

## What to Expect in BCMB 406A Fall 2020

Due to the COVID 19 pandemic things are going to look a little different in the 406 labs this fall. Don't worry though, we have an excellent plan in place to keep everyone safe. For 406, we are going to use both our normal lab space, and the third year lab space (third years will be in the MICRO 200 lab) so we will have double the floor space. That means that we can easily stay socially distanced from each other. In our lab spaces that usually accommodate 24 students, we will have a maximum of 12 students. Each student will have their own dedicated space in the lab, and you will no longer be working in pairs. You will bring your own lab coat and goggles that will stay in a zip locked bag that is kept in the lab. We will increase the frequency of disinfection of work surfaces, communal equipment and high touch surfaces, and we will establish directional traffic flow in the lab. There will be a strict illness policy for both students and staff. If you experience any COVID-19-like symptoms (even mild), you will need to stay home for at least 10 days. If you come into contact with someone known to have COVID-19, you will have to self-isolate for at least 14 days.

The extra lab space will allow us to run the practical labs in the same way that we usually do so there will be plenty of hands on time. However, there will be a few changes to the way pre-lab talks are delivered and how assessments are handled. For example, all pre-lab talks will be pre-recorded and posted on our new learning management system (LMS). All Exams will be conducted online through the LMS, and any assignments will be submitted online. We still would like you to keep a lab journal, and we ask that you send us a digital image of the relevant sections of your lab journal every two weeks for marking.

As lab instructors, we are dedicated to supporting you and will continue to offer support in and out of the lab. Office hours will be held over Zoom, and you will have the opportunity to book one-on-one sessions. We will also be available to answer questions by email, and phone.

## Course Description

In BCMB 406A, you will develop your practical skills to prepare samples for analysis using modern methods in laboratory research. In this process, you will become familiar with current techniques in biochemistry and microbiology; specifically you will get experience running samples on a mass spectrometer, HPLC, flow cytometer and QPCR machine. These 3-4 week experiments offer an introduction to project-based learning experiences where you will be given an opportunity to plan some logistical portions of your own experiment. Once samples have been processed, you will critically examine and interpret multiple sets of data to study complex problems.

In lab 1, you will learn how mass spectrometry and HPLC are used in the field of proteomics. In two parallel experiments, *E.coli* proteins will be separated by 2D gel electrophoresis and a Glu-C digest of insulin will be used to generate peptide that will be separated using HPLC. The resulting purified proteins/peptides will be identified by mass spectrometry.

The focus of Lab 2 is tumour immunology. You will work with a tumour-derived cell line and characterize its phenotype using flow cytometry and evaluate its ability to elicit a T-cell response using a functional immune assay.

In lab 3, epigenetic theory is applied to data generated by performing QPCR on ChIP enriched DNA. The first step of this experiment is isolating chromatin from yeast. This chromatin is then fragmented into smaller pieces using a micrococcal nuclease digestion in preparation for ChIP. After specific pieces of chromatin are immunoprecipitated, the resulting DNA is analyzed using QPCR and conventional PCR.

## Intended Learning Objectives for 406A

Upon completion of 406A you will be able to:

- Describe the theory and principles of mass spectrometry, HPLC, flow cytometry and QPCR
- Develop proficiency in practical skills used for protein and DNA sample preparation, cell culture, flow cytometry, epigenetics and ChIP
- Evaluate experimental controls
- Generate a record of your experimental work and 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

Week	Dates	Lab(s)	Day 1 (5 hours)	Day 2 (2 hours)	Due Dates
1	Sep 14-18	<b>Introduction and Safety talk</b>	Bradford assay	1 <sup>st</sup> dimension of 2D-PAGE	
2	Sep 21-25		2 <sup>nd</sup> dimension of 2D-PAGE & HPLC	Gel imaging & spot excision	
3	Sep 28 – Oct 2		Lab 1: Tryptic digestion & HPLC	Lab 1: Zip-tip plate spotting	Lab 2 calc. problem set
4	Oct 5-9		Lab 2: Cell culture & cell staining	Lab 2: Complete cell staining	
5	Oct 12-16	<b>Lab 2:</b> Immunological Characterization of Cancer Cell Lines	<b>No labs</b>	FlowJo tutorial	Lab 1 Report (Day 2) FlowJo exercise
6	Oct 19-23		Cell culture & T cell assay set-up	T cell assay development	
7	Oct 26-30		Data analysis	Data analysis	
8	Nov 2-6	<b>Lab 3:</b> Chromatin Immunoprecipitation Analysis of YEF3	Chromatin prep, MNase digestion & reverse cross-linking	DNA purification & agarose gel	Lab 2 Report (Day 2)
9	Nov 9-13		<b>Reading Break – No Labs</b>		
10	Nov 16-20		Immunoprecipitation (IP)	IP & reverse cross-linking	Lab 2 Midterm
11	Nov 23-26		IP DNA purification, PCR & QPCR	Agarose gel & QPCR data analysis	
12	Nov 30 – Dec 4				Lab 3 Report (Day 1)
<b>TBA – Lab 3 exam during regular exam schedule</b>					

## Course evaluation

Exams	<b>40 %</b>
Lab Reports	<b>30 %</b>
Practical Assessment	<b>20 %</b>
Laboratory Journal	<b>10 %</b>