

# BCMB 406B

## Laboratory Manual

### Spring 2023

Student Name: \_\_\_\_\_ Section: \_\_\_\_\_

Email address: \_\_\_\_\_

#### Instructors and Contact Information

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3	Val Kerr	valk@uvic.ca	250-472-5119	Petch 194

Each instructor is responsible for a different portion of the course as indicated above.  
Please address any concerns or questions to the appropriate instructor.

We acknowledge and respect the ləkʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day.

Department of Biochemistry and Microbiology  
University of Victoria

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### Laboratory Procedures

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## Laboratory Schedule

Week	Dates	Lab	Day 1 (5 hours)	Day 2 (2 hours)	Due Dates	
1	Jan 9-13	<b>Lab 1:</b> Primer Design	Primer design and evaluation			
2	Jan 16-20	<b>Lab 2:</b> Site Directed Mutagenesis of CBM Proteins	<i>In silico</i> cloning		<b>Lab 1 Report due on Day 2</b>	
3	Jan 23-27		Inverse PCR, agarose gels, DpnI digestion, electrocompetent cells	Electroporation		
4	Jan 30 - Feb 3		Plasmid purification, restriction digests, agarose gels	Plasmid preps, DNA quantification, sequencing	Electroporation controls	
5	Feb 6-10		<b>Lab 3:</b> Purification and Characterization of a Mutant CBM	Lab 2 - Chemical transformation Lab 3 - Media prep	Lab 2 - Count plates Lab 3 - Starter culture	
6	Feb 13-17			Inoculate/induce large culture, prep solutions, WT macroarray	Pellet cells, macroarray development	<b>Lab 2 Report due on Day 1</b>
7	Feb 20-24	<b>No Labs – Reading Break</b>				
8	Feb 27 – Mar 3	<b>Lab 3:</b> Purification and Characterization of a Mutant CBM	Chemical lysis of cells, IMAC: nickel column chromatography	Identify protein-containing fractions	Bradford assay assignment	
9	Mar 6-10		SDS-PAGE of fractions	Dry gels, pool fractions, dialysis	<b>Midterm exam</b> Thurs. Mar. 9 7-9 pm	
10	Mar 13-17		Bradford assay and A <sub>280</sub> , macroarray (mut vs. WT)	Macroarray development	Day 2: Protein conc. calc's	
11	Mar 20-24		Affinity gels, lysozyme crystallization	Dry gels, visualize crystals		
12	Mar 27 -31		Pick up gels Exam preparation			
13	Apr 3-6				<b>Lab 3 Report due on Day 1</b>	
<b>TBA – Lab 3 exam during regular exam schedule</b>						

## Course Description

BCMB 406B is a project-based course that will build on research skills you have developed in previous lab courses. Unlike other lab courses that consist of several distinct labs, 406B has three labs that build on each other to create a continuous research project from start to finish. The overall aim of 406B is to create and characterize a mutant carbohydrate binding module (CBM). CBMs are accessory modules of glycoside hydrolases (GH) which are enzymes that hydrolyse the glycosidic bond between carbohydrates. As the name suggests, the CBM targets the enzyme to its substrate by binding to carbohydrates.

In lab 1, you will learn the principles of primer design and use a variety of web-based tools to design and evaluate a set of primers for site directed mutagenesis.

At the start of Lab 2, you will use molecular biology software to plan and predict the results of individual steps in the site-directed mutagenesis of a CBM gene. You will then use inverse PCR to generate the site directed mutant, and restriction digests and DNA sequencing to confirm the presence of the desired mutation. Once the correct mutation has been confirmed, you will move the newly created mutant CBM construct into an expression host.

Lab 3 focuses on the purification and characterization of the mutant protein. Initially, you will induce expression of the mutant CBM protein and purify the protein using Immobilized Metal Affinity Chromatography (IMAC). Once purified, you will assess the mutant CBM's ability to bind carbohydrate using two techniques that will allow you to compare the function of the mutant CBM to that of wild type. Finally, you will attempt to crystallize the mutant protein and use modelling software to compare and contrast the structures of the mutant and wild type CBMs.

