



# UNIVERSITY OF CALGARY

## DEPARTMENT OF BIOLOGICAL SCIENCES COURSE OUTLINE

### 1. **Course:** **CMMB 637 – ADVANCED TOPICS IN MOLECULAR MICROBIOLOGY**

Lecture Section(s)	L01	MWF	11:00	SS 008	Fall 2015
<b>Instructor(s):</b>	Dr. M.F Hynes		BI 429C	220-8473	hynes@ucalgary.ca
	Dr. J.J. Harrison		BI 429B	220-7627	jjharris@ucalgary.ca
	Dr. C.R.J. Hubert		EEEL 509E	220-7794	chubert@ucalgary.ca

Course website or Desire 2 Learn (D2L) course name, D2L CMMB 637

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

2. **Prerequisites:** Permission of department; graduate students and senior undergrads only. 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>Major term paper (grant) (Hynes, Due Nov. 2, 2015)</b>	<b>25 %</b>
<b>Major term paper (Harrison, Due Dec. 1, 2015)</b>	<b>25 %</b>
<b>In class presentations, participation, assignments and/or quizzes</b>	<b>50 %</b>

\* There will NOT be a final exam scheduled by the Registrar's office

Each piece of work (assignment, laboratory report, 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 provided on this course 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:** Dates and times of approved class activities held outside of class hours.  
**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:** References and links will be provided in class and on D2L. Published material available on line through U of C library.
7. **Examination Policy:** For quizzes and other in-class assignments, students will not be allowed any notes, books or electronic aids, except non-programmable calculators, if required. 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 on quizzes, tests, term papers and other written assignments will be a major factor in the evaluation of those reports. 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 (FOIPPA). 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

**(f)** <http://www.ucalgary.ca/secretariat/privacy>.

**(g) 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>

**(h) 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.

**(i)** 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 \_\_\_\_\_

Department Approval  
for NO Final Exam: \_\_\_\_\_ **ORIGINAL SIGNED** \_\_\_\_\_ Date: \_\_\_\_\_  
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UNIVERSITY OF CALGARY  
DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE

TERM: Fall 2015 SECTION NO.: 01

PREREQUISITE: Permission of Department; Graduate students and senior undergrads

COURSE COORDINATOR: Dr. Michael F. Hynes

Instructor(s):  
Dr. **Michael F. Hynes** BI 429C 220-8473 hynes@ucalgary.ca  
Dr. Joe Harrison BI 429B 220-7627 jjharris@ucalgary.ca  
Dr. Casey R. Hubert EEEL 509E 220-7794 chubert@ucalgary.ca

LECTURES: MWF 11:00 AM SS 008

LABORATORIES/TUTORIALS: Students have the opportunity to use techniques learned in class in the instructors' laboratories if they so desire (optional, by appointment)

TEXTS:  
A. Required NONE  
B. Other Supplies NONE

MARK DISTRIBUTION: A. Composition of Final Grade

Major term paper, - grant (Dr. Hynes)	Due November 2, 2015	25 %
Major paper - annotation/bioinformatics (Dr. Harrison)	Due December 1, 2015	25 %
In class presentations, assignments, participation and/or quizzes/tests		50 %

Students will submit a major paper worth 25% of their final mark each of the two major instructors. The rest of the final grade will be based on various in-class assessments, including presentations and tests or quizzes, or short take home assignments, **as well as on in class participation**. The breakdown for each instructor will be explained in his first lecture and posted on Desire 2 Learn Dr. Hynes will allocate 20 of these marks, Dr. Harrison and Dr. Hubert 15 each.

Exact details on each assignment, as well as due dates, will be introduced by each instructor and posted to D2L. Each course component will be assigned a % grade and the total % grade for the course, calculated using the weightings above will be converted to a letter grade using the scheme in this course outline.

B. Final Examinations

There will be no final examination.

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

Nil.

**CALENDAR DESCRIPTION:**

Techniques, and discussion of recent literature in molecular microbiology. Topics covered will vary from year to year, but could include bioinformatics, genomics, mutagenesis, advanced microscopy techniques, proteomics, vectors and cloning techniques, gene expression, and over-expression of proteins, as they relate to the study of prokaryotic systems. Course content will be tailored to the interests of the graduate students enrolled in the class in a given year. Students who are interested in hands on experience with techniques described in the course will be able to set up times to carry out such experiments if desired.

**Tentative Lecture topics and locations – some details yet to be finalized. The order and content of lectures may change from what is suggested here. There is no textbook and material will be taught using recent and classic papers in the field.**

**Section I Dr. Hynes Room SS 008 at 11:00 AM MWF**

Sept 9,11 Gene cloning – history and state of the art  
Sept 14,16 Broad host range vectors and applications  
Sept 18, 21, 23 Gene fusions and applications; expression vectors  
Sept 25, 28 Transposon Mutagenesis, Mutagenesis screens, STM, TnSeq  
Sept 30, Oct 2, 5,7 Student presentations, *in class test* October 7th.  
Oct 26, 28, 30 Sessions on career development, jobs, interviews, CVs, what you can do with a graduate degree; editorial and grant processes.

**OCTOBER 1 Special workshop on MiSeq and Metagenomics sponsored by Illumina.**

Highly recommended for students interested in this area; attendance not mandatory. 9 am - noon on Thursday October 1, with free lunch and an open consultation period in the afternoon where attendees can get expert advice on their own data. Contact Dr. Harrison for more information.

**Section II Dr. Harrison Genomics, Bioinformatics and Transcriptomics**

October 9 Massively parallel DNA-sequencing technologies – An introduction  
October 14 Massively parallel DNA-sequencing technologies – An introduction  
October 16 Assemblers and variant detection  
Student Presentation – Pathogen Evolution  
October 19, 21, 23 Genomics literacy: Laptop bioinformatics workshops (BYOL)  
Term Assignments  
Genomics for Canadian Wildlife Conservation - *Erysipelothrix rhusiopathiae* Annotation Project  
Gene Ontology – *Pseudomonas* Community Annotation Project  
November 2,4 Microbial diversity - 16S amplicon sequencing  
Student Presentation – Human or Earth Microbiome Projects  
November 6,9 Microbial diversity – Metagenomics  
Student Presentation – Human or Earth Microbiome Projects  
November 16,18 Prokaryotic transcriptomics – RNA-sequencing  
Student Presentation – Transcriptomics  
November 20 Probing regulatory networks – Transposon-sequencing  
Student Presentation – ChIP-seq and/or RIP-seq  
November 23 TBA or additional student presentations.

**Section III Dr. Hubert (November 25, 27, 30, December 2,4, 7)**

**Case studies and techniques in molecular microbial ecology,. Test in last class.**

**Mark conversion scheme:**

**A+  $\geq 92\%$  A  $\geq 85\%$  A-  $\geq 80\%$  B+  $\geq 77\%$  B  $\geq 74\%$  B-  $\geq 70\%$  F  $< 70\%$   
(for Undergrads, if any, C+  $\geq 66$ , C  $\geq 63$ , C-  $\geq 60$ , D  $\geq 50$ , F  $\geq 50$ )**