



# UNIVERSITY OF CALGARY

## DEPARTMENT OF BIOLOGICAL SCIENCES COURSE OUTLINE

### 1. Course: **CMMB 549 – MICROBIAL GENETICS**

Lecture Section(s)	L01	MWF	9:00	MS 205	Fall 2015
<b>Instructor(s):</b>	Dr. M.F. Hynes Dr. J.J. Harrison		BI 429C BI 429B	220-8473 220-7627	hynes@ucalgary.ca jjharris@ucalgary.ca

Course website or Desire 2 Learn (D2L) course name. CMMB 549 on D2L

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

### 2. Prerequisites: **CMMB 411**

See section 3.5.C in the Faculty of Science section of the online Calendar  
[www.ucalgary.ca/pubs/calendar/current/sc-3-5.html](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:

<b>Term Paper</b>	<b>15%</b>	<b>(DUE November 16th, 2015)</b>
<b>Assignment</b>	<b>10%</b>	<b>(DUE December 3rd, 2015)</b>
<b>Oral Presentation</b>	<b>5%</b>	
<b>Midterm Exam 1</b>	<b>15%</b>	<b>(October 5th 2015, in class)</b>
<b>Midterm Exam 2</b>	<b>15%</b>	<b>(November 2nd 2015, in class)</b>
<b>Final Exam</b>	<b>40%</b>	

**There will be a cumulative, 3 hour final exam scheduled by the Registrar's office**

Each piece of work (assignment, term paper, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's 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 scheme on this outline.

### 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 with these regulations. See also Section E.6 of the University Calendar

### 5. Scheduled out-of-class activities: **NONE**

**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: Molecular Genetics of Bacteria, by Snyder, L, Peters, JE, Henkin T & Champness,W. ASM Press, Washington, D.C., 2013, 4th Edition

### 7. Examination Policy: Exams will be written without any electronic aids, or notes or books. Non-programmable calculators may be used to answer quantitative questions if required. Clear information on permitted use of calculators will be indicated on the exam paper if any such questions are a feature of the exam. Some questions for the midterms and final exam **MAY** be provided to students in advance of the exam. Students will be expected to answer those questions without notes or other aids during the exam period. There will always be some choice on exams, and if some questions are provided ahead of time, these questions will not be mandatory (i.e. students can opt to answer alternate questions not provided in advance)

Students should also read the Calendar, Section G, on Examinations.

### 8. [Writing across the curriculum statement: In this course, the quality of the student's writing in **all assignments and exams** will be a factor in the evaluation of those course components. See also Section E.2 of the University Calendar.

## 9. ETHICS IN THE BIOLOGICAL SCIENCES

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. 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 Section K. Student Misconduct 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 on assembly points.
- (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](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](mailto: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](mailto:suvpaca@ucalgary.ca)  
SU Faculty Rep. Phone: 403 220-3913 Email: [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca) and [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca);  
Student Ombuds Office: 403 220-6420 Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca); <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. 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.
- (h) At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses ([www.ucalgary.ca/usri](http://www.ucalgary.ca/usri)). Your responses make a difference - please participate in USRI Surveys.

Department Approval ORIGINAL SIGNED \_\_\_\_\_ Date \_\_\_\_\_

UNIVERSITY OF CALGARY  
DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE  
**CMMB 549**  
MICROBIAL GENETICS

TERM: Fall 2015 SECTION NO: 01

PREREQUISITE(S): CMMB 411

A student may not register in a course unless he or she has a grade of at least C- in each prerequisite course.

COURSE COORDINATOR: Dr. M.F. Hynes

LECTURERS: Dr. M.F. Hynes BI 429C 220-8473 hynes@ucalgary.ca  
Dr. J.J. Harrison BI 429B 220-7627 jjharris@ucalgary.ca

LECTURE: L01 MWF 9:00-9:50 MS 205

TEXT: Required: Molecular Genetics of Bacteria, by Snyder, L, Peters, JE, Henkin T & Champness, W. ASM Press, Washington, D.C., 2013, 4th Edition

MARK DISTRIBUTION:

A. Composition of Final Grade

<b>Term Paper</b>	<b>15%</b>	<b>(Due November 16, 2015)</b>
<b>Assignment</b>	<b>10%</b>	<b>(Due December 1, 2015)</b>
<b>Oral Presentation</b>	<b>5%</b>	
<b>Midterm Exam 1</b>	<b>15%</b>	<b>(October 5, 2015, in class)</b>
<b>Midterm Exam 2</b>	<b>15%</b>	<b>(November 7, 2015, in class)</b>
<b>Final Exam</b>	<b>40%</b>	

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 required: NIL

## CMMB 549 - Fall 2015

The aim of this course is to provide a detailed exposure to concepts in microbial genetics (almost exclusively bacterial genetics) as well as an introduction to modern Bacterial and Archaeal genomics. The first part of the course (up to about lecture 20) will make use of the textbook, as well as occasional review articles and articles from the primary literature. The last part of the course will be taught using current research papers and reviews.

