



COURSE OUTLINE

1. **Course:** CMMB 443, Microbial Physiology - Fall 2021

Coordinator(s)

Name	Email	Phone	Office	Hours
Dr. Lisa Gieg	lmgieg@ucalgary.ca	403 210-7207	BI 228A	By Appointment

Section(s)

Lecture 01: MWF 14:00 - 14:50 - Online

Instructor	Email	Phone	Office	Hours
Dr Casey Hubert	chubert@ucalgary.ca	403 220-7794	EEEL 509E	By Appointment
Dr. Lisa Gieg	lmgieg@ucalgary.ca	403 210-7207	BI 228A	By Appointment

In Person Delivery Details:

The lab component of this course will be in person and attendance is mandatory. Three labs will be offered during the semester, and students are enrolled in either the morning (B01) or afternoon (B02) sections. Students enrolled in either the morning or afternoon sections will be each divided into 2 groups to maintain social distancing while conducting labs (10 students maximum per group; divided based on alphabetical order of surname) and will come in person to perform the labs on different dates. These student cohort groups (groups A, B, C, D) will be communicated at the start of the semester. The lab dates will be as follows:

Lab 1:

Sept. 14 (group A, morning section; group B, afternoon section)

Sept. 21 (group C, morning section; group D, afternoon section)

Lab 2:

Sept. 28, Part 1 (group A, morning section; group B, afternoon section)

Oct. 12, Part 2 (group A, morning section; group B, afternoon section)

Oct. 19, Part 1 (group C, morning section; group D, afternoon section)

Nov. 2, Part 2 (group C, morning section; group D, afternoon section)

Lab 3:

Nov. 16 (group A, morning section; group B, afternoon section)

Nov. 23 (group C, morning section; group D, afternoon section)

Information about safety protocols and other relevant information for in-person labs will be provided to the students prior to the start of the labs.

Students are expected to attend and perform labs in person. A case-by-case evaluation will be made should a student not be able to attend and perform a lab in person (e.g., due to illness).

Re-Entry Protocol for Labs and Classrooms:

To limit the spread of COVID-19 on campus, the University of Calgary has implemented safety measures to ensure the campus is a safe and welcoming space for students, faculty and staff. The most current safety information for campus can be found [here](#). **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.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

This course has a registrar scheduled, synchronous final exam. The writing time is 2 hours + 50% buffer time.

The lecture component of this course will be offered online via Zoom. The lectures will be primarily given synchronously at the scheduled class time. Lectures will be recorded and posted on D2L. Some lectures may be provided asynchronously, and students will be notified in advance if this should occur.

As with in person classes, students are expected to behave in a professional and respectful manner during online teaching and learning sessions, and when using course tools such as discussion boards. The chat function in an online program such as Zoom is reserved to ask questions in a respectful manner or to respond to questions posed in class. The chat function must not be used for posting disrespectful comments towards other students or the course instructor, nor be used for having side-conversations, including private chats. Please note that if the instructor downloads the chat history for the session, ALL chats (including private chats) will be included in the history. Please be sure to not type anything in the chat that you would not be comfortable with the instructional team seeing.

Course Site:

D2L: CMMB 443 L01-(Fall 2021)-Microbial Physiology

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 343; and Biochemistry 341 or 393.

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 1	20	October 5
Midterm 2	20	October 26
Labs	20	various due dates, will be available on D2L
*Final exam	40	

The final exam, scheduled by the Registrar, will focus on the second half of the course.

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 %	82 %	77%	73%	70 %	67 %	63%	60%	55 %	50 %

This course will have a final exam that will be scheduled by the Registrar. [The Final Examination Schedule](#) will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

The final exam will be administered using an on-line platform. Per section [G.5](#) of the online Academic Calendar, timed final exams administered using an on-line platform, such as D2L, will be available on the platform. Due to the scheduling of the final exams, the additional time will be added to **the end** of the registrar scheduled **synchronous** exam to support students. This way, your exam schedule accurately reflects the **start time** of the exam for any **synchronous** exams. E.g. If a **synchronous** exam is designed for 2 hours and the final exam is scheduled from 9-11am in your student centre, the additional time will be added to the **end** time of the **synchronous** exam. This means that if the exam has a 1 hour buffer time, a synchronous exam would start at 9

am and finish at 12pm.

The University of Calgary offers a [flexible grade option](#), Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: <https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade>

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, one possible arrangement is that the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course. This option is at the discretion of the coordinator and may not be a viable option based on the design of this course.

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

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

6. **Course Materials:**

Lecture content derives from primary literature, review articles, and an optional textbook. Any additional resources will be provided as links in D2L or in lecture notes.

Optional textbook: *The Physiology and Biochemistry of Prokaryotes*, 2012, Oxford University Press, White D, Drummond J, and Fuqua C.

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:

Unless otherwise indicated, no aids are allowed on examinations - these include lecture notes, or other written resources, accessing the internet for information (e.g., looking up information on Google or other search engines), accessing shared documents (such as Google docs, OneDrive, etc.), or using chat or messaging servers/apps (Discord, WhatsApp, Instagram, FaceTime, SnapChat, etc.). You are also prohibited from working with or contacting others during exams through the above or any other means. Violation of these rules is considered academic misconduct and penalties will be applied as described in University Calendar Section K.

