worn.
 - f. Clothing shall adequately cover and protect the body from accidental exposure to chemicals. Slacks or jeans are recommended. Wear clothing that you don't mind getting stained or ruined. Low cut or strapless tops, tops with spaghetti straps and outfits with bare midriffs are not allowed.
 - g. Lab coats/aprons, appropriate gloves and goggles will be worn as required by the MSDS sheets (located in the Microbiology lab) when working with chemicals.
5. Dispose of all chemicals properly. Check with your supervisor or the written preparatory notes for proper disposal for any chemicals.
6. Note the location and learn the operation of fire extinguishers, safety showers and eye wash equipment now, before an emergency occurs. Safe laboratory practices and knowing what to do in the case of an accident are the responsibility of every person in the laboratory.
 - a. To use the eye wash fountains, turn on the fountain, and place your face in the water stream. Rinse for several minutes and remove any glasses and contacts as soon as you can. Rinse your eyes for 15 minutes. Seek medical attention.
 - b. If hazardous chemicals are splashed on to your skin use either a sink or the safety shower to wash it off. If the chemical is on the hands or forearms, the sink will be sufficient, otherwise, use the safety shower. To use the shower, pull the lever turning the shower on, and rinse the affected areas of your body for at least 15 minutes. If possible, remove any affected clothing as soon as it is safe to do so. Safety showers are also useful in the event that your clothing or hair has caught fire. Stop, drop, and roll to smother the flames and then move to a safety shower.
 - c. Fire extinguishers can be operated by pulling the pin, pointing the hose at the base of the fire, and pressing the handle. The spray should be directed back and forth until the fire goes out. We currently have class ABC fire extinguishers in the lab; these extinguishers can be used for all lab fires except those involving flammable metals. Do not use a fire extinguisher unless you have been trained to so.
7. Never work in the laboratory without another person being present or within calling distance.
11. Do not taste anything in the laboratory. Do not drink from laboratory glassware. Only if instructed, note the odor of fumes by very carefully wafting the vapors to your nose and avoid breathing vapors of any kind. Do not mouth pipet any solution in the laboratory. Always use the appropriate bulb or pump to transfer solutions from one container to another.
12. **BE PREPARED.** Be clear about all instructions, tasks, and precautions *prior* to performing any work in the lab rooms. Do not perform any tasks that you are uncertain about or feel to be unsafe. If you have any questions or concerns, ask your supervisor for assistance.
13. Inform your supervisor of any mishap that occurs in the laboratory even if you have handled the situation according to safety guidelines. Do not attempt to clean up chemical spills without specific instructions from your supervisor.

11. It is your responsibility to inform laboratory staff about any known allergies or sensitivities you may have to substances that might be encountered in the laboratory. Do you have any known allergies or sensitivities to substances (i.e. sulfur, halogens, latex, peanuts, etc.)? Also list any pre-existing medical conditions such as asthma, diabetes, etc.)
12. Prior to handling a chemical for the first time consult the appropriate SDS or MSDS to familiarize yourself with the hazards of the chemical, including the exposure limits (PEL, TLV, or other appropriate values), and the appropriate precautions that you should take when handling the chemical. The MSDS books are located in the Microbiology lab.
13. No work with hazardous chemicals will be performed without the proper personal protective equipment.
14. No work with Biohazardous materials will be performed without the proper personal protective equipment and express permission of your supervisor.
15. No work with flammable chemicals will be performed in the presence of open flames.
16. Fume hoods will be used when working with any chemicals that produce hazardous vapors, strong odors, or present other inhalation or aspiration hazards.
17. If at any time you feel unwell or have reason to expect that you have been accidentally exposed to a hazardous chemical when working in the lab, immediately stop working, and take any necessary emergency response including the use of sinks, eye wash fountains, safety showers, or evacuating the room. Inform your supervisor as soon as possible.

By signing this form, you acknowledge that you understand and agree to follow the rules laid out in this document. You also acknowledge that your supervisor has gone over this form and the use of all of the safety equipment listed in this form.

NAME (printed): _____ SIGNATURE: _____

DATE SIGNED: _____

Appendix E: Microscope Do's and Don'ts (Survival Notes)

a. Obtaining microscope from cabinet:

1. Clear area on table for microscope; avoid crowded working area.
2. Carry ONE microscope with TWO hands - one on microscope arm, one under the scope base.
3. Secure electrical cord in safe place; do not let it hang where your arm or foot may accidentally drag microscope off table.

b. Focusing Sequence

While looking at microscope from the side:

1. Lower stage as far as it will go.
2. Rotate **scan** objective into place over stage aperture.
3. Place slide on stage, using stage clamp to secure it.
4. Center slide specimen over stage aperture.
5. Move stage up as far as it will go.

Now, looking through the oculars:

6. Move stage downward, using coarse adjustment knob, until specimen comes into focus. Sharpen focus.
7. Center specimen in microscope field.

Looking at microscope from the side:

8. Slowly rotate the **low power** objective into position.

Now, looking through the oculars:

9. Sharpen the focus, if necessary, with the coarse adjustment knob. Since these microscopes are parfocal, a minimum amount of adjustment is usually necessary.
10. Center the specimen in field, if necessary.

Looking at microscope from the side:

11. Rotate the **high power** objective into place - very carefully!

Now, looking through the oculars:

12. Using the fine adjustment knob only, sharpen focus. Re-center if necessary. (If your specimen has "disappeared", immediately return to low power and re-center the specimen.)

When removing a slide, always return to scan before lifting slide off.

C. Returning microscope to cabinet:

1. Rotate scanning lens into position over stage.
2. Lower stage.
3. Remove slide from stage.
4. If oil was used, clean slide and objective.
5. Adjust mechanical stage so that it does not project too far to either side.
6. Secure cord around scope.
7. Replace dust cover on scope.
8. Carry with TWO hands.

D. General Information

1. Do NOT play handy person - no microscope is to be disassembled. Report malfunctions to instructor.
2. Keep stage dry at all times.
3. Cleaning
 - a. Clean lenses only with "optically safe" lens tissue, and oil immersion lens with lens tissue wetted or lens cleaner.
 - b. Locating source of dirt.
 - c. Look through oculars:
 - Move slide. If dirt appears to move, it's on the slide.
 - While looking at microscope field, close right eye, then left eye. If visible with only one eye, clean that ocular. If still visible, with both eyes...
 - Change objectives. If still visible then dirt was not on lens objective so . . .
 - Clean condenser, substage light, eyeglasses.