

MICB 325: Analysis of Microbial Genes and Genomes

This course provides a foundation for understanding bacterial genes and genomes, including how genes function and are regulated to enable bacterial growth and survival. Students will also learn how a variety of genetic, molecular biological and bioinformatics tools are used to analyze how genes and genomes function to determine bacterial physiology and, more broadly, the operation of microbial systems.

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Class meetings: MWF 10:00 - 10:50, WOOD 6

Tutorials: Thurs 12:00 - 12:50, PHRM 1101; Fri 13:00 - 13:50, WESB 201

Calendar description.

Genetic, molecular biological and bioinformatics approaches for the analysis of microbial genomes, gene structure-function and gene expression with emphasis on bacteria.

[3-0-1]

Prerequisite: MICB 201 or BIOL 234 and third year standing.

Grading

6% participation in clicker questions. Full credit will be awarded for 90% of the total possible (*i.e.*, missing a few class sessions will not result in penalty).

6% for completing homework assignments. Each assignment will be awarded 0 to 2 points based on completeness of answer.

10% project (due April 1, 2019)

28% midterm exam (February 15, 2019)

50% final exam

General course learning outcomes

1. A broad knowledge of bacterial genetics and genomics that can serve as a foundation for advanced studies, diverse careers and understanding our world.
2. Fluency with terms and concepts in microbial genetics and genomics, as well as the related molecular biology and bioinformatics.
3. New information fit into a growing framework of understanding largely based on evolution and natural history.
4. An ability to articulate well considered and supported explanations of course topics.
5. An ability to critically analyze real-world issues involving microbial genetics and genomics in areas such as health, environment and biotechnology.
6. A facility with data science related to bacterial genetics and genomics.
7. An ability to propose and evaluate genetic and genomic approaches to understanding bacterial physiology

Course structure

- Lectures are designed to teach tools and approaches of bacterial genetics and genomics, together with their logic and application.
- Homework assignments are essentially problems in bacterial genetics, bioinformatic analysis of gene function, genomics and large data sets. These are designed to reinforce the concepts taught in lectures and their application. Students are encouraged to work on homework together, but all submitted work must be your own.
- The project builds on the same principles as the homework, applied to a larger scale problem.
- Course slides will be posted on line, as will short readings, designed to supplement your baseline knowledge.
- Clicker questions will be used to review material and identify challenging concepts requiring clarification.
- Tutorials are to an opportunity to further your comprehension and to hone your problem-solving skills. Accordingly, the tutorials are optional and will be used mainly to go over homework, clicker questions, and other lecture material/problems that you may be struggling with. With respect to the latter, e-mail any questions to the TA prior to tutorials so that they may prepare appropriately.

Canvas website. This is an essential element of the course that will be used for: providing slides, optional readings and grades: providing and submitting assignments (homework); and a discussion board. Announcements, including due dates for assignments and exams, will be posted on this site. *Students are responsible for regularly monitoring this site.*

Course notes. 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 \$79 and on reserve at UBC library).

i>Clickers are required and can be purchased in the bookstore. You must register your iClicker on the Connect site by the end of the drop-add period (Jan 14th), but you must first use it to respond to at least one question in class prior to registering. The iClickers can be registered via a link on the Connect site, where instructions are provided. You will receive credit for iClicker

responses made prior to registering (the system keeps track of them). Credit is for participation, regardless of whether answers are correct. You are responsible for bringing your iClicker to every class meeting, and no loaners are available. However, no credit will be lost for missing only a few iClicker sessions. Check the iClicker frequency in Wood 6 and set your clicker accordingly. *iClicker sessions will begin to count for credit on January 4.*

Optional readings. Short readings will be occasionally provided. The objectives are (1) to foster interest in course topics by illustrating their applications and importance and (2) to provide a deeper understanding of topics. Readings may be discussed to clarify course topics, but students are not responsible on exams for material in the readings beyond that in the notes.

Late assignments will be penalized 25 percentage points for every day that they are late.

Discussion Board and Questions. The Discussion Board feature on Connect is an option for students to discuss course material among themselves. The Instructor and Teaching Assistant 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 Instructor and Teaching Assistant will usually be available after class to answer questions, and office hours are available by appointment. Questions can be sent via email, but they will normally be addressed with the entire class during the next class meeting, and we cannot guarantee that they will always be promptly answered.

Exams. There will be one midterm exam and a final exam. These exams will largely involve solving problems and using logic involving genetic and molecular concepts. Students are responsible for all material in the course slides and homework assignments, including conceptually simple material that may not be covered in class. The final exam is cumulative. The homework provides extremely useful practice for exams.

Missed midterm exam. There will be no make-up test for a missed midterm exam. If a student misses the midterm exam, their final exam will be increased from 50% to 78% of the course grade provided that a medical certificate is given to the course instructor. *If a student misses the mid-term exam and numerous assignments, and then also misses the final exam, he or she may not be eligible for a deferred final exam, due to failure to demonstrate satisfactory achievement during the term.*

Exam rules. The following university rules apply to all midterm and final exams:

1. Each candidate must be prepared to produce, upon request, a Library/AMS card for identification.
2. Candidates are not permitted to ask questions of the invigilators, except in cases of supposed errors or ambiguities in examination questions.
3. No candidate shall be permitted to enter the examination room after the expiration of one-half hour from the scheduled starting time, or to leave during the first half hour of the examination.
4. Candidates suspected of any of the following, or similar, dishonest practices shall be immediately dismissed from the examination and shall be liable to disciplinary action.
 - Having at the place of writing any books, papers or memoranda, calculators, computers, audio or video cassette players or other memory aid devices, other than those authorized by the examiners.
 - Speaking or communicating with other candidates.

- Purposely exposing written papers to the view of other candidates. The plea of accident or forgetfulness shall not be received.
5. Candidates must not destroy or mutilate any examination material; must hand in all examination papers; and must not take any examination material from the examination room without permission of the invigilator.

Additional rules for MICB 325 exams. Only two pens and an identity card are permitted on the desk top during exams. *Everything else must be out of view.* This means no pencil cases, no erasers, no cell phones, no drinks and no food. In addition, cell phones must be powered down. Possible errors in marking will not be considered for exams written in pencil. Do not erase errors; line them out. Space for corrections will be provided. Do not wear a hat with a brim (e.g., no baseball caps) or a jacket.

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.