MICB 405: Bioinformatics

COURSE OVERVIEW

**MICB 405: Bioinformatics** introduces students to the concepts and applications of sequence-based bioinformatics research across several broad topic areas including: Unix/Linux and the command line; massively parallel sequencing; applications of massively parallel sequencing including genomics, functional genomics, metagenomics, sequence assembly and sequence similarity. From a biological perspective, the main considerations and applications of the computational tools used in each of these subject areas are discussed. Team projects where students work within groups to apply bioinformatic tools introduced in class to an experimental datasets supplements lecture materials.

Students are expected to have access to a computer to complete projects for MICB 405. A personal Unix account will be provided to each student to log-in to the MICB 405 server. Students are expected to abide by UBC policies on the Acceptable use of Electronic Information and Systems when accessing the MICB 405 server. To ensure system availability and security, activity on the MICB 405 server is monitored and recorded.

COVID SAFETY

**Masks:** As of July 1st, 2022, UBC no longer requires masking on-campus in indoor spaces. However, as we enter the cooler months of the year, we encourage the use of masks in-class, both for your own protection and for the safety and comfort of everyone else in the class.

**Vaccination:** If you have not yet had a chance to get vaccinated and/or boosted against COVID-19, vaccines are available to you, free, and on campus ([http://www.vch.ca/covid-19/covid-19-vaccine](http://www.vch.ca/covid-19/covid-19-vaccine)). The higher the rate of vaccination 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.

**Your personal health:** 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). Do not come to class if you have COVID symptoms, have recently tested positive for COVID, or are required to quarantine. You may perform a self-assessment for COVID symptoms using this tool: [https://bc.thrive.health/covid19/en](https://bc.thrive.health/covid19/en)
If you do miss class because of illness:

- Make use of the lecture recordings to catch up and review.
- Make a connection early in the term to another student or a group of students in the class. You can help each other by sharing notes. If you don’t yet know anyone in the class, post on Piazza to connect with other students.
- Consult the class resources on Canvas and use Piazza for help.
- Come to office hours through Zoom.
- See the marking scheme for reassurance about what flexibility you have.
- If you are concerned that you will need to miss a particular key activity due to illness, contact us to discuss.

If you are sick on a midterm exam day, please email the instructor as soon as you are confident you should not come to the scheduled exam and also request for an academic concession here: https://ubc.ca1.qualtrics.com/jfe/form/SV_8cvEls27xMrbtno

If you do show up for an exam and you are clearly ill, you will not be able to write the exam and we will make alternate arrangements with you. We would strongly prefer that you contact us to make an alternate arrangement than for you to come to the exam while you are ill.

If you are sick on a final exam day, do not attend the exam. You must apply for deferred standing (an academic concession) through Science Advising no later than 48 hours after the missed final exam/assignment. Students who are granted deferred standing write the final exam/assignment at a later date. Learn more and find the application online: https://science.ubc.ca/students/advising/concession

For additional information about academic concessions, see the UBC policy here: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0

If I (the instructor) am sick: I will do my best to stay well, but if I am ill, develop COVID symptoms, or test positive for COVID, then I will not come to class. If that happens, here’s what you can expect:

- The other instructor or TA will substitute.
- If I am well enough to teach, but am taking precautions to avoid infecting others, we may have a synchronous online session or two. If this happens, you will receive an announcement in Canvas telling you how to join the class. You can anticipate that this would very likely be a last-minute email. Our classroom will still be available for you to sit and attend an online session, in this (hopefully rare) instance.
COURSE LEARNING OBJECTIVES

By the end of this course, students will be able to...

1. … describe the foundational principles underlying nucleic acid sequence based bioinformatics.
2. … navigate a Unix/Linux file system, execute basic commands through the command line, and make use of public web and file-based resources.
3. … explain the principles of DNA sequencing and standard sequence file types in its analysis.
4. … assess a selection of standard sequence based bioinformatic tools, and discuss the advantages, assumptions and limitations to their use.
5. … design and execute appropriate bioinformatics analyses to answer a relevant biological question.

COURSE FORMAT

Classes run: Thursday, September 8, 2022 - Tuesday, December 6, 2022

Location: Biological Sciences 2200

Meeting days: Tuesday, Thursday, Friday

Meeting times:
12:30 PM - 2:00 PM (Tues, Thurs): Lectures
10:00 AM - 11:00 AM (Fri): Tutorial T01 (MCLD 3014)
2:00 PM - 3:00 PM (Fri): Tutorial T02 (MCLD 3014)

Midterm Exam: October 18, 2022

Final: TBA*

Prerequisites: One of MICB 324; BIOC 300; BIOC 302; BIOC 303; BIOL 335

URLs: Course material will be posted to https://canvas.ubc.ca

* Do not plan travel until after exam period
INSTRUCTORS

Name: Dr. Donald Wong  
Email: donald.wong@ubc.ca  
Office Hours: Wednesdays 12:00 PM to 1:00 PM via Zoom, or by appointment

Name: Dr. Martin Hirst (course coordinator)  
Email: hirstm@mail.ubc.ca

Name: Juan Burckhardt (course Teaching Assistant)  
Email: jburckha@student.ubc.ca  
Office Hours: Fridays 11:00 AM to 12:00 PM via Zoom

GRADING

Quizzes: 10%  
Midterm Exam: 25%  
Team Project: 30%  
Final Exam: 35%

Note on the exams: If you fail to write the midterm, the weighting will be adjusted to the final exam. You must achieve a passing average on the exam(s) to pass the course.

Note on the team project: The score you earn will comprise of both a (larger) group and (smaller) individual component. We reserve the right to assess the group component individually if it is determined that a student's contribution to their group is minimal.

CLASS SCHEDULE

The class schedule is available on the Canvas page for MICB 405. Selected core concepts and bioinformatic tools will be reviewed during weekly tutorials. As the course progresses, it is possible that the schedule will need to be adjusted; however, the exam date will not change. When an updated schedule is posted to Canvas, an email alert will be sent to the class.

KEY DATES:
September 6th (Tue.) – Imagine Day: no undergrad classes (except the few that start at or after 5:00 pm and meet only once per week). Instead, all students (new and returning) are invited to various virtual orientation events.
KEY DATES (Cont’d):
Sept. 8th (Thurs.) – First day of MICB 405.
Sept. 9th (Fri.) – First tutorial for MICB 405.
Sept. 19th (Mon.) – last day for dropping first-term courses without a “W”
October 28th (Fri.) – last day to withdraw from MICB 405.
December 6th (Thurs.) – Last day of MICB 405
December 11th (Sun.) to December 22nd (Thurs.) – Exam period (inclusive).

Please do not plan to be away until you see the actual exam schedule, which is published in the middle of the term.

ACADEMIC CONCESSIONS

Students may request an academic concession for medical reasons, on compassionate grounds, or in certain cases of conflicting responsibilities. Please refer to UBC’s policy on Academic Concession for more details.

To apply for an academic concession, please inform your instructor as soon as possible, and fill out the Self Declaration of Academic Concession form here: https://ubc.ca1.qualtrics.com/jfe/form/SV_8cvEls27xMrbtno

Note: On this form, you are asked to give details about the reason for your academic concession request. A brief explanation will suffice—you are not expected to disclose sensitive information about your specific medical concerns, family emergency, etc.

ACADEMIC INTEGRITY

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President’s Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences. A more detailed description of academic integrity, including the University’s policies and procedures, may be found in the Academic Calendar.