In this course, emphasis is placed on experimental design, data analysis and problem solving with the intention of developing your ability to work independently in the lab.

## Intended Learning Objectives

Upon completion of this course you will be able to:

- Describe the theory and principles of primer design, site-directed mutagenesis and protein expression, purification and characterization
- Develop proficiency in practical skills and *in silico* techniques used for primer design, site-directed mutagenesis and protein expression, purification and characterization
- Solve typical calculations used in biochemistry and microbiology experiments
- Evaluate experimental controls
- Generate a written record of data in a lab journal
- Evaluate data generated and summarize findings in written lab reports
- Compare and contrast data generated in the laboratory with that of relevant published research articles

## **Introduction Quiz: Due Fri. Jan. 13<sup>th</sup> at 11:59 pm:**

The quiz is posted on Brightspace in the Introduction section. The purpose of it is to ensure that you have read and understood all the introductory information in the lab manual on pages ii-xiv prior to attending your first lab session. To successfully complete the quiz, you must obtain a mark of 100%. However, you may repeat it as many times as necessary to achieve this.

## **Health Measures**

The health of the campus community remains the university's top priority. UVic's Communicable Disease Plan remains in effect unless otherwise stated. Please ensure that you read and understand the following points since they are most relevant to our course:

- Sanitize or wash your hands with soap and water for 20 seconds upon entry and exit.
- You must provide your own lab coat and safety goggles. Your lab coat will be stored in a Ziploc bag in the lab for the duration of the course.
- Sanitize your workspace before and after use with spray bottles containing bench disinfectant, and paper towels. Place used paper towel in the general waste bin.
- At the time of printing, the university strongly encourages the use of masks indoors when physical distancing cannot be maintained *or* when in close proximity to others. Both situations are the case in the student lab environment. BCMB 406 is a practical course and its completion is dependent on performing hands-on experiments which must be done in the lab so it is difficult for all involved to make up missed classes. Disposable masks will be available and encouraged for use by students. This additional safety measure will benefit both students and instructors as it will reduce absenteeism.

**Importantly, do a daily self-assessment before coming to campus. If you are ill or have symptoms of a communicable disease (e.g. fever, chills, recent onset of coughing or diarrhea), you must:**

- Stay home
- Inform your lab instructor
- Consult the COVID-19 self-assessment tool at [bc.thrive.health/covid19](https://bc.thrive.health/covid19) to see if you should get tested
- Contact 811 for medical advice
- Follow guidelines for how to self-monitor and self-isolate at <http://www.bccdc.ca/health-info/diseases-conditions/covid-19/if-you-have-covid-19>

## Brightspace

Important information for the course and each lab is posted on Brightspace. Announcements are frequently sent to students, so please get into the habit of regularly checking the email you have on record at UVic for course updates.

<https://bright.uvic.ca>

Enter: NetLink-ID and Password

Select: 202301 BCMB 406B B01-B04 X

## Office Hours

Office hours for each instructor will be posted on Brightspace and will vary throughout the term based on anticipated need due to assignment deadlines and exam schedules. Office hours will be conducted in person and/or on Zoom depending on the public health recommendations at the time. Zoom meeting details for each instructor are posted on Brightspace. Please email the appropriate instructor to set up an individual appointment.

## Student Resources on Campus

The current pandemic is placing added stressors (financial, mental, and physical) on everyone. Your wellbeing is of foremost importance. If you are experiencing difficulties coping, the University has resources to help. Reach out to Counselling Services, the Centre for Academic Communication, or Learning Assistance Program if you need assistance.

### Center for Accessible Learning (Campus Services Building)

CAL provides students with a learning disability, ADHD, chronic health issue, mental health issue or long-term recurring physical or sensory disability the support they need to negotiate the accommodations they may require to be successful in a course. [infocal@uvic.ca](mailto:infocal@uvic.ca), <https://www.uvic.ca/services/cal/>, 250-472-4947

### International Student Services (University Center)

ISS provides support for international students studying at UVic, and coordinates programs for all UVic students interested in studying abroad. [issinfo@uvic.ca](mailto:issinfo@uvic.ca), 250-721-6361

### Counselling Services (Health and Wellness Center)

Free professional, confidential, inclusive support to currently registered UVic students. 250-721-8563, Vancouver Island Crisis Line 1-888-494-3888

### Career Services (Campus Services Building, Room 110)

Contact info: [careers@uvic.ca](mailto:careers@uvic.ca), 250-721-8421

Jeremy Pearce is the career educator for students in the Faculty of Science.

