



UNIVERSITY OF CALGARY  
FACULTY OF SCIENCE  
DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE

1. **Course:** CMMB 549, Microbial Genetics -- Fall 2018

Instructor Name	Email	Phone	Office	Hours
L01: ( MWF 09:00 - 09:50 in ST 055)				
Joe Harrison	jjharris@ucalgary.ca	4032207627	BI429B	TBA
Michael Hynes	hynes@ucalgary.ca	403-220-8473	BioSci 429C	By appointment only

**Course Site:**

D2L: CMMB 549 L01-(Fall 2018)-Microbial Genetics

**Department of Biological Sciences:**

Office: BIO 186  
Phone: 403 220-3140  
Email: biosci@ucalgary.ca

**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
Term Paper	15%	November 19th, 2018
Assignment	10%	December 7, 2018
Oral Presentation	5%	week of November 26-30th, 2018
Midterm Exam 1	15%	October 1, 2018
Midterm Exam 2	15%	November 5th, 2018
Final Exam	40%	Registrar Scheduled.

There will be a **cumulative**, 3 hour final exam scheduled by the Registrar's Office

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
<b>Minimum % Required</b>	90 %	85 %	80 %	77%	73%	70 %	66 %	63%	60%	55 %	50 %

This course has a registrar scheduled final exam.

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

The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself/themself with these regulations. See also [Section E.3](#) of the University Calendar.

## 5. **Scheduled out-of-class activities:**

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

## 6. **Course Materials:**

Required Textbook(s):

Larry Snyder, Joseph E. Peters, Tina M. Henkin, Wendy Champness, *Molecular Genetics of Bacteria*: ASM Press .

Slides available through D2L. Links to articles provided on D2L.

## 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 may be pre-assigned as much as two weeks in advance. These will never be mandatory questions, and students electing not to do these questions will still have choice on the exam. For these pre-assigned questions, students can do as much research and preparation as they like, but will have to answer the question during the exam period with no notes or other aids.

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 taken into consideration in all evaluations in this course. In order to get a high mark on a longer answer question, students will need to write complete, grammatical, well thought out sentences, and organize their response into a cogent, logical argument.

## 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.

1. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **15 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 immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections [I.1](#) and [I.2](#) of the University Calendar

2. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

I will be happy to correct any mathematical errors in computing marks, and to correct mistakes I have made in marking, if students can provide clear factual proof that their answer is correct. I will not change marks on longer answer questions or term papers just because students think their answer deserves more. There is a strong comparative element to the marking of such papers or questions, and full marks are reserved for truly outstanding answers that go well beyond the expectations of the course.

## 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:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. 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 ([svsa@ucalgary.ca](mailto:svsa@ucalgary.ca)) or phone at [403-220-2208](tel:403-220-2208).
- 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. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- f. **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](mailto: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.
- g. **Safewalk:** Campus Security will escort individuals day or night (See the [Campus Safewalk](#) website). Call [403-220-5333](tel:403-220-5333) for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). 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.
- i. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca). SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca). Student Ombudsman, Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca).

- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. **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.

UNIVERSITY OF CALGARY

**CMMB 549 - Fall 2018**

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 19th. This will take the form of a critical mini review article or 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 7th. 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.

**CMMB 549, Fall 2018 - Lecture Schedule (tentative! precise topics and order may change)**

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

<u>Lecture</u>	<u>Date</u>	<u>Lecturer</u>	<u>Topic</u>	<u>Location/Chapter</u>
1	Sept 07	MH	Introduction to course and topics, basic concepts	Ch 1
2	Sept 10	MH	Introduction to bacterial genetics	Ch 1,2,3
3	Sept 12	MH	Introduction to bacterial genetics	Ch 1,2,3
4	Sept 14	MH	Review of recombination (not in depth)	Ch 10
5	Sept 17	MH	Mutations and mutagenesis	Ch 11 (1,2,3)
6	Sept 19	MH	Plasmids	Ch 4
7	Sept 21	MH	Plasmids	Ch 4
8	Sept 24	MH	Plasmids	Ch 4
9	Sept 26	MH	Plasmids, Conjugation	Ch 4, Ch 5
10	Sept 28	MH	Conjugation	Ch 5
	Oct 01	MH	<b>Midterm Exam 1 (IN CLASS)</b>	
11	Oct 03	MH	Conjugation, Review Midterm	Ch 5
12	Oct 05	MH	Conjugation	Ch 5
	Oct 08		<b>THANKSGIVING MONDAY</b>	
13	Oct 10	MH	Transformation	Ch 6
14	Oct 12	MH	Transformation	Ch 6
15	Oct 15	MH	Transduction	Ch 7,8
16	Oct 17	MH	Transduction	Ch 7,8
17	Oct 19	MH	GTAs	
18	Oct 22	MH	Antiphage mechanisms, Abi, Restriction and others	
19	Oct 24	MH	CRISPRs	
20	Oct 26	MH	Anti-CRISPR	Ch 9
21	Oct 29	MH	Transposition and transposon mutagenesis	Ch 9
22	Oct 31	MH	Transposition and transposon mutagenesis	Ch 9
23	Nov 02	MH	Transposition and transposon mutagenesis	Ch 9
	Nov 05	MH	<b>Midterm Exam 2 (IN CLASS)</b>	
24	Nov 07	JH	Bacterial Genomics: Massively parallel sequencing technology	
25	Nov 09	JH	Bacterial Genomics: Massively parallel sequencing technology	
Nov 12 to 16th			<b>READING DAYS, NO CLASSES</b>	

26	Nov 19	JH	Bacterial Genomics: Library construction, assemblers and annotation
27	Nov 21	JH	Laptop bioinformatics for molecular (micro)biologists – Part I
28	Nov 23	JH	Bacterial Gene Expression: RNA-sequencing, ChIP-seq
29	Nov 26	MH	Student presentations
30	Nov 28	MH	Student presentations
31	Nov 30	MH	Student presentations
32	Dec 3	JH	Microbial diversity, metagenomics and 16S amplicon sequencing
33	Dec 5	JH	Laptop bioinformatics for molecular (micro)biologists – Part II
34	Dec 7	JH	Laptop bioinformatics - Part III

**Department Approval:**

Electronically Approved

**Date:** 2018-08-31 15:32

## 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