

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 NAME	COURSE CODE	CREDIT VALUE
Analysis of Microbial Genes and Genomes	MICB325	3

PREREQUISITES

One of MICB211 Foundations of Microbiology, MICB201 Introductory Environmental Microbiology, or BIOL234 Fundamentals of Genetics, and third year standing.

TEACHING TEAM

Dr. Steven Hallam (shallam@mail.ubc.ca), Instructor and Course Coordinator

Dr. Nina Radisavljevic (nina.radis@mssl.ubc.ca), Instructor

Beth Davenport (beth1313@student.ubc.ca), Teaching Assistant

Office Hours: By appointment. Please consult Canvas for more information on scheduling.

TEACHING AND LEARNING PHILOSOPHY

We believe in a constructivist approach to learning in which the student is given the opportunity to develop his or her own knowledge based on prior and current experience. It is essential to recognize the personal nature of the educational journey, and we appreciate that each student comes to learning with his or her own individual gifts and style. At the same time, it is our responsibility as educators to bring the solitary learner into a collaborative partnership, in which both students and teacher share, creating a flow and exchange of ideas. In this partnership, by providing an environment rich in possibility, we facilitate the acquisition of knowledge and nourish the life of the mind. In the context of new experience, we are there to give input and encouragement, offering direction when needed, and celebrating small steps as enthusiastically as giant strides. Accepting our responsibility for careful preparation and thorough grasp of subject matter, we expect that students will make a serious commitment to the learning process and accept responsibility for their academic success. We firmly believe that the role of the educator is not one of implantation, but evocation. It is our job to evoke from students that which is known but unsaid, to draw forth from wonder an articulate voice.

COURSE STRUCTURE

This lecture course and accompanying tutorial sessions explore genetic, biochemical, and bioinformatics approaches useful in the analysis of microbial genes, pathways, and whole genomes, with emphasis on genotype-phenotype relationships within the bacterial and archaeal domains of life (prokaryotic microorganisms). All course activities and affiliated office hours will happen in-person. *The ultimate success of our collective teaching and learning experience depends on your participation.* Please speak up or contact us if we say something that motivates or mystifies you. We appreciate all forms of feedback that improve course structure and dynamics.

Class meetings: MWF 11:00-12:00, Hennings, 6224 Agricultural Road, [HENN 200](#)

Tutorials: T03, F 13:00-14:00, [BIOL 2200](#) and T04 15:00-16:00, [CHEM C126](#)

Unit Topics: The course consists of 3 learning modules.

- **Module 1- Identifying Units of Selection with Forward Genetics**
- **Module 2- Exploring Gene Function with Reverse Genetics**
- **Module 3- Navigating the Genotype to Phenotype Continuum**

SCHEDULE OF TOPICS

Please consult course schedule on Canvas for a more granular overview of lectures and assessment throughout the term. This schedule is subject to change and will be updated as the term progresses. Students will be informed of any changes to the course schedule.

LEARNING OUTCOMES

By the end of the course, students will be able to:

- Comment on the similarities and differences between forward and reverse genetics as they relate to identifying units of selection and interpreting gene function within microbial genomes.
- Define terms and concepts associated with microbial genetics and genomics.
- Identify and implement design principles underlying genetic screens based on real world examples spanning the genotype to phenotype continuum.
- Evaluate genetic screening and biochemical data to order genes in pathways or regulatory networks.
- Apply bioinformatic approaches to explore microbial genome structure and function at different levels of biological information flow.

- Critically evaluate the role of microbial genomics and genetic engineering in relation to health, environment, and industrial biotechnology innovation.

LEARNING ACTIVITIES

Course lectures are designed to introduce students to concepts and methods in microbial genomics and genetics with emphasis on experimental logic and application in real-world settings. Slides will be posted on Canvas prior to each lecture for students interested in reviewing content ahead of time. However, presentation versions of each lecture may be subject to change at any time. In addition to slides, students will be assigned relevant readings excerpted from books, popular media, review articles or the primary scientific literature to support learning outcomes.

- All students are expected to participate in class by asking questions, providing comments, answering iClicker questions, working in groups in a constructive and respectful manner, and by coming to class prepared e.g., completing assigned reading ahead of time.
- All writing submitted in this course should be the student's original work. Students should be aware of university policies related to academic integrity and [plagiarism](#) and adhere strictly to these policies. The use of generative AI tools, including ChatGPT and other similar tools, to complete or support the completion of any form of assignment or assessment in this course is not allowed and would be considered academic misconduct. Academic misconduct (or cheating) of any kind will not be tolerated. The consequence for academic misconduct will include a grade of zero and possible expulsion from the course and suspension from the University.
- Discussion Board and Questions. The Discussion Board feature on Canvas is an option for students to discuss course material among themselves. The teaching team will not normally participate in discussions, unless posted information requires correction. The preferred forum for questions to the instructor on course material is in class, as this will benefit the greatest number of students. The teaching team will be available after class to answer questions, and office hours are available by appointment.

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; nor should you help others to do the same. For example, it is prohibited to share your past assignments and answers with other students; work with other students on an assignment when an instructor has not expressly given permission; or spread information through word of mouth, social media, websites, or other channels that subverts the fair evaluation of a class exercise, or assessment. The course teaching team, UBC, and the scholarly community at large share an understanding of the ethical ways that we use to produce knowledge. A core practice of this shared value of academic integrity is that we acknowledge the

contributions of others to our own work, but it also means we produce our own contributions that add to the scholarly conversation: we don't buy or copy papers or exams or have someone else edit them. We also don't falsify data or sources, or hand in the same work in more than one course.