**Departmental Web Page:** <http://www.uvic.ca/science/biochem>

**Occupational Health and Safety:** 250-721-897, <http://ohs.uvic.ca>

**Campus Security:** 250-721-7599, <http://www.uvic.ca/security>

**University Health Services (Health and Wellness Center):** 250-721-8492, <http://www.uvic.ca/services/health>

## Evaluation and Assessment

### Percentage Breakdown for the Course:

Exams	40 %
Lab Reports	30 %
Practical Assessment	20 %
Laboratory Journal	10 %

\* See pages vi-vii for more details.

### Final Course Percentages:

A final percentage will be calculated for the course based on the above criteria. All percentages will be rounded to the nearest whole number. For example, a calculated percentage of 79.49% will be recorded as 79% whereas 79.50% will be recorded as 80% .

### Letter Grades will be assigned as follows:

90 - 100	A+
85 - 89	A
80 - 84	A-
77 - 79	B+
73 - 76	B
70 - 72	B-
65 - 69	C+
60 - 64	C
50 - 59	D
0 - 49	F (or N*)

#### \* N grades

Students who have completed the following course requirements will be considered to have completed the course and will be assigned a final percentage and letter grade.

- In class lab work (all Day 1 and Day 2 practical components must be performed)
- Midterm exam
- Final exam

Failure to complete one or more of these elements will result in a grade of "N" regardless of the cumulative percentage on other elements of the course. An N is a failing grade, and it factors into a student's GPA as 0. The maximum percentage that can accompany an N on a student's transcript is 49.

**Lab Exams (40%):** There will be two non-cumulative exams in this course.

Exam	Date	Lab covered	Percent
Midterm	Evening of Mar. 9th	Labs 1 and 2	20 %
Final	TBA (during exam schedule)	Lab 3	20 %

**Lab Reports (30%):** Marks for lab reports will be assigned as indicated below.

Lab 1	5%
Lab 2	12.5%
Lab 3	12.5%

**Practical Evaluation (20%):**

Practical assessments are done by lab instructors and teaching assistants and consist of:

- Frequent and random pre-lab quizzes to assess preparedness
- Pre-lab and in-lab assignments, calculations and problem sets
- Frequent evaluation of experimental results to assess technique
- Thoroughness of clean-up at each bench after the lab

Weighting of these assignments will vary based on the discretion of the instructors.

**Maintenance of a Laboratory Journal (10%):**

A hard cover or spiral bound notebook is to be used as a laboratory journal for recording raw data generated while performing the labs and processed data used to create figures and tables. Portions of marked reports will not be considered as journal entries. Journals will be marked periodically throughout the term, so the expectation is that they are kept up to date and brought to every lab session. If you do not have it available for marking, it must be submitted to the instructor by 10 am the following morning either in person or as an email with a pdf containing photos of the relevant sections attached. An initial 30% penalty will be applied for the first day and 10% per day for each subsequent day it is late. If you are absent, it is your responsibility to obtain the relevant information from your lab partner to ensure your journal is complete.

Please write in ink and include the following relevant information.

