



LAND ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəyəm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

COURSE INFORMATION

Course Title	Course Code Number	Credit Value
Biochemical Methods	BIOC 404	3

PREREQUISITES

Restricted to Honours students in Biochemistry or others with permission of the instructor.

COREQUISITES

COURSE LOCATION AND TIME

Time (Day(s), Hour)	Room
Mondays and Fridays, 12pm – 1pm Mondays and Fridays, 1pm – 2pm	Term 1: BIOL 1012 Term 2: FNH Classroom 30

COURSE CHAIR

Course Chair	Contact Details
Prof. Sriram Subramaniam (he/him/his)	sriram.subramaniam@ubc.ca

COURSE INSTRUCTOR(S)

Course Instructor(s)	Contact Details	Office Location	Office Hours
Prof. Sriram Subramaniam	sriram.subramaniam@ubc.ca	DMCBH Office 3406 (behind door 3402) 2215 Wesbrook Mall	Arrange by email



Prof. Scott Covey	scott.covey@ubc.ca	BSC Office 3049 6270 University Blvd	Arrange by email
Prof. Thibault Mayor	mayor@mail.ubc.ca	NCE Office 306	By appointment
Prof. Filip Van Petegem	filip.vanpetegem@ubc.ca	LSC Office 2356 2350 Health Sciences Mall	By appointment
Prof. Vivlen Measday	vivien.measday@ubc.ca	FNH Office 325	Arrange by email
Post Docs	TBD		

LEARNING OUTCOMES

In this course, we will teach the theory and applications of classical and emerging technologies in biochemical and molecular biology research. While this is a methods based course, the objectives of the course go beyond simply learning the theoretical details of biochemical approaches. This course aims to have students:

- Obtain a sense of the wide array of biochemistry and molecular biology techniques
- Learn a variety of classical techniques and emerging technologies
- Transition to learning in a seminar style format
- Acquire knowledge from a variety of experts
- Gain experience in developing scientific hypothesis and research aims
- Develop proficiency in designing experiments and analyzing experimental data
- Improve presentation skills
- Gain experience in productive group work

COURSE OUTLINE

The course is divided in 6 blocks, each of 6 lectures. Each block will be taught by a different instructor who will focus on a different topic, with the exception of the block 6, which will be taught by 2 specialized instructors.

**COURSE SCHEDULE****TERM 1 (18 LECTURES | MONDAY/FRIDAY | 12PM-1PM | BIOL 1012):****Block 1 - Dr. Scott Covey – Transgenics and Quantitative PCR**

Lecture 1: qPCR Part 1 – Approaches and Theory **Sep 9 (F)**

Lecture 2: qPCR Part 2 – RT-qPCR Approaches to Quantitation **Sep 12 (M)**

Lecture 3: qPCR Part 3 – RT-qPCR Reference Analysis and MIQE **Sep 16 (F)**

Lecture 4: Introduction to Transgenic Organisms **Sep 19 (M)**

Lecture 5: Conditional Alleles **Sep 23 (F)**

Lecture 6: Assignment Introduction and Exam Information – **Sep 26 (M)**

Midterm – **Oct 3 (M)**

Evaluation: Assignment and Midterm

Block 2 - Dr. Thibault Mayor – Mass Spectrometry Based Proteomics

Lecture 1: Introduction to Shotgun Mass Spectrometry – **Oct 7 (F)**

Lecture 2: Tandem Mass Spectrometry (Intro part II) – **Oct 14 (F)**

Lecture 3: Data Analysis & Post Translation modifications– **Oct 17 (M)**

Lecture 4: Quantitative Mass Spectrometry – **Oct 21 (F)**

Lecture 5: Protein-protein Interactions – **Oct 24 (M)**

Lecture 6: Proteomics in Structural Biology – **Oct 28 (F)**

Q&A Session for Team Assessments – **Oct 31 (M)**

Midterm – **Nov 4 (F)**

Evaluation: Team Assignments, Peer Evaluations and Midterm

Block 3 - Dr. Vivien Measday – Next Generation Sequencing Technology w/Synthetic Biology

