



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

1. Course: CMMB 343 – MICROBIOLOGY

Lecture Section:	L01	MWF	15:00-15:50	ICT 102	WINTER 2019
LABS:		T	09:00/13:00	EEEL 303/369	
		R	09:00/13:00	EEEL 303/369	
Course Coordinator:	Dr. S.L. Wong				
Instructor(s):	Dr. P. Dunfield	BI 319D		220-2469	pfdunfie@ucalgary.ca
	Dr. S.L. Wong	BI 178A		220-5721	slwong@ucalgary.ca
Lab Coordinator:	W. Huddleston	EEEL 235B		220-7739	wrhuddle@ucalgary.ca

Desire 2 Learn site for this course is CMMB 343 - Winter 2019 - Microbiology

NOTE: Students must use their UofC account for all course correspondence.
Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

- 2. REQUISITE(S):** Chemistry 351 and one of Biology 231 or 243 or 311 or Medical Science 341.
See section 3.5.C in the Faculty of Science section of the online Calendar
(<http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html>)
- 3. Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Laboratory		40%	
First Midterm Exam	Feb. 13	15%	In-Class
Second Midterm Exam	Mar. 20	15%	In-Class
Final exam (cumulative)		30%	

(There will be a final exam scheduled by the Registrar's Office.)

Each piece of work (laboratory reports, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components 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 using the conversion scale provided below, bearing in mind that a maximum grade of D+ will result if the student does not write and pass (> 50%) the lab exams **and** the laboratory component of the course. Students must attend all laboratory classes; lab assignments will not be accepted from students who were absent without a valid excuse from the lab in which data were collected/distributed. Students who miss a substantial number of labs will not be permitted to write the laboratory exams. The final score will only be rounded if the difference is equal to (or less than) 0.3% (eg. 79.6 will not be considered 80; 79.7 will be considered 80). Not knowing, or forgetting, the examination dates is not an acceptable reason for requesting a deferred exam.

Letter Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Min. Percent Required	93	89	84	79	76	73	70	65	60	55	50

- 4. Missed Components of Term Work:** In the event that a student misses any course work due to illness, supporting documentation, such as a medical note or statutory declaration, will be required (see Section N.1; for more information regarding the use of statutory declaration/medical notes, see FAQ) Absences must be reported within 24 hours.
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 with these regulations. See also [Section E.3](#) of the University Calendar.
Attendance is required at all laboratory classes for the duration of the scheduled lab time, and you may only attend your registered lab section due to space, equipment and safety limitations. Students with unexcused absences will not be permitted to write the lab exams. Assignments will not be accepted if you have an unexcused absence from the lab in which data are collected.
- 5. Dates and times of class exercises held outside of class hours:** This course requires time in the laboratory outside of scheduled class time. If your class schedule conflicts with the open lab times, contact W Huddleston to make alternate arrangements. See the Laboratory information posted on D2L. The open labs will run throughout March and will be open throughout the day (Monday, Wednesday and Friday) to accommodate students.

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a conflict with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

6. **Course Materials:** TEXT: Required: Huddleston et al. 2019. CMMB 343 Lab Manual (posted on D2L)
Madigan and Martinko. Brock: Biology of Microorganisms.
15th Edition. Pearson Prentice-Hall.
A laboratory jacket (available at the bookstore) is **required** for CMMB 343
Optional: Leboffe and Pierce. A Photographic Atlas for the Microbiology Laboratory. 4th Edition.
Morton Publishing Company.
RESERVE READING ROOM: Books and reviews are listed on the last page.
7. **Examination Policy:** No electronic or written aids (e.g. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper. Students should also read the Calendar, [Section G](#), on Examinations.
8. In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.

9. 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.

10. Students are expected to be familiar with Section SC.4.1 of the University Calendar.

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 **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 reassessment of the work if, and only if, the student has sufficient academic grounds. 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.

11. 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.
- 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.

- 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. 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 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 Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: 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.

Department Approval _____ ORIGINAL APPROVED _____ Date _____
M343 co W19; 1/9/2019 10:59 AM