**Note:** the last three items are new expectations for students in 4<sup>th</sup> year.

- Date and title of the experiment
- Unknown numbers
- Pre-lab or in-lab calculations
- All raw data you (and/or your partner) generate with important information included
- Experimental conditions (temperature, time, wavelengths, etc...)
- Loading order and volumes of samples put onto gels, etc...
- Detailed procedural steps used when not working directly from the lab manual
- Changes to the procedure or mistakes/errors made
- Handouts of data and/or copies of student data posted on Brightspace
- \* **Observations made during the lab experiment**
- \* **Processed data in the form of tables, graphs or other important figures**
- \* **Interpretations of results – written statements that summarize the findings with or without clearly labeled summary figures**



## Laboratory Report Guidelines and Format

- **All laboratory reports must be written up individually**
- Text should be typed and double-spaced, with margins no smaller than 1.9 cm (0.75")
- Figure/table titles should be single-spaced
- Use 12 point font of a standard style such as Calibri, Arial or Times New Roman
- All written text should be concise, well written and proofread for grammar and spelling

Below is a general outline of what should be included in the following portions of a lab report in this course. **Each lab report will have a different set of requirements so be sure to read the instructions for each submission carefully.** Refer to Brightspace for a more detailed description of lab report expectations.

**Abstract:** State the purpose of the experiment(s) and put it in context. Summarize the methods, results and conclusions of the research.

**Introduction:** In a few well written paragraphs, state the purpose and introduce the main concepts of the lab by defining important terms and explaining new ideas. As well, briefly describe and indicate the purpose of performing the individual techniques or experiments.

**Methods:** Refer to the source of the procedure in proper citation format (most of the time this will be the lab manual). For procedures that you have designed, briefly summarize techniques and materials used so that someone could repeat the experiment (minor details are not necessary). Include any *significant* modifications that were communicated to you either verbally or in written form. Also, include mistakes that were made by you, your partner or other individuals that may have affected your results.

**Results:** Organize data in the form of fully labeled tables, graphs or figures. State the results in written form in a *Results Summary* placed before the figures, drawing attention to the key results. Reserve *all* interpretation for the discussion. Tables, graphs and figures should be numbered in the order in which they are cited in the text.

**Discussion:** The discussion should provide an interpretation of your results. Be concise. Keep discussion relevant to the data generated from your own experiment (and that of your classmates when appropriate). Incorporate into your discussion the answers to any relevant questions that appear in the lab manual. In a couple of sentences, draw a conclusion based on the results of the experiment.

**References:** Online links to all relevant reference papers can be found on Brightspace. Laboratory reports must be referenced following the format of the *Journal of Molecular Biology*. This is the same format we use in the lab manual.

**Appendix:** Include raw data, calculations and other information that is relevant. Remember to number your appendices and include a basic title for each.

**Please note:** A report submission consists of a hard copy and electronic copy. Both must be submitted by the due date, otherwise late penalties will apply. Electronic copies are to be uploaded to Brightspace.

## Course Policies

### ***Attendance***

Lab attendance is mandatory. This is a practical course that progressively builds your expertise in lab techniques so we expect you to attend lab sessions. **If you have any symptoms of a communicable disease (e.g. fever, chills, recent onset of cough, diarrhea) do not come to the lab.** Please stay at home. If you miss a lab due to illness/injury or another emergency, please contact the lab instructor immediately to let them know. They will work with you to reschedule when you will come in or arrange an accommodation but be advised that professional documentation may be required. It is important to arrive on time. You will not be given extra time if arriving after a pre-lab quiz has begun nor will a makeup quiz be given if you arrive after a quiz is over. The instructor reserves the right to refuse late arrivals or withhold practical marks associated with that lab if you are late without a legitimate reason.

### ***In Course Extensions, Late Assignments or Lab Reports***

To request more time for an assignment, or to reschedule a test or midterm exam, you must submit a request for in-course extension form to the lab instructor. This form is available on Brightspace. Late assignments or lab reports will be penalized 10% per day and will not be accepted after one week (7 days) following the designated due date. Late lab reports or assignments can be submitted to Brightspace or emailed to the instructor on days when the university is closed but a hard copy must be brought in to the instructor by noon on the first working day after the electronic version was submitted.

### ***Re-marking Policy***

Request to have assignments (reports, quizzes, exams, journal entries, etc.) reviewed/remarked must be made within one week of the assignment being made available. You are expected to promptly review your assignments after marking is completed. Any resubmissions will involve remarking of the entire assignment and students will be given the grade assigned after the second review.