Midterm exams will be scheduled to be completed synchronously online (e.g., through D2L) during regularly scheduled lab times (Tuesday Oct. 5 and Tuesday Oct. 26), and will be designed to be completed in 60 min. Students will be given an extra 50% time for the online exam (for a total of 90 min) to account for any potential technical or disruption issues.

The registrar scheduled timed final exam will also be synchronously offered online and designed to be completed in 120 min. Students will be given an extra 50% time for the online exam (for a total of 180 min) to account for any potential technical or disruption issues.

Accommodations will be given to SAS students.

Important note: It is the responsibility of students to ensure that they have adequate internet and computer access on the exam dates. Students will be required to begin their exams at the start of the scheduled class time on the exam date. If technical issues are encountered at the beginning of the exam or any time throughout (such as lost internet connection), the students must document the problem by taking a photo/video, or taking a screenshot, and must contact the instructor immediately so that the issue can be resolved and/or alternate arrangements can be made. Students claiming to have such difficulties at the start of the exam must contact the instructor with evidence of the technical issue within 15 min of the start time, else the student will not be able to write the exam and will receive a zero on the exam. Similarly, if a technical issue arises during the exam, the instructor must be notified immediately and evidence (as above) must be provided. In this case, students will be granted reentry to the 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.

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 Services:** 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 (svsa@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/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-Violence-Policy.pdf>)
- d. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](#) and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

[Student Handbook on Academic Integrity](#)
[Student Academic Misconduct Policy](#) and [Procedure](#)
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

e. Academic Accommodation Policy:

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the [Request for Academic Accommodation Form](#) and sending it to Lisa Gieg by email imgieg@ucalgary.ca preferably 10 business days before the due date of an assessment or scheduled absence.

- f. **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.

- g. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](#) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [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.

Tentative schedule of lecture topics, CMMB 443

1. Sept 8 CH (JR) Cell envelope I
2. Sept 10 CH (JR) Cell envelope II
3. Sept 13 CH (JR) Cell envelope III
4. Sept 15 CH (JR) Cell envelope IV
5. Sept 17 CH (JR) Cell division I
6. Sept 20 CH (JR) Cell division II
7. Sept 22 CH Microbial growth I
8. Sept 24 CH Microbial growth II
9. Sept 27 CH Microbial growth III
10. Sept 29 CH Microbial growth IV/Dormancy & sporulation I
11. Oct 1 CH Dormancy & sporulation II
12. Oct 4 CH Dormancy & sporulation III

Oct 5 Midterm 1 - cell envelope, cell division, growth

13. Oct 6 CH Dormancy & sporulation IV
14. Oct 8 CH Bioenergetics I

Oct 11 Thanksgiving, no lecture

15. Oct 13 CH Bioenergetics II
16. Oct 15 CH Bioenergetics III/Electron transport I
17. Oct 18 CH Electron transport II
18. Oct 20 CH Electron transport III
19. Oct 22 LG Solute transport
20. Oct 25 LG Protein secretion I

OCT 26 MIDTERM 2 - Dormancy & sporulation, bioenergetics, electron transport

21. Oct 27 LG Protein secretion II
22. Oct 29 LG Signal transduction/2-component regulatory system
23. Nov 1 LG Biofilms and quorum sensing I
24. Nov 3 LG Quorum sensing II
25. Nov 5 LG Motility and chemotaxis

Nov 8-12 Fall Break, no lectures

26. Nov 15 LG Adaptive responses I
27. Nov 17 LG Adaptive responses II
28. Nov 19 LG Inorganic metabolism: N and S metabolism
29. Nov 22 LG Inorganic metabolism: N and S metabolism
30. Nov 24 LG Central pathways I
31. Nov 26 LG Central pathways II
32. Nov 29 LG Fermentations I
33. Dec 1 LG Fermentations II
34. Dec 3 LG Fermentation and syntrophy
35. Dec 6 LG C1 metabolism: methanogenesis and methanotrophy
36. Dec 8 LG C1 metabolism and review

Course Outcomes:

- Describe cell envelope features and their functions for different kinds of microorganisms (Gram positive and Gram negative bacteria and archaea), including functions related to protein secretion and transport processes across membranes
- Describe in detail how microbial cells divide, sporulate, and move
- Explain and calculate microbial growth yields, ATP production yields, and maintenance energy
- Explain the central metabolic pathways in microbial cells and how these relate to energy production and cellular biosynthesis
- Describe pathways of fermentation and anaerobic electron-accepting processes including nitrate reduction, sulfate reduction, and methanogenesis
- Through the laboratory component, visualize various aspects of microbial physiology (such as sporulation, enzyme measurements, chemotaxis) through performing experiments related to topics covered in the lecture portion of the course
- Perform various laboratory techniques used to understand principles of microbial physiology (such as protein assays, microscopy, agar plate assays, spectrophotometric assays, mass balance calculations) and communicate scientific results in detailed laboratory reports

Electronically Approved - Sep 07 2021 06:19

Department Approval

Electronically Approved - Sep 07 2021 10:40

Associate Dean's Approval