CMMB 343 - Lecture schedule Winter 2019

Date	Topic	Lecturer
Jan 11	Introduction (Microorganisms and Microbiology)	P. Dunfield
Jan 14	Microbial diversity	P. Dunfield
Jan 16	Microbial ecosystems	P. Dunfield
Jan 18	Adaptation to Extreme Environments	P. Dunfield
Jan 21	Microbial growth curves	P. Dunfield
Jan 23	Metabolism: Glycolysis and fermentation	P. Dunfield
Jan 25	Metabolism: Aerobic respiration and the electron transport chain	P. Dunfield
Jan 28	Metabolism: Redox and energetics	P. Dunfield
Jan 30	Metabolism: Anaerobic respiration and lithotrophy	P. Dunfield
Feb 1	The nitrogen cycle	P. Dunfield
Feb 4	The carbon cycle/Microbes and global climate change	P. Dunfield
Feb 6	Microbial Ecology	P. Dunfield
Feb 8	Cell structure	P. Dunfield
Feb 11	Cell structure	P. Dunfield
Feb 13	First Midterm Exam (in class, TBA) 50 minutes	P. Dunfield
Feb 15	Cell structure	P. Dunfield
Feb 17-24	Reading WEEK	
Feb 25	Microbial symbioses	P. Dunfield
Feb 27	Microbial symbioses	P. Dunfield
Mar 1	Bacterial genomes	S.-L. Wong
Mar 4	Genomes and gene organization	S.-L. Wong
Mar 6	Gene organization and transposon	S.-L. Wong
Mar 8	Transposon	S.-L. Wong
Mar 11	Plasmid and conjugation	S.-L. Wong
Mar 13	Conjugation	S.-L. Wong
Mar 15	Transformation	S.-L. Wong
Mar 18	Genetic engineering	S.-L. Wong
Mar 20	Second Midterm exam (in class, TBA) 50 minutes	Dunfield/Wong
Mar 22	Bacteriophages and viruses	S.-L. Wong
Mar 25	Bacteriophages and viruses	S.-L. Wong
Mar 27	Bacteriophages and viruses	S.-L. Wong
Mar 29	Protein secretion	S.-L. Wong
Apr 1	Protein secretion	S.-L. Wong
Apr 3	Bacterial communication	S.-L. Wong
Apr 5	Bacterial communication	S.-L. Wong
Apr 8	Immunology	S.-L. Wong
Apr 10	Immunology	S.-L. Wong
Apr 12	Immunology	S.-L. Wong

Final Exam (cumulative): April 15-27, 2019

MICROBIOLOGY RESERVED READING LIST

- Brock Biology of Microorganisms (14th edition) Madigan, Martinko, Stahl and Clark, 2015
Bacterial Metabolism (2nd ed.) - Gottschalk - QR 88 G67
Bacterial Energetics (The Bacteria Volume 12) - Krulwich - QR 41 G78
Biology of the Prokaryotes – Lengeler et al., (1999)
Early Life - Margulis - QH 325 M32
Microbiology: An Evolving Science, 3rd edition – Slonczewski and Foster- 2013
Physiology of the Bacterial Cell: A Molecular Approach - Neidhardt et al. - QR 84 N44
Variations in Autotrophic Life - Shively and Barton - QR 88 V37
Bergey's Manual of Systematic Bacteriology on ONE HOUR RESERVE - 7th Ed. - QR 81 S63
8th Ed. - QR 81 S63
9th Ed. vol.1 - QR 81 S633
vol.2 - QR 81 S633
- Molecular Genetics of Bacteria – Snyder and Champness – (4th Ed.), 2013
Molecular Evolution - Terzaghi et al., - QR 371 M68
Microbiology - An Introduction (4th Ed.) - Tortora et al., - QR 41.2 T67
Fundamental Bacterial Genetics – Nancie Trun and Janine Trempey, 2004 Edition
Basic Virology – Edward K. Wagner, Martinez J. Hewlett; 2nd Edition, 2003
Genes VIII – Benjamin Lewis, 2004 Edition

LEARNING OUTCOMES

At the end of the course you should be able to:

1. Describe and explain the differences between organisms in the three Domains (Eukarya, Archaea, and Bacteria). Further you should be able to explain which of the three are Prokaryotes. (Disciplinary knowledge, Science in society)
2. Explain and discuss the prominent role of Prokaryotes in:
 - a. Evolution
 - b. Nutrient cycling
 - c. Extreme environments.
3. Describe and discuss topics in the field of microbiology, such as bacteriology, virology, immunology, bacterial genetics, molecular biology, bacterial ecology, metabolism, host-microbe interactions. (Disciplinary knowledge, Science in society)
4. Work safely and effectively with bacteria and bacteriophage using sterile technique with bacteria. (Technical skills)
5. Communicate effectively in lab reports using appropriate scientific terms. (Communication)
6. Create a presentation on a specific microbe. (Communication)
7. Identify an unknown microbe using appropriate diagnostic tools. (Curiosity and Creativity, Critical thinking)
8. Work with another student to carry out experiments, collect and analyze the data and then write your lab reports independently. (Research, Collaboration, Self-directed learning, Communication, Career Skills)