### ***Centre for Accessible Learning***

Students with diverse learning styles and needs are welcome in this course. If you have a disability/health consideration that may require accommodations, please feel free to approach an instructor and/or the Centre for Accessible Learning (CAL) as soon as possible. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (see student resources on page iv for contact details). The sooner you let us know your needs, the quicker we can assist you in achieving your learning goals in this course.

### ***Course Experience Survey (CES)***

We value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES). The survey is vital to providing feedback on the course and our teaching. When it is time for the survey, you will receive an email. If you do not receive an email invitation, you can go directly to your [CES dashboard](#). Use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. We will remind you nearer the time but please be thinking about this important activity.

## Department Information and Policies

1. The Department of Biochemistry and Microbiology upholds and enforces the University's policies on academic integrity. These policies are described in the current University Calendar. All students are advised to read this section.
2. Cell phones, computers, and other electronic devices must be turned off at all times during live class sessions unless being used for the purpose of engaging with the class.
3. No recordings of live lectures are permitted without permission of the instructor. Many online courses will be recorded by the instructor for accessibility for students unable to attend. If you do not wish to be recorded, contact your instructor to determine if alternative arrangements can be made.
4. Students and instructors are expected to assess their health daily and avoid campus if they are ill.
5. Course materials, such as notes, problem sheets, quizzes, examinations or review sheets, may not be redistributed without the explicit written permission of the instructor.
6. Students are expected to be available for all exams. Instructors may grant deferrals for midterm examinations for illness, accident, or family affliction. Although students do not require documentation, students must contact their instructor and BCMB office ([biocmicr@uvic.ca](mailto:biocmicr@uvic.ca)) with the reason for their absence within 48 hours after the midterm exam. The Department will keep a record of the absences. It is the responsibility of the student to ensure all required components are complete, and to arrange deferred exams/assignments with the instructor, which normally should occur within one week of the original exam date.
7. The Department of Biochemistry and Microbiology considers it a breach of academic integrity for a student taking a deferred examination to discuss the exam with classmates. Similarly, students who reveal the contents of an exam to students taking that exam are considered to be in violation of the University of Victoria policy on academic integrity (see current University Calendar). Students must abide by UVic academic regulations and observe standards of scholarly integrity (no plagiarism or cheating). Online exams must be taken individually and not with a friend, classmate, or group, nor can you access notes, course materials, the internet, or other resources without the permission of the instructor. You are prohibited from sharing any information about the exam with others. Use of unauthorized electronic devices and accessing the internet and class material during exams is prohibited unless permission is granted by the instructor. Instructors may use Browser Lockdown Software to block access during classes and exams.
8. Deferral of a final exam must be requested with an Academic Concession form and submitted directly to Undergraduate Records. Deferred final exams for fall term courses will be arranged by the instructor. Deferred final exams or spring term courses will be arranged through Undergraduate Records and must be written before the end of the summer term as stipulated in the University Calendar.
9. Requests for review/remark of an exam must be made within one week of it being returned.
10. The instructor reserves the right to use plagiarism detection software or other platforms to assess the integrity of student work.
11. Supplemental exams or assignments will not be offered to students wishing to upgrade their final mark.
12. Anonymous participation in online classes is not permitted without permission of the instructor.
13. Attendance and engagement in the classroom is an integral part of the learning process and cannot be substituted with recordings. For this reason, BCMB will no longer provide video recordings of its lectures. Instructors may at their sole discretion provide audio recordings or give students permission to audio record a lecture. However there is no obligation to do so nor is there any expectations about the quality of the recordings. It is the responsibility of students who miss lectures to catch up in the material through extra readings, and obtaining notes from fellow students. Students who will miss several lectures due to illness should contact their instructors to discuss options.

## **University Policy on Academic Integrity**

Maintaining a high level of academic integrity is essential in all aspects of the BCMB lab courses. You are required to abide by the University's policy on academic integrity in every aspect of this course whether it is an in-person or online assessment. Course materials provided to you by the instructors are the intellectual property of the Department of Biochemistry and Microbiology and must not be shared with anyone without the consent of the instructor.

Suspected cases of plagiarism or cheating will be documented and submitted to the department chair for penalty assessment as described in the current UVic calendar.