Lecture 1: Introduction to Next Generation Sequencing – **Nov 14 (M)**

Lecture 2: Illumina Sequencing – Method, Applications – Part I **Nov 18 (F)**

Lecture 3: Illumina Sequencing – Method, Applications – Part II **Nov 21 (M)**

Lecture 4: Analysis of Illumina fastq files – **Nov 25 (F)**

Lecture 5: PacBio Sequencing – Method, Applications – **Nov 28 (M)**

Lecture 6: Nanopore Sequencing – Method, Applications – **Dec 2 (F)**

Dec 5 (M) - ns

Evaluation: Assignment and Midterm

**TERM 2 (18 LECTURES | MONDAY/FRIDAY | 1PM-2PM | FNH 30):****Block 4 - Dr. Filip van Petegem – X-ray Crystallography**

Lecture 1: The phase problem and its solution via molecular replacement – **Jan 9 (M)**

Lecture 2: Tutorial 1 on Molecular Replacement – **Jan 13 (F)**

Lecture 3: Tutorial 2 on Molecular Replacement – **Jan 16 (M)**

Lecture 4: Tutorial 1 on Refinement and Model Building – **Jan 20 (F)**

Lecture 5: Tutorial 2 on Refinement and Model Building – **Jan 23 (M)**

Lecture 6: Tutorial 1 on Structure Validation and Analysis – **Jan 27 (F)**

Evaluation: Assignment

Block 5 - Dr. Sriram Subramaniam – Electron Microscopy

Lecture 1: Introduction to Imaging with Electrons – **Jan 30 (M)**

Lecture 2: Cryo-EM of Protein Complexes – **Feb 3 (F)**

Lecture 3: Visualizing and Interpreting cryo-EM data – **Feb 6 (M)**

Lecture 4: Visit to cryo-EM Laboratory at the Centre for Brain Health – **Feb 10 (F)**

Lecture 5: Electron Tomography – **Feb 13 (M)**

Lecture 6: Focused Ion Beams in Biology – **Feb 17 (F)**

Family Day – Feb 20 (M)

Midterm Break – Feb 24 (F)

Evaluation: Assignment

Block 6 - Postdocs – TBD

Lecture 1: - - - **Mar 3 (F)** **PDF1** (*TBD*)

Lecture 2: - - - **Mar 6 (M)** **PDF1**

Lecture 3: - - - **Mar 10 (F)** **PDF1**

Lecture 4: - - - **Mar 13 (M)** **PDF2** (*TBD*)

Lecture 5: - - - **Mar 17 (M)** **PDF2**

Lecture 6: - - - **Mar 20 (F)** **PDF2**

Mar 27 (M)

Evaluation: TBD



COURSE MATERIALS

Each instructor will provide their course slides on Canvas and provide, if needed, additional recommended reading material to students.

GRADING SCHEME

Assignment	Grade Weight
Prof. Subramaniam: Written Assignment	16.67% - Assignment
Prof. Scott Covey	16.67% - Assignment and exam Block 1 Assignment (submitted on Canvas): 8.33%. Block 1 Midterm: 8.33%
Prof. Thibault Mayor	16.67% - Team Assignment, peer evaluations and exam Block 2 Team Assignment: 6.67% (40 points) Block 2 Peer Assessment: 1.67% (10 points) Block 2 Midterm: 8.33% (50 points)
Prof. Filip Van Petegem	16.67% - Assignment
Prof. Vivlen Measday	16.67% - Assignment and exam Block 3 Assignment: 6.67% Block 3 Midterm (1.5 hr in December Final Exam schedule): 10.0%
Block 6 (Post Docs)	16.67% - TBA

GRADING AND COURSE POLICY

Students with disabilities and ongoing medical conditions have the option to request an accommodation for the course assessments after registering with the Centre for Accessibility. If you are eligible for exam accommodations, you will need to write your exams with the Centre for Accessibility. To book an exam, notify the course chair or instructor by email and register with the Centre for Accessibility at least one week in advance of the midterm date or summer final, or at least 7 days before the start of the examination period for a final in April and December.

