



COURSE OUTLINE

1. **Course:** CMMB 549, Microbial Genetics and Genomics - Fall 2020

Lecture 01: MWF 09:00 - 09:50 - Online

Instructor	Email	Phone	Office	Hours
Dr Joe Harrison	jjharris@ucalgary.ca	403 220-7627	BI 429B	TBA
Dr Michael Hynes	hynes@ucalgary.ca	403 220-8473	BI 429C	By appointment only

The course coordinator is Dr. Michael Hynes

Online Delivery Details:

This course is being offered online in real-time via scheduled meeting times, you are required to be online at the same time.

Lectures will be delivered by ZOOM. All students must have access to a computer with reliable internet access, a camera, and audio input and output on zoom. Lectures will not be recorded and posted, but Powerpoint presentations will be posted ahead of each class.

Course Site:

D2L: CMMB 549 L01-(Fall 2020)-Microbial Genetics and Genomics

Note: Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s):

Cellular, Molecular and Microbial Biology 411.

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

Component(s)	Weighting %	Date
Midterm Exam 1	10	October 5, 2020 (online during class period)
Midterm Exam 2	10	November 2, 2020 (online during class period)
Grant Proposal	25	Due November 16th, 2020
On-line Quizzes	10	Multiple, TBA. Only the top 5 will count towards final mark (2 % each)
Presentation	5	Various class sessions in December
Assignment	10	Due December 9th.
Final Exam	30	Registrar scheduled (online) and a take-home component.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	92 %	87 %	80 %	77%	73%	70 %	66 %	63%	60%	55 %	50 %

This course has a registrar scheduled final exam.

4. **Missed Components Of Term Work:**

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

5. **Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

6. **Course Materials:**

Required Textbook(s):

Snyder, Peters, Henkin, and Champness, *Molecular Genetics of Bacteria*: ASM Press.

Links to important articles will be provided on D2L. Powerpoints from course will be posted to D2L ahead of each class. Lectures will NOT be recorded.

The course textbook is usually available on-line through the University Library.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

7. Examination Policy:

No notes or electronic aids are allowed on tests or examinations. Non-programmable calculators may be used to answer mathematical questions, should any occur. The presence of such questions will be communicated in advance to students.

Some questions for midterms and the final exam may be pre-assigned as much as two weeks in advance, (possibly even longer for the final). These will be take-home elements of those exams, and a choice of such questions will be offered.

Students should also read the Calendar, Section G, on Examinations.

1) There will be TWO (2) midterm exams administered through the course D2L website. They will be completed during two of the regularly scheduled class periods as indicated in the grading section and you will be expected to be available to write the exams during those times. The exams will be 30 minutes plus 15 minutes technical time (45 minutes total). Time will be adjusted for SAS students if needed and accommodations for students will be done on a case-by-case basis. Exams will/may be a mixture of multiple choice, true or false, fill in the blank, and definition questions. A short take home section, which students will have several days to prepare, will be required to be submitted on the same day as the midterm exam.

IMPORTANT: It is the student's responsibility to ensure that they have adequate computer and internet access to write the exams. Students will be required to begin their exams promptly at the start of their scheduled class on the day of the exam. If a student encounters any technical issues starting an exam, they MUST document the issue by taking a photo, screenshot, or video, and they must contact the instructor immediately so that either additional time can be provided to access the exam or alternative arrangements made. **Students claiming to experience such difficulties who do not contact their instructor providing evidence of technical difficulties within 15 minutes of the scheduled start of the exam will not be allowed to write the exam and will receive a grade of zero (0) on the exam.** If a student's exam is suspended during the exam (lost internet connection, internet browser crashes etc.), they MUST provide evidence (photo/ screenshot/video) and contact the instructor immediately. Students will then be granted reentry to suspended exams if they began the exam on time, provided evidence of the suspension, and still have time remaining to complete their exam.

2) The final exam is a registrar scheduled timed exam and is designed to take 2 hrs to write but 3hrs will be given to account for any issues. Students will start at the registrar scheduled time. Time will be adjusted for SAS students if needed and accommodations for students will be done on a case-by-case basis. The final exam will be administered online through the course D2L website. Again, there will be a take-home component due on the same day as the final exam.

Students should also read the Calendar, [Section G](#), on Examinations.

8. Approved Mandatory And Optional Course Supplemental Fees:

There are no mandatory or optional course supplemental fees for this course.

9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section [E.2](#) of the University Calendar.

Writing quality WILL be part of the assessment for all course components.

10. Human & Living Organism Studies Statements:

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS. Students taking laboratory and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

Students are expected to be familiar with [Section SC.4.1](#) of the University Calendar.

11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar
- b. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. Other Important Information For Students:

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Center:** For more information, see www.ucalgary.ca/wellnesscentre or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (syva@ucalgary.ca) or phone at [403-220-2208](tel:403-220-2208). The complete University of Calgary policy on sexual violence can be viewed at (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>)
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**
- e. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for

accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy by email addy@ucalgary.ca or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- g. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: sciencerep@su.ucalgary.ca. [Student Ombudsman](#), Email: ombuds@ucalgary.ca.
- h. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- i. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.