Academic integrity violations covered by this policy can take a number of forms such as:

### **Plagiarism**

A student commits plagiarism when he or she:

- submits the work of another person as original work
- gives inadequate attribution to an author or creator whose work is incorporated into the student's work, including failing to indicate clearly (through accepted practices within the discipline, such as footnotes, internal references and the crediting of all verbatim passages through indentations of longer passages or the use of quotation marks) the inclusion of another individual's work
- paraphrases material from a source without sufficient acknowledgement

### **Multiple Submission**

Multiple submission is the resubmission of work by a student that has been used in identical or similar form to fulfill any academic requirement at UVic or another institution. Students who do so without prior permission from their instructor are subject to penalty.

### **Unauthorized Use of an Editor**

An editor is an individual or service, other than the instructor or supervisory committee, who manipulates, revises, corrects or alters a student's written or non-written work.

The use of an editor, whether paid or unpaid, is prohibited unless the instructor grants explicit written authorization. The instructor should specify the extent of editing that is being authorized.

Review by fellow students and tutoring that do not include editing are normally permitted. In addition to consulting with their instructors, students are encouraged to seek feedback on their work that prompts them to evaluate the work and make changes themselves.

### **Falsifying Materials Subject to Academic Evaluation**

Falsifying materials subject to academic evaluation includes, but is not limited to:

- fraudulently manipulating laboratory processes, electronic data or research data in order to achieve desired results
- using work prepared by someone else and submitting it as one's own
- citing a source from which material was not obtained
- using a quoted reference from a non-original source while implying reference to the original source
- submitting false records, information or data, in writing or orally

## **Cheating on Assignments, Tests and Examinations**

Cheating includes, but is not limited to:

- copying the answers or other work of another person
- sharing information or answers when doing take-home assignments, tests and examinations except where the instructor has authorized collaborative work
- having in an examination or test any materials or equipment other than those authorized by the examiners
- accessing unauthorized information when doing take-home assignments, tests or examinations
- impersonating a student on an examination or test, or being assigned the results of such impersonation
- accessing or attempting to access examinations or tests before it is permitted to do so

Students found communicating with one another in any way or having unauthorized books, papers, notes or electronic devices in their possession during a test or examination will be considered to be in violation of this policy.

## **Aiding Others to Cheat**

It is a violation to help others or attempt to help others to engage in any of the conduct described above.

## **Collaborative Work (Penalties) \* See below for details specific to this course.**

In cases in which an instructor has provided clear written instructions prohibiting certain kinds of collaboration on group projects, instances of prohibited collaboration on a substantial part of the assignment should result in a grade of zero for the assignment, while instances of prohibited collaboration on the bulk of the assignment should result in a grade of F for the course.

**\* In BCMB 406, it is required that all assignments, lab reports, online quizzes and exams be written independently.** Collaborative work is only allowed in specific situations when students are directed to share data by the instructor. Students can discuss thoughts and ideas with other students but all written work, including figures and figure titles, must be original. Be sure to submit work that is entirely your own.

**If exams are given online, the Respondus LockDown Browser and Zoom will be used for invigilation during the online exam through the BrightSpace Quiz tool.**

## Safety Regulations

Work in a microbiology laboratory involves exposure to living microorganisms, many of which must be considered potential pathogens. Personal recognition of safety and the acceptance of certain precautions are therefore necessary prerequisites to working in the laboratory.

