



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

1. **Course:** CMMB 443, Microbial Physiology -- Fall 2018

Instructor Name	Email	Phone	Office	Hours
<i>L01:</i> (MWF 14:00 - 14:50 in SA 107)				
Casey Hubert	TBA	TBA	TBA	TBA
Lisa Gieg	lmgieg@ucalgary.ca	403-210-7207	BI-228A	by appointment
Sui-Lam Wong	slwong@ucalgary.ca	403-220-5721	BI 178A	Send E-mail to set up an appointment

Course Site:

D2L: CMMB 443 L01-(Fall 2018)-Microbial Physiology

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): Biochemistry 393 and Cellular, Molecular and Microbial Biology 343.

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 - In Class	19%	Sept. 28
Midterm Exam 2 - In Class	19%	Oct. 22
Lab Reports	24%	
* Final Exam	38%	

There will be a 3-hour final exam scheduled by the Registrar's Office.

***Final exam will be on material covered in Lectures 18-34.**

A Grade of 'F' will result if the student does not pass the overall lab OR the overall lecture components.

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	90 %	85 %	80 %	77%	73%	70 %	67 %	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/themselves 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:**

Recommended Textbook(s):

White, D.; Drummond, J.; Fuqua, C., *The Physiology and Biochemistry of Prokaryotes, 4th Ed. (2012)*: Oxford University Press .

7. **Examination Policy:**

No aids are allowed on tests or examinations.

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.

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.

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 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) 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 or phone [403 220-6979](tel: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. SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: 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.

Tentative schedule of lecture topics, CMMB 443

1. Sept 7 SLW Cell envelope I: Gram-ve bacterial outer membrane
2. Sept 10 SLW Cell envelope II: Gram-ve bacterial outer membrane & cytoplasmic membrane
3. Sept 12 SLW Cell envelope III: Bacterial cell wall: structural models and functions
4. Sept 14 SLW Cell envelope IV: Bacterial cell wall: biosynthesis and cytoskeletal proteins
5. Sept 17 SLW Sporulation I: sporulation and its regulation
6. Sept 19 SLW Sporulation II: spore structure and function
7. Sept 21 CH Sporulation III: spores and dispersal
8. Sept 24 CH Sporulation IV: spores and survival
9. Sept 26 CH Cell division

SEPT 28 MIDTERM 1, IN CLASS, LECTURES 1-8

10. Oct.1 CH Microbial growth I
11. Oct 3 CH Microbial growth II
12. Oct 5 CH Microbial growth III

Oct 8 Thanksgiving, no classes

13. Oct 10 CH Bioenergetics I
14. Oct 12 CH Bioenergetics II
15. Oct 15 CH Bioenergetics III
16. Oct 17 CH Electron transport I
17. Oct 19 CH Electron transport II

OCT 22 MIDTERM 2, IN CLASS, LECTURES 9-17

18. Oct 24 LG Solute transport I
19. Oct 26 LG Protein secretion
20. Oct 29 LG Signal transduction/2-component regulatory systems
21. Oct 31 LG Chemotaxis
22. Nov 2 LG Chemotaxis/Quorum sensing and biofilms
24. Nov 5 LG Quorum sensing and biofilms
24. Nov 7 LG Adaptive responses I
25. Nov 9 LG Adaptive responses II

Nov 12-16 Fall break, no lectures

26. Nov 19 LG Metabolism: glycolysis, ED pathway
27. Nov 21 LG Metabolism: biosynthetic role of TCA cycle

28. Nov 23	LG	Fermentations: cellulose, butanol-acetone, balances
29. Nov 26	LG	Fermentations: homo- and heterolactic, syntrophic associations
30. Nov 28	LG	Fermentations: conclusion
31. Nov 30	LG	C1 metabolism: Methanogenesis and methanotrophy
32. Dec 3	LG	Inorganic metabolism: N and S metabolism
33. Dec 5	LG	Inorganic metabolism: N and S metabolism
34. Dec 7	LG	Inorganic metabolism wrap-up/review

Tentative LAB schedule for CMMB 443, Fall 2018 (subject to change)

Lab Location: BI-132 Lab section 01: 9:00-12:00

Lab section 02: 12:00-15:00

There is no published lab manual to buy. Individual labs and associated material will be posted to D2L. THERE IS NO LAB IN THE FIRST WEEK OF CLASSES.

Sept. 18	Lab 1: Different methods for estimating protein concentration
Sept. 25	Lab 1: Different methods for estimating protein concentration (if needed)
<i>Oct. 2</i>	<i>No lab</i>
Oct. 9	Lab 2: Sporulation Part I
Oct. 16	Lab 2: Sporulation Part II
<i>Oct. 23</i>	<i>No lab</i>
Oct. 30	Lab 3: Catabolite repression of glycerokinase in <i>E. coli</i>
Nov. 7	Lab 4: Chemotaxis <u>or</u> Bacteriocins (TBD)
<i>Nov. 14</i>	<i>No lab (Fall break)</i>
Nov. 20	Lab 5: Sulfate reduction and mass balances

Department Approval:

Electronically Approved

Date: 2018-08-31 15:27

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