CMMB 549 - Fall 2020

The aim of this course is to provide a detailed exposure to concepts in microbial genetics (almost exclusively bacterial genetics) as well as an introduction to modern Bacterial and Archaeal genomics. The first part of the course (up to about lecture 23, with a few exceptions) will make use of the textbook, as well as occasional review articles and articles from the primary literature. The last part of the course will be taught using current research papers and reviews.

Students will be required to submit one term paper, due November 16th. This will take the form of **grant proposal**. Details on the scope of this assignment, and suggested topics, will be posted on Desire2Learn. Students will also be required to make a brief (maximum 12-15 minutes (enrolment dependent), including questions) presentation based on a recent research article (their choice, but some suggestions will be provided). The lecture schedule may be altered slightly to accommodate these, depending on enrolment.

Finally, students will be required to complete one assignment, due December 9th. The assignment will focus on genomics literacy. Details of the assignment will be posted on Desire 2 Learn by November 5th. The assignment will require the use of web-based bioinformatics tools. A topic will be chosen to highlight course material and may integrate with current community driven genome annotation efforts. The aim will be to apply computational approaches to investigate the structure of bacterial genomes and predict gene function and regulation.

Lecture Schedule (tentative! precise topics and order may change; note that due to online delivery, some substantial changes may be forced on us)

Textbook: Snyder et al. , Molecular Genetics of Bacteria, ASM Press, Washington, D. C., 4rd edition, 2013.

Lecture Date Lecturer Topic Location/Chapter

- 1 Sept 09 MH Introduction to course and topics, basic concepts Ch 1
- 2 Sept 11 MH Introduction to bacterial genetics Ch 1,2,3
- 3 Sept 14 MH Introduction to bacterial genetics Ch 1,2,3

4 Sept 16 MH Review of recombination (not in depth) Ch 10

5 Sept 18 MH Mutations and mutagenesis Ch 11 (1,2,3)

6 Sept 21 MH Plasmids Ch 4

7 Sept 23 MH Plasmids Ch 4

8 Sept 25 MH Plasmids Ch 4

9 Sept 28 MH Plasmids, Conjugation Ch 4, Ch 5

10 Sept 30 MH Conjugation Ch 5

11 Oct 02 MH Conjugation, Ch 5

Oct 05 MH **Midterm Exam 1 (IN CLASS) Monday October 5**

12 Oct 07 MH Transformation Ch 6

13 Oct 09 MH Transformation Ch 6

October 12 **THANKSGIVING MONDAY**

14 Oct 14 MH Transduction and phage biology and genetics Ch. 7,8

15 Oct 16 MH Transduction Ch 7,8

16 Oct 19 MH Transduction + GTAS Ch 7,8

17 Oct 21 MH Antiphage mechanisms, Abi, Restriction and others

18 Oct 23 MH CRISPRs

19 Oct 26 MH Anti-CRISPR and other novelties

20 Oct 28 MH Transposition and transposon mutagenesis Ch 9

21 Oct 30 MH Transposition and transposon mutagenesis Ch 9

Nov 02 MH **Midterm Exam 2 (IN CLASS) Monday November 2nd.**

22,23 Nov 04, 06 JH Bacterial Genomics: Massively parallel sequencing technology

Nov 08 to 14th **READING DAYS, NO CLASSES**

24 Nov 16 JH Laptop bioinformatics for molecular (micro)biologists – Part I

25 Nov 18 JH Bacterial Gene Expression: RNA-sequencing, ChiP-seq

26 Nov 20 JH Microbial diversity, metagenomics and 16S amplicon sequencing

27 Nov 23 JH Laptop bioinformatics for molecular (micro)biologists – Part II

28 Nov 25 JH Laptop bioinformatics - Part III

29 Nov 27 JH Wrap up.

30 Nov 30 MH/JH Student presentations

31 Dec 02 MH/JH Student presentations

32 Dec 4 MH/JH Student presentations

33 Dec 7 MH/JH Student presentations

34 Dec 9 MH/JH Student presentations

Course Outcomes:

- Explain the concepts and tools required to do experimental work in bacterial genetics
- Describe in detail the mechanisms by which genes are exchanged between microorganisms
- Explain methods used to generate mutants in bacteria, and the application of these methods
- Describe advances in DNA sequencing technology and their application to sequencing genomes and studying gene expression
- Use computer-based tools to carry out bioinformatic analysis of genes and genomes
- Read primary research articles in the field of Molecular Microbiology, and explain them in oral presentations and in written assignments that require a critical analysis of the literature
- Generate hypotheses about mechanisms underlying genetic processes in bacteria, and design experiments that could test those hypotheses

Electronically Approved - Sep 01 2020 16:40

Department Approval