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.

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.

TEACHING TEAM

Name: Dr. Donald Wong
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Office Hours: Tuesdays from 2:30-3:30 PM in BIOL 1026, or by appointment

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

Name: Jerry He (course Teaching Assistant)
Email: jerryhe@student.ubc.ca
Office Hours: Fridays from 11 AM to noon via Zoom

Please include “MICB 405” in the subject line—this will help to keep everyone’s inbox organized.

COURSE FORMAT

Classes run: Thursday, September 7, 2023 - Tuesday, December 7, 2023

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 (ESB 2012)
2:00 PM - 3:00 PM (Fri): Tutorial T02 (MCLD 3018)

Midterm Exam: October 17, 2023

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

GRADING

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

Note on the exams: If you miss the midterm, the weighting will be shifted 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 reassess the group component individually if 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 5th (Tues.) – 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.
September 7th (Thurs.) – First day of MICB 405.
September 9th (Fri.) – First tutorial for MICB 405.
September 18th (Mon.) – last day for dropping first-term courses without a "W."
October 12th (Thurs.) – Makeup Monday: attend your Monday classes instead.
October 17th (Tues.) – Midterm exam during class time.
October 27th (Fri.) – last day to withdraw from MICB 405.
December 7th (Thurs.) – Last day of MICB 405.
December 11th (Sun.) to December 22nd (Thurs.) – Exam period (inclusive). Do not plan to be away until you see the actual exam schedule.

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.

Use of Generative AI Tools

Generative artificial intelligence tools are those that have the capability to generate written content using AI algorithms trained on large data sets, and many of these have become widely accessible over the last year. Like any other tool, appropriate use can provide much opportunity to support learning. When misused, these will ultimately hamper your ability to practice critical thinking and communication of your original ideas and thoughts (a detriment during examinations!). In this course, students are permitted to use these tools for formative work such as assisting in coding, gathering information or brainstorming, but it is just as effective to use non-scholarly sources (e.g., Wikipedia) to get started. However, the use of generative AI tools to produce parts of or entire assignments is unacceptable. Assignments produced using these tools no longer represent original work produced by the student, a violation of academic integrity. Content produced by such tools might also include inaccurate information and/or lack sources—this could potentially constitute as plagiarism and be investigated as academic misconduct. If you have further questions around the acceptable or unacceptable use of generative AI tools, we encourage you to speak to us.

PERSONAL HEALTH

If you are sick, it is important that you stay home—no matter what you think you may be sick with (e.g., cold, flu, COVID). Do not come to class if you are feeling unwell.

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 do not yet know anyone in the class, post on the discussion board to connect with your fellow students.
- Consult resources on Canvas and use the discussion board 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