If you are ill, please do not attend class. If you do miss class/assessments because of illness: contact the instructor of each block to learn their policy.



If you do miss a final exam because of illness: Students who miss a final exam due to illness or extreme personal distress and would like to apply for a deferred exam must submit a request for an academic concession within 48 hours of the missed exam. All appropriate documentation must be submitted within 14 calendar days of the missed exam. In addition the course chair and instructor should also be notified by email within 48 hours to coordinate the deferred exam.

If the instructor is sick: We will all do our best to stay well, but if one of the instructors falls ill then they will not come to class. If that happens, all efforts will be made to communicate that to students in a timely manner prior to class time, usually via an announcement in Canvas. Depending on the situation a substitute lecturer will take over, the lecture may take place over zoom, or the class may be cancelled.

ACADEMIC MISCONDUCT

UBC and the Department of Biochemistry and Molecular Biology take the issue of academic misconduct very seriously; the honest assessment of student learning is key to both the success of the university and success for individual students. Cheating, in any form, undermines the value of a degree and can have serious consequences for your continued academic success. As such it is important to know what your responsibilities are, what constitutes misconduct and how you can avoid it. With some effort and forethought no student should ever have to find themselves facing discipline for academic misconduct; inform yourself as to the expectations placed on you and what your responsibilities are. UBC definition of academic misconduct can be found in the UBC Calendar and additional information is available in this UBC resource link.

What consequences can arise from academic misconduct?

The severity of the discipline can range from a letter of reprimand or a zero on the assignment in question all the way to expulsion from the University. Perhaps the most common outcome in these cases are grades of zero in the course in which the misconduct occurred.

EQUITY DIVERSITY AND INCLUSION (EDI) POLICIES

It is our goal that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and diversity that the students bring to this class be viewed as a resource, strength and benefit. We make a commitment to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture. We will foster a climate within the classroom where students of diverse backgrounds and identities feel comfortable sharing their opinions and experience with varied topics throughout the class. We (like many people) are learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable or if you observe a situation where someone else is made to feel uncomfortable, please talk to us about it. This includes concerns about any class-related interactions that lead to feelings of exclusion or marginalization. We welcome and encourage your feedback on how we can better cultivate a sense of inclusion in our course. This can be done through meetings, email or anonymous feedback through canvas. We aim to do our best to address each situation as it arises and effect meaningful changes moving forward. For more information visit our departmental EDI webpage.



STUDENT RESOURCES

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available on the [UBC Senate website](#).

Mental Health Resources

In case you are struggling with mental health, or are feeling stressed or anxious, [UBC Counselling services](#) provides information about a number of resources for students to use. Additionally, UBC students receive [mental health coverage of up to \\$1500](#) under the AMS Health & Dental Plan (more information about coverage [here](#)).

[Here2Talk](#) is available for BC post-secondary students to talk with trained counsellors 24/7 (via voice call or text messages). If you are a student living in UBC residence, [Counsellors in Residence](#) can also be a valuable resource to provide mental health support. If you have a UBC email address, [Therapy Assistance Online \(TAO\)](#) is a free online resource that provides tools to manage stress, relationship problems, substance use, etc.

COVID RELATED POLICIES

For UBC's latest response to COVID-19, please visit [covid19.ubc.ca](#). For our in-person meetings in this class, it is important that all of us feel as comfortable as possible engaging in class activities while sharing an indoor space. Non-medical masks that cover our noses and mouths are a primary tool to make it harder for COVID-19 to find a new host. The higher the rate of vaccination is in our community overall, the lower the chance of spreading this virus. You are an important part of the UBC community. Please arrange to get vaccinated if you have not already done so. **If you're sick, it's important that you stay home – no matter what you think you may be sick with (e.g., cold, flu, other).**

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