



COURSE OUTLINE

1. **Course:** CMMB 563, Microbial Diversity - Fall 2021

Lecture 01: MWF 11:00 - 11:50 in SA 235

Instructor	Email	Phone	Office	Hours
Dr Peter Dunfield	pdfunfie@ucalgary.ca	220-2469	BI 319D	TBA

In Person Delivery Details:

It is anticipated that most of the components of this course will be completed online via Zoom. However lecture times on Wednesdays will be IN PERSON unless otherwise announced. This is primarily to provide an opportunity for students to do their "Oral research presentations" (see Grading section) in person if they wish. Students may choose whether to deliver these talks in person or via Zoom.

If you are unable to attend any in-person events please contact the instructor at least two days beforehand. We will attempt to make other arrangements.

Yes, the first lecture on Sept 8 will be in person!

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:**

Some aspects of this course are being offered in real-time via scheduled meeting times. For those aspects 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.

Students should be available for the booked class times (MWF 1100-1150). It is the student's responsibility to ensure they have adequate computer and internet access. Classes on Mondays and Fridays will be online. Classes on Wednesdays will be in person, UNLESS OTHERWISE ANNOUNCED at least two days in advance.

Most class time slots will be used for synchronous events, including:

- A) Professor-led synchronous lectures. Some lectures will be held live via Zoom during scheduled class times. Live Zoom lectures will be recorded and posted to D2L after class
- B) Synchronous student presentations of recent research publications. Each student will present the results of recent research in the field (10-15 min) via Zoom or in person (whichever they prefer). Presentations will be followed by class discussion of the topic. These presentations need to be attended live.
- C) Interactive bioinformatics exercises. These presentations are synchronous and need to be attended live.
- D) Synchronous timed D2L quizzes.

Some lectures will be asynchronous. These lectures will be prerecorded and posted to D2L. These may be viewed at any time. Dates of any asynchronous lectures will be announced at least a week in advance.

Course Site:

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 or consent of the Department.

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
Research Grant Letter of Intent	10%	due Oct. 8
Online Quiz 1	10%	Oct. 1
Online Quiz 2	10%	Oct. 27
Online Quiz 3	10%	Nov. 29
Research proposal	20%	due Dec 3
Oral research paper presentations (including participation in discussions of other students' presentations)	20%	Various dates
Exercise 1 (Microbial genomics)	10%	TBA (Oct)
Exercise 2 (Microbial community analysis)	10%	TBA (Nov)

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 %	78%	74%	70 %	67 %	64%	61%	56 %	50 %

1) Quizzes will be conducted online via D2L. The quizzes are expected to require 30 min each to complete. Each quiz will be available for 50 minutes within a scheduled class time. The quizzes will become available on D2L at 1100 h MDT on the designated days. You must begin the quiz by 1110 h at the latest and the quiz will be due by 1150h MDT at the latest.

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

The quizzes are open book.

Time will be adjusted for SAS students if needed and accommodations for students will be done on a case-by-case basis. Students can request alternative timing by speaking to the instructor if the timing will not work for them (e.g., childcare or other reasons). The instructor can provide them with a different time or different assessment. Please communicate this at least a week in advance.

2) Oral presentations and discussions will be conducted during scheduled class time.

3) Details of the Research Grant (Letter of Intent and Proposal components) will be given in the first class. These may be worked on anytime until the due dates.

4) The two exercises are take-home assignments that will be provided 1 week before their due dates. These will require online bioinformatics analyses explained previously in class lectures.

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:**

Recommended support readings will be provided. These are usually review papers and will be available via the U of C library resources.

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:**

Online exams are open-book.

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.

The course includes written work for grading. Quality of writing will be affect the grade.

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 (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/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 mgieg@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 (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.

Lecture Topics will include:

(NOTE: Outline is tentative, some content and/or dates may change).

1 (Sept 8) Course outline, course business

2-3 (Sept 10, 13) The history of life; Geological evidence of the dawn of microbial life; Microfossils

4-5 (Sept 15, 17) The many trees of life

6-7 (Sept 20, 22) Microbial taxonomy

8 (Sept 24) Genotyping and strain delineation

9-10 (Sept 27, 29) Cultivation-independent analyses of diversity: Next-gen sequencing of 16S rRNA genes

Oct 1, Quiz 1

11 (Oct 4) Cultivation-independent quantitative analyses: FISH, qPCR

12-13 (Oct 6, 8) Cultivation-independent methods for linking community structure and function: SIP, Mar-FISH, etc.

Oct 8, Letters of intent for grant proposal due

Oct 11, Thanksgiving, no class

14-15 (Oct 13, 15) Metagenomics

16 (Oct 18) Example, anaerobic methane oxidation

17-19 (Oct 20, 22, 25) Microbial genomics

Oct 27, Quiz 2

20-21 (Oct 29, Nov 1) Analysis of microbial genomes using the IMG platform(In class bioinformatics exercise)

22-23 (Nov 3, 5) SAGs and MAGs (Single cell genomes and metagenome-assembled genomes)

Nov 7-13, Reading Week no classes

24 (Nov 15) Microbial Dark Matter

25-26 (Nov 17, 19) The uncultured majority

27 (Nov 22) Cultivation bias

28-29 (Nov 24, 26) New cultivation technologies

Nov 29, Quiz 3

30 (Dec 1) Microbial ecology

31-32 (Dec 3, 6) How many species of microbes are there?

33 (Dec 8) Wrap up

Course Outcomes:

- Contrast species concepts used for prokaryotes versus those used for multicellular organisms
- List the major taxonomic groups of prokaryotes and assess their relative importance in nature
- Design experiments to assess microbial community composition (who is there) and microbial function (who is doing what) in an environment
- Describe how evolutionary processes in prokaryotes differ from those in multicellular eukaryotes
- Apply online bioinformatics tools to describe microbial community composition and diversity
- Predict metabolic functions of a microbe or microbial community based on its genomic/metagenomic content
- Perform routine genomic analyses of a bacterium using the online Integrated Microbial Genomes (IMG) platform
- Compare different DNA sequencing technologies
- Interpret and summarize scientific literature in the field of microbial ecology.
- Demonstrate improved speaking/presentation skills

Electronically Approved - Sep 05 2021 15:54

Department Approval

Electronically Approved - Sep 07 2021 10:41

Associate Dean's Approval