



UNIVERSITY OF CALGARY

UNIVERSITY OF CALGARY DEPARTMENT OF BIOLOGICAL SCIENCES COURSE OUTLINE

1. Course: CMMB 563 - MICROBIAL DIVERSITY

Lecture Sections:	L01	MWF	11:00-11:50	SA 235	FALL 2015
Instructor(s):	Dr. P.F. Dunfield	BI 319D	220-2469	pfdunfie@ucalgary.ca	

The D2L name for this course is CMMB 563 L01 - (Fall 2015) - Microbial Diversity

Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

2. **PREREQUISITES:** CMMB 343 or consent of the Department
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 in “Academic Regulations, sections F.1 and F.2” of the online University Calendar (<http://www.ucalgary.ca/pubs/calendar/current/f-1.html> and <http://www.ucalgary.ca/pubs/calendar/current/f-2.html>) In determining the overall grade in the course the following weights will be used:

Midterm Exam	20% (Oct 23)
Research Grant Proposal/Term paper	10% for letter of intent (Oct 9) 15% for final paper (Nov 30)
Oral Presentations/Class Exercises	15%
<u>Final Exam</u>	<u>40%</u>
Total	100%

There will be a Final Exam Scheduled by the Registrar’s Office

Each piece of work (grant proposal, term paper, oral presentation, class exercise, 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

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: <http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html>. It is the student's responsibility to familiarize himself/herself with these regulations. See also <http://www.ucalgary.ca/pubs/calendar/current/e-3.html>.

5. Dates and times of class exercises held outside of class hours: N/A

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

Department Approval: _____ **ORIGINAL SIGNED** _____ Date _____

6. **EXAMINATION POLICY:** Students should also read the Calendar, Section G, on Examinations: <http://www.ucalgary.ca/pubs/calendar/current/g.html>.
7. In this course, the quality of the student's writing in reports will be a factor in the evaluation of those reports. See also <http://www.ucalgary.ca/pubs/calendar/current/e-2.html>."
8. **STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS.** See also <http://www.ucalgary.ca/pubs/calendar/current/e-5.html>.
9. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**
- (a) **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 K. Student Misconduct (<http://www.ucalgary.ca/pubs/calendar/current/k.html>) to inform yourself of definitions, processes and penalties
- (b) **ASSEMBLY POINTS in case of emergency during class time.** Be sure to **FAMILIARIZE YOURSELF** with the information at <http://www.ucalgary.ca/emergencyplan/assemblypoints>.
- (c) **Student Accommodations:** 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* http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.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, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email addy@ucalgary.ca or phone 403 220-3140.
- (d) **SAFEWALK:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call **220-5333** for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **FREEDOM OF INFORMATION AND PRIVACY:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, **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 also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: suypaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **INTERNET and ELECTRONIC COMMUNICATION DEVICE Information.** You can assume that in all classes that you attend, **your cell phone should be turned off.** Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

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DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE
CMMB 563
MICROBIAL DIVERSITY

TERM: FALL 2015

PREREQUISITIE(S): CMMB 343 or consent of the Department

COORDINATOR &
INSTRUCTOR: Dr. P.F. Dunfield BI 319D 220-2469 pdfunfie@ucalgary.ca

TEXTS: No Text Required. Most material taught from research articles and reviews.

MARK DISTRIBUTION:

A. Composition of Final Grade

Midterm Exam	20% (Oct 23)
Research Grant Proposal/Term paper	10% for letter of intent (Oct 9) 15% for final paper (Nov 30)
Oral Presentations/Class Exercises	15%
<u>Final Exam</u>	<u>40%</u>
Total	100%

B. Final Exam

There will be a Cumulative Final Examination scheduled by the Registrar's Office.

C. Components of course for which a passing grade is essential

Nil

Mark breakdown	A+ $\geq 90\%$	A $\geq 85\%$	A- $\geq 80\%$
	B+ $\geq 77\%$	B $\geq 73\%$	B- $\geq 70\%$
	C+ $\geq 66\%$	C $\geq 63\%$	C- $\geq 60\%$
	D+ $\geq 55\%$	D $\geq 50\%$	F $< 50\%$

An introduction to the diversity, systematics, and evolution of bacteria and archaea. Includes detailed descriptions of methods used to study them in nature.

Lectures. Tentative schedule.

1	(Sept 9)	Course outline
2	(Sept 11)	The history of Earth. Microfossils
3,4	(Sept 14,16)	Species concepts. The history of microbial taxonomy.
5	(Sept 18)	The great plate count anomaly. The need for culture-independent methods
6	(Sept 21)	The Tree of Life. Phylogenetics based on conserved genes.
7,8	(Sept 23, 25)	Cultivation-independent analyses: DGGE, TRFLP, clone libraries
9	(Sept 28)	Cultivation-independent analyses: Next generation sequencing
10	(Sept 30)	<u>In class bioinformatics exercise:</u> Analysis of bacterial communities
11	(Oct 2)	How many species of microbes are there?
12	(Oct 5)	Statistical community analyses and diversity indices
13,14	(Oct 7, 9)	Cultivation-independent quantitative analyses: FISH, qPCR

Oct 9 Letters of intent for grant proposal due

Oct 12 Thanksgiving, no class

15	(Oct 14)	Methods for linking community structure and function: Analysis of functional genes
16,17	(Oct 16, 19)	Methods for linking community structure and function: Isotope based methods: SIP, Mar-FISH, NanoSIMS
18	(Oct 21)	Example, anaerobic methane oxidation

19 Friday Oct 23

MIDTERM EXAM (in class)

20,21	(Oct 26, 28)	Why are most bacteria uncultured?
22,23	(Oct 30, Nov 2)	New cultivation technologies
24,25	(Nov 4, 6)	Microbial genomics
26	(Nov 9)	<u>In class bioinformatics exercise:</u> Microbial genomics tools

Nov 11 Remembrance Day no class

Nov 13 Reading Day, no class

27	(Nov 16)	Metagenomics
28	(Nov 18)	Lateral gene transfer and the tree of life. Core-genomes and Pan-genomes
29	(Nov 20)	Single cell genomics
30	(Nov 23)	The Last Universal Common Ancestor (LUCA)
31	(Nov 25)	<u>In class bioinformatics exercise-</u> Analysis of bacterial communities in student-collected samples
32,33	(Nov 27, 30)	Biogeography of microbes: Is everything everywhere?

Nov 30 Term papers due

34	(Dec 2)	Biogeography of microbes: Species-area patterns
35	(Dec 4)	Reconceiving the species concept for microbes
36	(Dec 7)	Review, Q and A (Optional)

Final Exam to be scheduled by Registrar