UNIVERSITY OF CALGARY
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. Course: CMMB 563 - MICROBIAL DIVERSITY

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

Lecture Sections:	L01	MWF	11:00-11:50	SA 235	FALL 2017

Course Coordinator/ Instructor(s):	**Dr. P.F. Dunfield**	**BI 319D**	**220-2469**	**pfdunfie@ucalgary.ca**
	Dr. Tobin Verbeke	**BI222**	**220-3575**	**tobinjames.verbeke@ucalgary.ca**

The D2L name for this course is CMMB 563 L01 - (Fall 2017) - 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)	**IN CLASS**
Research Grant Proposal/Term paper	5% for letter of intent (Oct 6)	
	20% for final paper (Dec 1)	
Oral Presentations	15%	
Class Exercises	15%	
Final Exam	25%	
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

Final Grade Scale :

A+: 92 or higher
A : 87 and under 92
A- : 82 and under 87
B+: 78 and under 82
B : 74 and under 78
B- : 70 and under 74
C+: 65 and under 70
C : 60 and under 65
C- : 55 and under 60
D+: 53 and under 55
D : 50 and under 53
F : <50

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.

6. **Course Materials:** No Text Required. Most material taught from research articles and reviews.

7. **EXAMINATION POLICY**: The use of camera devices, MP3 Players and headphones, wireless earbuds or wireless access devices such as smart phones, smart watches, iOS and/or Android, etc., during the examination will not be allowed. Students should also read the Calendar, Section G, on Examinations: **http://www.ucalgary.ca/pubs/calendar/current/g.html**.

8. 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**."

9. **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**.

10. **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: suvpaca@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.

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

CMMB 563 Fall 2017

Lectures. Tentative schedule (Some content and/or dates may change).

1	(Sept 11)	Course outline
2-3	(Sept 13, 15)	The history of Earth; Geological evidence of the dawn of microbial life; Microfossils
4-5	(Sept 18, 20)	The Many Trees of Life
6-7	(Sept 22, 25)	Microbial taxonomy
8	(Sept 27)	Molecular phylogenetics
9-10	(Sept 29, Oct 2)	Cultivation-independent analyses of diversity: Next-gen sequencing of 16S rRNA genes
11	(Oct 4)	Microbial Dark Matter
12	(Oct 6)	Cultivation-independent quantitative analyses: FISH

Oct 6 Letters of intent for grant proposal due

Oct 9 Thanksgiving, no class

13	(Oct 11)	Cultivation-independent quantitative analyses: qPCR
14-16	(Oct 13, 16, 18)	Cultivation-independent methods for linking community structure and function: SIP, Mar-FISH, NanoSIMS
17	(Oct 20)	Example, anaerobic methane oxidation

Monday Oct 23 **MIDTERM EXAM (in class)**

18-19	(Oct 25, 27)	Microbial genomics; Lateral gene transfer; Core-genomes and Pan-genomes
20	(Oct 30)	**In class bioinformatics exercise:** Analysis of microbial genomes using the IMG platform
21-22	(Nov 1, 3)	Metagenomics
23-24	(Nov 6, 8)	SAGs and MAGs (Single cell genomes and metagenome-assembled genomes)

Nov 10 Remembrance Day no class
Nov 13 Reading Day no class

25	(Nov 15)	Why are most bacteria uncultured?
26-27	(Nov 17, 20)	New cultivation technologies
28	(Nov 22)	**In class bioinformatics exercise-**Introduction to R
29-30	(Nov 24, 27)	What does diversity mean? Alpha and beta diversity metrics
31-32	(Nov 29, Dec 1)	**In class bioinformatics exercise-** Analysis of bacterial communities in student-collected samples

Dec 1 Term papers due

33-34	(Dec 4, 6)	How many species of microbes are there?
35	(Dec 8)	Review, Q and A (Optional)

Final Exam to be scheduled by Registrar