## **LAND ACKNOWLEDGEMENT**

UBC’s Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəy̓əm (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.

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## **COURSE INFORMATION**

|  |  |  |
| --- | --- | --- |
| **Course Title** | **Course Code Number** | **Credit Value** |
| Biochemical Methods | BIOC 404 | 3 |

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### **PREREQUISITES**

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

### **COREQUISITES**

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### **COURSE LOCATION AND TIME**

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| --- | --- |
| **Time** (Day(s), Hour) | **Room** |
| Mondays and Fridays | 12pm – 1pm  Mondays and Fridays | 1pm – 2pm | Term 1: BIOL 1001  Term 2: FNH Classroom 50 |

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## **COURSE CHAIR**

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

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## **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 | By email |
| Prof. Eden Fussner-Dupas | eden.fussner@ubc.ca | BSC Office 3049  6270 University Blvd | By email (with BIOC 404 in Subject field) |
| Prof. Thibault Mayor | mayor@mail.ubc.ca | NCE Office 306 | By appointment |
| Prof. Filip Van Petegem | filip.vanpetegem@ubc.ca | LSI Office 2356  2350 Health Sciences Mall | By appointment |
| Prof. Vivien Measday | vivien.measday@ubc.ca | FNH Office 325 | By email |
| POST DOCS | TBD | TBD | TBD |

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## **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**

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| **Term 1 (18 lectures | Monday/Friday | 12pm-1pm | BIOL 1012):** |
|  |
| **Block 1 - Dr. Thibault Mayor – Mass Spectrometry Based Proteomics** |
| Lecture 1:  Introduction to Shotgun Mass Spectrometry – **Sept 8 (F)** |
| Lecture 2:  Tandem Mass Spectrometry (Intro Part II) – **Sept** **11 (M)** |
| Lecture 3:  Data Analysis & Post Translation Modifications – **Sept** **15 (F)** |
| Lecture 4:  Quantitative Mass Spectrometry – **Sept** **18 (M)** |
| Lecture 5:  Protein-protein interactions – **Sept 22 (F)** |
| Lecture 6: Proteomics in Structural Biology – **Sept 25 (M)** |
| Midterm – **Sept 29 (M)** |
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| Evaluation: Team Assignment & Midterm |
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| **Block 2 - Dr. Sriram Subramaniam – Electron Microscopy** |
| Lecture 1:  Introduction to Imaging with Electrons**– Oct 6 (F)** |
| ***Thanksgiving – Oct 9 (M)*** |
| Lecture 2: Cryo-EM of Protein Complexes– **Oct 13 (F)** |
| Lecture 3:  Visualizing and Interpreting cryo-EM Data – **Oct 16 (M)** |
| Lecture 4:  Visit to cryo-EM Laboratory at the Centre for Brain Health– **Oct 20 (F)** |
| Lecture 5: Electron Tomography– **Oct 23 (M)** |
| Lecture 6: Focused Ion Beams in Biology – **Oct 27 (F)** |
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| Evaluation: Assignment |
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| **Block 3 - Dr. Eden Fussner-Dupas – Computational Biochemistry** |
| Lecture 1: Introduction to structural modeling and docking– **Nov 10 (F)** |
| ***Remembrance Day – Nov 13 (M)*** *Remembrance Day* |
| ***Midterm Break – Nov 13-15*** |
| Workshop 1: Sequence Alignments and Databases– **Nov 17 (F)** |
| Workshop 2: Alphafold Structure Prediction and Visualization Tools– **Nov 20 (M)** |
| Workshop 3: Swissdock Introduction – Prepping Proteins and Ligands– **Nov 24 (F)** |
| Workshop 4:Swissdock Part II – Assessing and Visualizing Poses – **Nov 27 (M)** |
| Lecture 2:Generating Hypotheses from Molecular Models and Docking Experiments – **Dec 1 (F)** |
| Presentations– **Dec 4 (M)** |
|  |
| Evaluation: Assignment |
| **Term 2 (18 lectures | Monday/Friday | 1pm-2pm | FNH 30):** |
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| **Block 4 – Dr. Filip Van Petegem – X-ray Crystallography** |
| Lecture 1: The Phase Problem and its Solution via Molecular Replacement – **Jan 8 (M)** |
| Lecture 2: Tutorial 1 on Molecular Replacement – **Jan 12 (F)** |
| Lecture 3: Tutorial 2 on Molecular Replacement – **Jan 15 (M)** |
| Lecture 4: Tutorial 1 on Refinement and Model Building – **Jan 19 (F)** |
| Lecture 5: Tutorial 2 on Refinement and Model Building – **Jan 22 (M)** |
| Lecture 6: Tutorial 1 on Structure Validation and Analysis – **Jan 26 (F)** |
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| Evaluation: Assignment |
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| **Block 5 - Dr. Vivien Measday – Next Generation Sequencing Technology w/Synthetic Biology** |
| Lecture 1:  Introduction to Next Generation Sequencing– **Jan 29 (M)** |
| Lecture 2:  Illumina Sequencing - Method, Applications - Part I– **Feb 2 (F)** |
| Lecture 3:  Illumina Sequencing - Method, Applications - Part II – **Feb 5 (M)** |
| Lecture 4:  Analysis of Illumina fastq files– **Feb 9 (F)** |
| Lecture 5: PacBio Sequencing - Method, Applications – **Feb 12 (M)** |
| Lecture 6: Nanopore Sequencing - Method, Applications – **Feb 16 (F)** |
| ***Family Day – Feb 20 (M)*** |
| ***Midterm Break – Feb 19-23*** |
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| Evaluation: Assignment |
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| **Block 6 – Postdoc Lectures** |
| **Postdoc 1 TBD** |
| Lecture 1: ------- Lecture Title ------- **Mar 4 (F)** |
| Lecture 2: ------- Lecture Title ------- **Mar 8 (M)** |
| Lecture 3: ------- Lecture Title ------- **Mar 11 (F)** |
|  |
| Evaluation: Assignment and/or Exam – TBD |
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| **Postdoc 2 TBD** |
| Lecture 4: ------- Lecture Title ------- **Mar 15 (M)**  Lecture 5: ------- Lecture Title ------- **Mar 18 (M)** |
| Lecture 6: ------- Lecture Title ------ **Mar 22 (F)** |
|  |
| Evaluation : Assignment and/or Exam - TBD |

