

# Introduction to the BIOL1406 Laboratory

This course will introduce you to important techniques and strategies that are routinely used in cell and molecular biology laboratories. Lab techniques you will use include spectrophotometry; microscopy; thin layer and column chromatography; gel electrophoresis; and recombinant DNA procedures.

## Materials required for BIOL1406 lab

- Calculator** To analyze data collected in lab, you need a calculator that can calculate mean, percent error of mean, standard deviation, and linear regression. Instructions on how to perform these calculations using a TI-36X calculator are provided in this manual. You may use a different calculator provided it can perform all the required calculations. If you use a different calculator, you are responsible for obtaining the necessary instructions.
- Graph paper** Because you will often make scatter diagrams and graphs of your data, you need a supply of scientific graph paper.
- Computer** You must have access to a computer with a spreadsheet program such as MS *Excel*. You will use the spreadsheet program to construct tables and graphs, and to carry out statistical analysis of your data.
- Lab notebook** To record lab notes, procedures, and data, you need a lab notebook with quadrille-ruled paper. During lab, all data should be entered **directly** into your lab notebook. Data should **never** be recorded on separate sheets of paper and then transferred into your notebook at a later time.
- General instructions for keeping a lab notebook and writing a lab report can be found in Appendix A of this manual. Check with your instructor for any additional instructions or requirements.
- Protective Equipment** You are required to purchase and wear safety goggles in lab. Protective gloves will be provided by ACC.

## Mandatory laboratory safety rules for BIOL1406

Modern laboratories are equipped with supplies and equipment that may pose a hazard if used incorrectly. Following safety rules, paying attention to what you are doing, and using common sense will make your experience in this course a safe one. Health and safety are paramount values in science classrooms, laboratories and field activities. You are expected to learn, understand and comply with ACC environmental, health and safety procedures and agree to follow the ACC science safety policy. You are expected to conduct yourself professionally, with respect and courtesy to all. Anyone who thoughtlessly or intentionally jeopardizes the health or safety of another individual will be immediately dismissed from the day's activity, may be withdrawn from the class, and/or barred from attending future activities. Specific safety training will take place before most activities. If you are late and miss this training, you will not be able to participate in the activity. You can read the complete ACC science safety policy at: [http://www2.austinctc.edu/sci\\_safe/](http://www2.austinctc.edu/sci_safe/).

## **General laboratory safety rules**

1. Never eat or drink in the lab. Do not bring food or drinks into the lab.
2. Do not come into contact with another's body fluids (blood, saliva, urine).
3. Wash your hands immediately after handling animals, body fluids, and chemical solutions.
4. Wear safety glasses or goggles and gloves when handling chemicals or body fluids.
5. Keep book bags and other personal items off the tables and floor during lab---put them on the counter or empty chairs so that they are out of the way.
6. Do not wear loose or flowing clothing or dangling jewelry in the laboratory. Pin up long hair or confine it under a hat. (Some of the substances used in the lab may stain or damage clothing. You may wish to wear a lab coat or apron for protection.)
7. Do not wear sandals or open-toe shoes. Leather shoes are preferred.
8. Report broken glass immediately to your instructor and always dispose of broken glass in its designated container.
9. Clean up your work stations and wash your hands before leaving the lab room.

## **General safety procedures**

1. Each student should know where the location and proper use of each of the following: protective gloves, shower, eyewash stations, disinfectant spray bottles, biohazard bags, broken glass disposal boxes, fire extinguishers, first aid kit, and hazardous material spill cleanup kits.
2. If you have any doubt about a proper safety procedure in a specific instance, ask your instructor.

## **Handling chemicals**

1. Wear gloves and goggles when handling potentially hazardous chemicals. Avoid wearing contact lenses in the laboratory.
2. Read all labels completely before handling a chemical (special attention to warning labels!).
3. Open volatile organic solvents only in a fume hood.
4. Close all containers immediately after use.
5. Always handle chemicals with care to avoid spills.
6. Report any spills of a potentially hazardous chemical immediately to your instructor.
7. Follow your instructor's directions on how and when to mix chemicals.
8. Don't taste chemicals or smell fumes directly.
9. Don't use your mouth to pull liquid into a pipette.
10. Use clean glassware to prevent contamination.
11. Don't pour unused chemicals back into storage containers where it may contaminate the rest of the reagent. Dispose of unused chemicals in proper waste containers.
12. Do not flush chemicals or cleanup materials down the drain without instructor's consent.
13. Consult with your doctor about any special health conditions that you may have: asthma, allergies, pregnancy, etc.
14. Clean up work areas thoroughly and wash hands prior to leaving the laboratory.