Students will be required to submit one term paper, due November 16th. This will take the form of a critical minireview article or grant proposal. Details on the scope of this assignment, and suggested topics, will be posted on Desire2Learn. Students will also be required to make a brief (maximum 12-15 minutes (enrolment dependent), plus questions) presentation based on a recent research article (their choice, but some suggestions will be provided). The lecture schedule may be altered slightly to accommodate these, depending on enrolment.

Finally, students will be required to complete one assignment, due December 3<sup>rd</sup>. The assignment will focus on genomics literacy. Details of the assignment will be posted on Desire 2 Learn by November 4<sup>th</sup>. The assignment will require the use of web-based bioinformatics tools. A topic will be chosen to highlight course material and may integrate with current community-driven genome annotation efforts. The aim will be to apply computational approaches to investigate the structure of bacterial genomes and predict gene function and regulation.

The following grade conversion scheme will be used to determine the final letter grade:

A+	≥ 90%
A	≥ 85%
A-	≥ 80%
B+	≥ 77%
B	≥ 73%
B-	≥ 70%
C+	≥ 66%
C	≥ 63%
C-	≥ 60%
D+	≥ 55%
D	≥ 50%
F	< 50%

**CMMB 549, Fall 2015 - Lecture Schedule (tentative! precise topics and order may change)**

Textbook: Snyder et al. , Molecular Genetics of Bacteria, ASM Press, Washington, D. C., 4<sup>rd</sup> edition, 2013.

<u>Lecture</u>	<u>Date</u>	<u>Lecturer</u>	<u>Topic</u>	<u>Location/Chapter</u>
1	Sept 09	MH	Introduction to course and topics, basic concepts	Ch 1
2	Sept 11	MH	Introduction to bacterial genetics	Ch 1,2,3
3	Sept 14	MH	Introduction to bacterial genetics	Ch 1,2,3
4	Sept 16	MH	Review of recombination	Ch 10
5	Sept 18	MH	Mutations and mutagenesis	Ch 11
6	Sept 21	MH	Plasmids	Ch 4
7	Sept 23	MH	Plasmids	Ch 4
8	Sept 25	MH	Plasmids	Ch 4
9	Sept 28	MH	Plasmids	Ch 4
10	Sept 30	MH	Conjugation	Ch 4
11	Oct 02	MH	Conjugation	Ch 5
	Oct 05	MH	<b>Midterm Exam 1 (IN CLASS)</b>	Ch 5
12	Oct 07	MH	Review Midterm, Conjugation	
13	Oct 09	MH	Transformation	Ch 6
	Oct 12		<b>THANKSGIVING</b>	
14	Oct 14	MH	Transformation	Ch 6
15	Oct 16	MH	Transduction	Ch 7,8
16	Oct 19	MH	Transduction	Ch 7,8
17	Oct 21	MH	GTAs	
18	Oct 23	MH	CRISPRs and antiphage mechanisms	
19	Oct 26	MH	Transposition and transposon mutagenesis	Ch 9
20	Oct 28	MH	Transposition and transposon mutagenesis	Ch 9
21	Oct 30	MH	Transposition and transposon mutagenesis	Ch 9
	Nov 2	MH	<b>Midterm Exam 2 (IN CLASS)</b>	
22	Nov 4	JH	Bacterial Genomics: Massively parallel sequencing technology	
23	Nov 6	JH	Bacterial Genomics: Massively parallel sequencing technology	
24	Nov 9	JH	Bacterial Genomics: Library construction, assemblers and annotation	
Nov 11 and 13th			<b>READING DAYS, NO CLASSES</b>	
25	Nov 16	JH	Laptop bioinformatics for molecular (micro)biologists – Part I	
26	Nov 18	JH	Bacterial Gene Expression: RNA-sequencing, ChiP-seq	
27	Nov 20	JH	Microbial diversity, metagenomics and 16S amplicon sequencing	
28	Nov 23	JH	Laptop bioinformatics for molecular (micro)biologists – Part II	
29	Nov 25	MH/JH	Student presentations	
30	Nov 27	MH/JH	Student presentations	
31	Nov 30	MH/JH	Student presentations	
32	Dec 02	MH/JH	Student presentations	
33	Dec 04	MH/JH	Student presentations	
34	Dec 07	JH	Student presentations and/or Review	