1. Access to the laboratory is limited to instructors and students.
2. No eating, drinking or smoking in the laboratory. Keep paper, pencils, fingers, and other objects out of the mouth.
3. It is strictly prohibited to attend labs while under the influence of an intoxicant (alcohol, cannabis, drugs, etc.). Students that do not comply will be asked to leave and all marks associated with that lab will be forfeit.
4. Mouth pipetting is prohibited. A safety bulb or pipettor must be used.
5. Safety glasses must be worn at all times. Students are expected to provide their own safety glasses.
6. Laboratory coats must be worn and properly fastened by all personnel working in the laboratory and must not be worn in public places. Students are expected to provide their own laboratory coats which will be kept in the lab in a Ziploc bag.
7. Appropriate footwear and clothing must be worn in the lab. Open-toed shoes, sandals and bare legs are not allowed.
8. Long hair must be tied back to protect against burning and falling into stains, chemicals or bacterial cultures.
9. Personal items (coats, bags, etc...) must be kept away from the work area.
10. Sitting on laboratory work surfaces is prohibited.
11. Use of cellular devices is not allowed in the lab.
12. Wash hands before and after completing all lab work.
13. Gloves must be worn in the following situations:
  - Working with Level 2 organisms
  - Working with potentially harmful reagents
  - If you have open cuts or abrasions on your hands
14. Gloves are not to be worn when working with communal equipment and computers or outside of the lab.
15. Lab doors and windows must be closed when working with Level 2 organisms.
16. Bunsen burners are to remain off when not in use.
17. Dispose of all liquids into the designated waste containers. No solutions or buffers are to be poured down the sink.

18. Contaminated liquid waste must be autoclaved prior to disposal.
19. Dispose of infectious solid waste in the yellow biohazard buckets for autoclaving. This includes pipette tips, agar plates, contaminated gloves or paper towels, etc.
20. Report any accidents or safety concerns to an instructor immediately.
  - If skin comes into contact with chemicals, wash immediately with cold running water for at least 10 min.
  - In the event of a bacterial spill, pour an equal volume of bench disinfectant on top of the spill and allow it to sit for five minutes. Clean up the spill wearing gloves and using a no-touch technique. Discard all waste in a yellow biohazard bucket for autoclaving. WASH YOUR HANDS with hand disinfectant and soap.
  - Do not pick up broken glass. The instructor will do this.
  - If something has splashed in your eyes, rinse them at the eye wash station for at least 20 min.
21. Note the location of the following safety equipment:
  - Eye wash station
  - Safety shower
  - Fire extinguisher
  - Telephone
  - Fire alarm
22. Before leaving the laboratory:
  - Place all cultures and other contaminated materials to be discarded in the appropriate containers for sterilization in the autoclave
  - Put your **labeled** experimental materials in the appropriate bins or racks for incubation or storage
  - Place contents of “tip discard” and used microfuge tubes into yellow biohazard bucket
  - Rinse all glassware and place in the appropriate bin(s)
  - Remove all labels from shared glassware and equipment
  - Check that gas, water and microscope lights are turned off
  - Wash the bench top with bench disinfectant
  - Wash your hands thoroughly with hand disinfectant and/or soap

Experiments conducted in a microbiology laboratory involve the handling of pathogenic organisms. Failure to handle and dispose of these organisms correctly may lead to infection, injury or even serious illness. For the safety of everyone, it is required that you understand and follow the appropriate laboratory procedures as outlined by your laboratory instructor.

Your successful completion of the **Introductory Quiz** is your acknowledgement that you have read the safety regulations and agree to abide by them.

## Building Evacuation in Case of Fire

### If you discover a fire:

- Activate the nearest fire alarm pull station.
- Call **911** and Campus Security Services at **7599**. State your name and location.
- Evacuate the building.

### If you hear a fire alarm:

- If possible secure equipment and close windows and doors.
- Follow the established evacuation route. Do not use elevators.
- Meet at your designated Emergency Evacuation Site.
- Do not re-enter the building until permission is given by the Fire Department.

### If you cannot evacuate:

- Close the doors between you and the fire.
- If possible call **911** and advise the Fire Department of your situation.
- Hang clothing or a cloth from a window to alert emergency response personnel.

## Earthquake Evacuation Procedures

### During an Earthquake:

- Get away from windows and heavy objects.
- Duck, cover and hold on. Crouch low to the ground; protect head with your arms; seek cover under and hold onto heavy furniture. Watch for moving objects.
- If you are in an interior hallway, stay there and crouch against the wall. Watch for swinging doors.

### After an Earthquake:

- After the shaking stops wait 60 seconds then evacuate the building. Do not use elevators.
- Meet at your designated Emergency Evacuation Site. Keep away from power lines and buildings to avoid falling debris.
- Report any injuries to Campus Security Services.