## **Handling biohazards**

1. When working with bacteria, always treat the bacteria as if it had the potential to cause disease: prevent spills and avoid direct contact, especially on open sores.
2. Wear gloves and goggles when working with biohazards.
3. Dispose of all potentially contaminated objects in a biohazard bag, a container filled with a bleach solution, or as described by your instructor.
4. Spray and wipe the work areas with 10% chlorine bleach solution before and after lab.
5. Wash hands immediately after handling a biohazard.

## **Handling mechanical hazards**

1. Never touch a rapidly moving machine, such as a centrifuge, while it is moving.
2. Distribute weights evenly in a centrifuge to prevent vibrations and breakage.
3. Do not leave a running centrifuge unsupervised.
4. If the centrifuge is vibrating excessively or “walking” across the tabletop, turn it off immediately.

## **Handling electrical hazards**

1. Do not use equipment that has any frayed or damaged wiring or plugs. Report any uninsulated wires to your instructor.
2. Always make sure the area around all electrically powered equipment is dry before turning on the power.
3. Gel electrophoresis poses a high risk for electrocution. When assembling or disassembling the gel apparatus, always be sure that it is unplugged. Connect the power supply and turn on the power supply only under the supervision of your instructor.

## **Handling glassware**

1. Dispose of disposable glass items such as capillary tubes and cover slips in a hard-sided box labeled “Glass Disposal”.
2. Do not use broken or cracked glassware. If you break a glass item, report the incident to your instructor and dispose of it in the “Glass Disposal” box.
3. NEVER put broken glass or disposable glass items with sharp edges in the ordinary trash can: this poses a serious hazard of laceration to the person who must empty the trash!
4. Avoid rapid temperature changes of any glassware: this will often cause the glass to break.
5. Report any cuts immediately to your instructor, and wash the wound thoroughly in running water. Check for glass in wound, dry area, and apply bandage.
6. Do not shake glass thermometers, and lay thermometers away from the edge of a bench on a towel or screen to avoid dropping it on the floor. If a thermometer breaks, immediately inform your instructor.

## **Handling Bunsen burners**

1. Check gas hose for cracks every time before using.
2. Make sure hose fits securely.
3. Make sure the striker produces sparks before turning on the gas.
4. Stand back, open gas, use striker, and adjust flame.
5. Flame should be blue. Adjust oxygen intake if you have a yellow flame.
6. If the flame sputters or goes out, immediately turn off gas and inform instructor.
7. If you smell gas, turn off gas and immediately inform instructor.
8. If you are going to heat a glass container, check container closely for cracks or stars. Do not use glass that is cracked or starred.
9. Glass containers must have an opening for vapors and heat to escape when heated.
10. Use beaker tongs or test tube holders when handling fired glass.
11. Remember: hot metal or glassware looks just like cool metal or glassware. Be aware of hot materials and make sure no one handles them.
12. When heating test tubes over a flame, move the tube back and forth on an angle pointing away from others and yourself to avoid spattering of superheated liquids.

## **Disposal procedures**

1. Treat all biological and chemical materials as if it were hazardous waste, unless notified otherwise by your instructor.
2. Do not pour chemicals, solutions, or biologicals down the drain without permission by your instructor.
3. Dispose of wastes in the proper labeled waste containers, as indicated by your instructor. Chemicals should go into a funnel into a labeled chemical waste bottle, biohazards should go into a leveled autoclave bag, and glass should go into a labeled glass waste container.

## **Accidents procedures**

1. Try to contain any spills without endangering yourself and others. Notify the instructor immediately when a spill has occurred.
2. If a caustic chemical is splattered into the eyes, notify the instructor or neighbors immediately so that you can be assisted to the nearest eye wash as quickly as possible. Continue to wash your eyes for at least 15 minutes while emergency personnel are being called.
3. If caustic chemicals are spilled on your skin, wash the contaminated area for at least 15 minutes. If it is a major spill, immediately remove contaminated clothing and wash for at least 15 minutes in a safety shower.
4. Quickly shout an immediate warning to all your neighbors in case of a fire. It is very important that everyone in the room know as quickly as possible when there is a fire.
5. All students should exit a lab in case of a fire. The lab instructor will call the Campus Police Dispatch at 222 (from any ACC phone) or 223-7999 (from an outside or mobile phone).
6. Speed is the most important aspect of dealing with a person who is on fire. Your nearest neighbors must respond quickly by smothering a flame as soon as it appears.
7. Do not allow a panicked person whose clothes or hair are on fire to move: stop the person, and quickly drop them to the floor to smother the flames immediately.
8. The student nearest to a fire blanket should bring the blanket to a person whose clothes are on fire, and once the flames are quenched, that person should be taken immediately to the safety shower.

## **Violations of the safety rules**

Failure to follow the lab safety procedures may have consequences for your grade in this course. Major infractions that endanger anyone working in the lab (including yourself) may result in your receiving a grade of "F" for the laboratory portion of the course and/or being prohibited from participating in future lab courses at ACC, at the discretion of the instructor.