Academic concession: You may need to 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 details. To apply for an academic concession, please inform the teaching team as soon as possible. Students with disabilities who have registered with the Disabilities Resource Center should notify the teaching team at the start of term.

Illness: Please don't come to class if you have an illness that could be transmitted to your classmates (e.g., a respiratory infection). In this class, the marking scheme is intended to provide flexibility so that you can prioritize your health and still succeed. Please inform the teaching team if you are ill; you will not lose participation marks if you miss a small number of classes due to illness. If you are ill for a long period of time, please contact the teaching team to discuss, and apply for an academic concession. More information about UBC's framework for preventing communicable disease is [here](#).

LEARNING MATERIALS

There is no textbook for this course. As noted, lecture slides and supplemental reading will be posted. For basic concepts and related background, "*Molecular Genetics of Bacteria*" (Snyder) is a good resource (ISBN 9781555816278; ebook available from Vital Source from \$135 and on reserve at UBC library). Another good reference is Griffiths et al., "*An Introduction to Genetic Analysis*" (ISBN:9781319401399); ebook available from Macmillan Learning from \$75.

ASSESSMENTS OF LEARNING

Each course module has learning objectives, readings, and assignments in addition to core lecture content to guide student learning.

	N	% of total
Assignments	8	20
Midterm 1	1	20
Midterm 2	1	20
Final	1	20
Group Project	1	15
Class Participation	*	5

Assignments: Problems described or initiated in class that are completed as homework. Assignments are intended to reinforce learning and help prepare students for exams and the

group project. They are graded for completion with feedback from the teaching team as needed. Late assignments will not be accepted.

Examinations: There will be a midterm exam after each learning module (Midterm 1 and 2), and a final exam. Exams are cumulative with respect to preceding course content. Exams are graded for accuracy and completion. There will be no make-up test for a missed midterm exam. If a student misses a midterm exam, their other midterm and final exam will be weighted accordingly. If a student misses a midterm exam and several assignments and misses the final exam, they may not be eligible for a deferred final exam unless an academic concession has been approved.

Group project: There will be a group project during Module 3 giving students the opportunity to use this cumulative knowledge. Working together in groups of up to 3 participants, students will select one of three use cases to report on. Each use case relates to a particular biological process in selected microorganisms. Students will interpret primary data related to these processes and use their genetics know-how to answer questions and design experiments related to the process under study. Projects are graded for accuracy and completion.

Participation (*): Participation will be assessed using the iClicker module embedded in Canvas. Students must respond to $\geq 80\%$ of total in-class questions to receive participation marks.

Tutorials: Sample problems and in-class activities will be used to review material and identify challenging concepts requiring clarification. Tutorials are an opportunity to further your comprehension and to hone your problem-solving skills. Accordingly, the tutorials are optional and will be used mainly to review assignments and other lecture material/problems. As appropriate additional practice problems will be provided. If you have questions, contact the TA prior to tutorial sessions so that they may prepare accordingly.

Weather: In-person, on campus activities may need to be cancelled due to issues such as weather conditions (e.g., snow). The most up-to-date information about cancellations will be posted on ubc.ca. Please check ubc.ca often during times when an extreme weather event could disrupt our course activities. The uncertainty that comes with extreme weather events can be stressful. Rest assured that the teaching team will be flexible with assignment deadlines and communicate with you as early as possible on Canvas. Here is what you can expect in the event an in-person class session, quiz, or exam is cancelled:

- If in-person activities are cancelled due to weather or other environmental conditions, class will be cancelled. The teaching team will let you know how this will affect the course schedule for the rest of the term.
- If weather impacts the midterm we will reschedule: Please see Canvas for rescheduling notifications. It is likely the quiz/midterm will take place at the next class session.
- If you are registered to write exams at the Centre for Accessibility, we encourage you to reach out to your CFA advisor well in advance to discuss the weather contingency plan for this course.

- If you have any questions or concerns about this weather contingency plan, please let the teaching team know. Discussing any issues prior to the cancellation is helpful so we can prepare in advance.

UNIVERSITY POLICIES

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](#).

LEARNING ANALYTICS

Learning analytics includes the collection and analysis of data about learners to improve teaching and learning. This course will be using Canvas to capture data about your activity and provide information that can be used to improve the quality of teaching and learning. In this course, I plan to use analytics data to:

- View overall class progress,
- Track your progress to provide you with relevant feedback,
- Review statistics on course content access to support curriculum development,
- Track participation in discussion forums and,
- Assess your participation in the course.

LEARNING RESOURCES

A variety of support services including tutoring are available from [AMS](#). For help with writing composition consider contacting the [UBC writing Centre](#). Additional UBC academic and learning resources can be found [here](#).

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All materials of this course (course handouts, lecture slides, assessments, course readings, etc.) are the intellectual property of the Course Instructors or licensed to be used in this course by the copyright owner. We are working hard to provide all the materials you need to succeed in this course. In return, please respect our work. All assignment instructions, quiz questions and

answers, discussion questions, announcements, PowerPoint slides, audio/video recordings, Canvas modules, and any other materials provided to you by the Teaching Team or in the textbook are for use in this course by students currently enrolled in MICB325. It is unacceptable to share any of these materials beyond our course, including by posting on file-sharing websites (e.g., CourseHero, Google Docs). It is unacceptable to copy and paste sentences from a textbook (e.g., definitions) into for-profit software (e.g., Quizlet) for use in studying. Respect the Teaching Team and textbook authors' intellectual property and follow copyright law. Redistribution of course materials by any means without permission of the copyright holder(s) constitutes a breach of copyright and may lead to academic discipline. Students are not permitted to record class sessions without written consent of Course Instructors.