## **COURSE MATERIALS**

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

## **GRADING SCHEME**

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| **Assignment** | **Grade Weight** |

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| --- | --- |
| Prof. Thibault Mayor | 16.67% - Team Assignment & Midterm  Team Assignment: 25 points  Midterm: 75 points |

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| --- | --- |
| Prof. Subramaniam: | 16.67%- Written Assignment |
| Prof. Eden Fussner-Dupas | Graded readings (2)  Workshops (4)  Case Study Draft (1)  Small group discussion presentations (1)  Peer Review (2)  Case Study Final (6)  Participation (0.67)  Total: 16.67% |
| Prof. Filip Van Petegem | 16.67% - Assignment |
| Prof. VivIen Measday | 16.67% - Assignment & Midterm  Assignment: 6.67%  Midterm (1.5 hr in December Final Exam schedule): 10.0% |
| Block 6 (Post Docs) | 16.67% - TBD Assignment and/or Exam |

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## **GRADING AND COURSE POLICY**

## Students with disabilities and ongoing medical conditions have the option to request an [accommodation](https://students.ubc.ca/enrolment/academic-learning-resources/academic-accommodations-disabilities) for the course assessments after registering with the [Centre for Accessibility](https://students.ubc.ca/about-student-services/centre-for-accessibility/registering-centre-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](https://students.ubc.ca/enrolment/academic-learning-resources/academic-accommodations-disabilities/exam-accommodation-guidelines-expectations) 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](https://students.ubc.ca/enrolment/exams/standing-deferred-supplemental-exams) 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.

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## **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](https://www.calendar.ubc.ca/vancouver/?tree=3,54,111,959) and additional information is available in this [UBC resource link](https://learningcommons.ubc.ca/resource-guides/understand-academic-integrity/).

**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](https://biochem.ubc.ca/equity-diversity-inclusion/).

## **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](https://senate.ubc.ca/policies-resources-support-student-success).

**Mental Health Resources**

In case you are struggling with mental health, or are feeling stressed or anxious, [UBC Counselling services](https://students.ubc.ca/health/counselling-services) provides information about a number of resources for students to use. Additionally, UBC students receive [mental health coverage of up to $1500](https://www.studentcare.ca/rte/en/UniversityofBritishColumbiaAMSGSS_Health_HealthCoverage_HealthPractitioners_Psychologists) under the AMS Health & Dental Plan (more information about coverage [here](https://www.studentcare.ca/rte/en/UniversityofBritishColumbiaAMSGSS_Health_HealthCoverage_HealthPractitioners_Psychologists)).

[Here2Talk](https://here2talk.ca/) 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](https://vancouver.housing.ubc.ca/counsellor-in-residence/) can also be a valuable resource to provide mental health support. If you have a UBC email address, [Therapy Assistance Online (TAO)](https://ca.taoconnect.org/register) is a free online resource that provides tools to manage stress, relationship problems, substance use, etc.

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