

MICR302
Molecular Microbiology
CRN 22240
Winter 2017

Class time/location: Mon, Thurs, 11:30 – 12:50, ECS 125

Instructor: Dr. Doug Briant

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Instructor: Dr. Chris Nelson

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Textbook: Since the course material is as up-to-date as possible, there is no course textbook. Much of the source material (papers) will be provided on-line in the CourseSpaces site, and will serve as an additional resource. You will need your UVic NetLink ID and password to access this information.

It is, however, recommended that you have easy access to a standard microbiology textbook.

Lecture Notes: Notes will generally be made available on the CourseSpaces site prior to lectures.

Notes are arranged by topic, and a single topic may span multiple lectures. **Lecture notes are not complete**, and students will be responsible for all materials covered in the lectures.

MICR302 course learning objectives:

- In this course, you will gain the tools to recognize relationships between DNA, RNA and protein. Applying these tools, you will be able to evaluate the specific contributions of different molecular mechanisms microbes utilize to respond to environmental changes.
- You will have the ability to compare microbial communication and signalling strategies.
- You will understand the importance of the microbiome in maintaining human health.
- You will be able to discuss the pertinent features of budding yeast lifecycle and identify biological processes conserved between yeast and man.
- You will be able to explain why a great deal of basic medical research is conducted in yeast.
- You will understand how systems and synthetic biology are fundamentally different to classic molecular approaches, and how they are revolutionizing biological sciences.

By the end of the course, it is expected that each student will be capable of examining a biological response and hypothesizing which underlying genetic and/or biochemical process defines the response. Students will then be able to design experiments, including all relevant controls, to test their proposed hypothesis.

Tentative Class Schedule:

topic	comments
1 Introduction	
2 Microbiome and metabolome	how does the microbiome/metabolome impact human health?
3 DNA/RNA	
a) gene structure and expression	bacterial gene architecture, σ factors, comparison between prokaryotic and eukaryotic systems
a) RNA structure and regulation	mRNA stability, riboswitches
b) CRISPR	RNA silencing in prokaryotes, gene editing
4 Protein	
a) two component systems	introduction to prokaryotic protein signalling
b) translational surveillance	identification and destruction of aberrant proteins in prokaryotes
5 Environment	
a) heat shock	role of sigma factors, chaperones and proteases
b) stationary phase	rpoS, σ^S
c) stringent response	response to stringent conditions, including σ and ppGpp
d) sporulation	role of phosphorylation and sigma factors
6 Bacterial Signalling	
a) environmental and community	chemotaxis and two component systems, quorum sensing and bacterial communication, importance of biofilms
7 Lifecycle of yeast	
	-mating types and mating type switching and signal transduction pathways -stress response and differentiation -comparison of budding yeast to pathogenic fungi
8 Yeast molecular genetic methods	
	- using yeast as a model eukaryote to delineate fundamental biological processes - classical genetic screens, plasmids, mutagenesis and epistasis analysis
9 Systems Biology – Genetics, chemical-genetics, proteomics	
	-genetic and genomic techniques to decipher gene function -synthetic genetic array technology, and systematic proteomics approaches -drug screening in yeast
10 Synthetic Biology	
	-How to build a designer genome: the convergence of technology, biology and engineering and the design of new genomes and their utility in science and industry

Important dates and evaluation:

EVALUATION	Date
25% midterm 1 DJB material	<i>in class</i> Thursday, January 26
25% midterm 2 DJB material	<i>in class</i> Thursday, February 23
15% midterm CJN	<i>In class</i> Monday March, 13
10% assignment	<i>Due last day of class</i> Thursday March 30
25 % final exam	<i>2hrs, set by registrar</i>

** no formal mark is awarded for mini assignments. Assignments will be discussed in lecture and electronically submitted for participation marks. Material may appear on exams.

- Students are responsible for ensuring that they are properly registered in the course.
- Students are expected to have met all pre/co-requisites for the course (see above).

Grading:

A⁺	90 -100	B⁺	77 - 79	C⁺	65 - 69	F	< 50
A	85 - 89	B	73 - 76	C	60 - 64	N **	< 50
A⁻	80 - 84	B⁻	70 - 72	D	50 - 59		

**** N grades**

Students who have completed the following elements will be considered to have completed the course and will be assigned a final grade:

- ***All three midterms and the final exam must be completed to complete the course***

Failure to complete one or more of these elements will result in a grade of “N” regardless of the cumulative percentage on other elements of the course. An N is a failing grade, and it factors into a student’s GPA as 0. The maximum percentage that can accompany an N on a student’s transcript is 49

DEPARTMENT INFORMATION AND POLICIES

1. The Department of Biochemistry and Microbiology upholds and enforces the University's policies on academic integrity. These policies are described in the current University Calendar. All students are advised to read this section.
2. Cell phones, computers, and other electronic devices must be turned off at all times unless being used for a purpose relevant to the class. Students having a cell phone, tablet, or computer on their person during an exam will be assumed to have it for the purpose of cheating.
3. Any recordings of lectures may only be performed with written permission of the instructor, and are for personal use only. The instructor retains copyright to such recordings and all lecture materials provided for the class (electronic and otherwise); these materials must not be shared or reposted on the Internet.
4. Course materials, such as notes, problem sheets, quizzes, examinations, example sheets, or review sheets, may not be redistributed without the explicit written permission of the instructor.
5. Students are expected to be present for the midterm and final exams. Instructors may grant deferrals for midterm examinations for illness, accident, or family affliction, and students must provide appropriate documentation 48 hours after the midterm exam. The deferred exam must be written within five business days of the original exam. The Department of Biochemistry and Microbiology considers it a breach of academic integrity for a student taking a deferred examination to discuss the exam with classmates. Similarly, students who reveal the contents of an examination to students taking a deferred examination are considered to be in violation of the University of Victoria policy on academic integrity (see current University Calendar). Deferral of a final exam must be requested with an Academic Concession form and submitted directly to Undergraduate Records. Deferred final exams for fall term courses will be arranged by the instructor. Deferred final exams for spring term courses will be arranged through Undergraduate Records and must be written before the end of the summer term as stipulated in the University Calendar.
6. Multiple choice scan sheets for machine scoring (bubble sheets) are considered the authentic exam answer paper and will be retained by the department for 1 year.
7. Professors may refuse to review/remark exams not written in indelible ink. In addition, requests for review/remark of a midterm exam must be made within one week of the exam being returned. Students are expected to promptly pick up midterm exams after marking has been completed, either in class or from the instructor.
8. Examination papers that have pages removed, or are mutilated will not be marked.
9. I reserve the right to use plagiarism detection software or other platforms to assess the integrity of student work."

Resource Centre for Students with a Disability

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, approach the Resource Centre for Students with a Disability (RCSD) as soon as possible (<http://rcsd.uvic.ca/>.) in order to assess your specific needs

Course Experience Survey (CES)

I value your feedback on this course. Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete an anonymous survey regarding your learning experience (CES). The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. The survey is accessed via MyPage and can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time but please be thinking about this important activity during the course.