



# UNIVERSITY OF CALGARY

## DEPARTMENT OF BIOLOGICAL SCIENCES COURSE OUTLINE

### 1. **Course:** **CMMB 411 - Molecular Genetics**

Lecture Section(s)	L01	MWF	15:00	ENE241	Fall 2015
<b>Instructor(s):</b>	Dr. S.-L. Wong		BI 178A	220-5721	slwong@ucalgary.ca
	Dr. S. Zimmerly		BI 319C	220-7933	zimmerly@ucalgary.ca

Desire 2 Learn (D2L) website for this course is CMMB 411 L01 - (Fall 2015) - Molecular Genetics

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

### 2. **Prerequisites:** **One of Biology 311 or Medical Sciences 341; and one of Biology 331 or Medical Sciences 351.**

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)

**NOTE:** Prior completion of or concurrent registration in Biochemistry 401 or 443 is strongly recommended.

### 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>In-class quiz 1</b>	<b>10% (September 30, 2015)</b>	
<b>In-class quiz 2</b>	<b>10 % (November 18, 2015)</b>	
<b>Midterm Exam</b>	<b>40 % (October 31, 2015)</b>	<b>(ST140)</b>
<b>Final Exam</b>	<b>40 %</b>	<b>(There will be a final exam scheduled by the Registrar's office.)</b>

Each piece of work (quiz, midterm test and 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](#). 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.

<b>Midterm:</b>	<b>Saturday, Oct. 31, 2015; 14:00-17:00</b>	<b>ST140</b>
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**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:** Required: Molecular Biology of the Gene, Watson, Pearson Education Canada, 7<sup>th</sup> Edition.

### 7. **Examination Policy:** No electronic or written aids (e.g. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper. Students should also read the Calendar, [Section G](#), on Examinations.

### 8. In this course, the quality of the student's writing will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.

## 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 [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.
- (j) Regrading of Quizzes and the Midterm Exam**  
A student who is not satisfied with the grading of the quizzes and the midterm exam should contact the corresponding instructor for reappraisal. This MUST be done within **15** days of the quiz/exam answer booklet being returned to the student. Refer to the University of Calgary calendar for further information.

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

Associate Dean's Approval for  
out of regular class-time activity: \_\_\_\_\_ ORIGINAL SIGNED \_\_\_\_\_ Date: \_\_\_\_\_  
C411 F15; 8/28/2015 11:57 AM

UNIVERSITY OF CALGARY  
DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE

CMMB 411  
Molecular Genetics

TERM: Fall 2015 SECTION NO. 01

PREREQUISITE(S): **One of Biology 311 or Medical Sciences 341; and one of Biology 331 or Medical Sciences 351.**

Note: Students may not register in a course unless they have a grade of at least C- in each prerequisite course.

LECTURER(S): Dr. S.-L. Wong BI 178A 220-5721 slwong@ucalgary.ca  
Dr. S. Zimmerly BI 319C 220-7933 zimmerly@ucalgary.ca

LECTURES: M W F 15:00 ENE 241

TEXT: Required: Molecular Biology of the Gene (including Mastering Biology), Watson, Pearson Education Canada, 7<sup>th</sup> Edition.

MARK DISTRIBUTION: A. Composition of Final Grade

<b>In-class quiz 1</b>	<b>10%</b>	
<b>In-class quiz 2</b>	<b>10 %</b>	
<b>Midterm Exam</b>	<b>40 %</b>	<b>ST140 Sat. Oct 31 2-5PM</b>
<b>Final Exam</b>	<b>40 %</b>	

B. Final Exam

There will be a final examination scheduled by the Registrar's Office.

C. Components of Course for Which a Passing Grade is Essential

Students must achieve a passing grade (minimum of D) on the lecture portion of the course (average of the quizzes, midterm and final exams) to qualify for a passing grade overall-

D. Grading Scheme

93 % = A +  
88 % =A  
83 % =A –  
78 % =B+  
73 % =B  
68% = B –  
64 % = C +  
60 % = C  
56 % = C –  
52 % = D +  
48 % = D  
47 % = F

## COURSE OUTLINE CMMB 411

1. DNA (SLW)  
DNA topology and topoisomerases  
(7<sup>th</sup> edition: Chapter 4, pp 77-89, pp 92-105; Chapter 9, pp 303; 6<sup>th</sup> edition: Chapter 6, pp 117-127).
2. Prokaryotic DNA Replication (SLW)  
DNA polymerases, primase, sliding clamp and clamp loader, replication fork, origins of replication and replication process. (7<sup>th</sup> edition: Chapter 9, pp 257-296; Chapter 10, pp 320; 6<sup>th</sup> edition: Chapter 8, pp 195-239)
3. Prokaryotic Mechanisms of Transcription (SLW)  
RNA polymerases, structural features of promoters and terminators, prokaryotic transcription process. (7<sup>th</sup> edition: Chapter 13, pp 429-447; 6<sup>th</sup> edition: Chapter 12, pp 377-397)
4. Gene regulation in Prokaryotes (SLW)  
Regulatory proteins, regulatory mechanisms at transcription initiation, elongation and termination. (7<sup>th</sup> edition: Chapter 18, pp 615-631, 634; 6<sup>th</sup> edition: Chapter 16, pp 547-567)
5. Translation (SLW)  
Structural and functional features of mRNA and tRNA, amino acid charging, codon recognition and decoding, structure of ribosome, translation process (initiation, elongation, mRNA translocation and termination). (7<sup>th</sup> edition: Chapters 15, pp509-549, Chapter 16; 6<sup>th</sup> edition: Chapters 14-15)
6. Molecular mechanism of recombination (SLW)  
Inter-strand and double strand breaks. Models for homologous recombination. Genes and enzymes involved in homologous recombination. (7<sup>th</sup> edition: Chapter 11, pp341-366; 6<sup>th</sup> edition: Chapter 10, pp 284-303, Chapter 11, pp 319-334)
7. DNA Damage, Mutagenesis and Repair Mechanisms (Chapter 10) (SZ)  
Types of DNA damage. Spontaneous and induced mutations. Mechanisms of DNA repair including base excision and nucleotide excision repair, transcription-coupled repair and recombination-based repair. Error-prone repair and mutagenesis.
8. Eukaryotic Chromosomes and Nucleosomes (Chapter 8) (SZ)  
Eukaryotic genome and chromosome structure. Chromatin, nucleosomes and their effect on transcription.
9. Eukaryotic DNA Replication and Telomeres (Chapter 8) (SZ)  
Chromosome duplication and segregation. Centromeres. Structure and function of telomeres. Mechanism of DNA replication. Replication of telomeres and telomerase.
10. Mechanisms of Eukaryotic Transcription (Chapter 13) (SZ)  
RNA polymerases I, II and III, the basic transcriptional machinery and transcription factors.
11. Gene Regulation in Eukaryotes (Chapters 19) (SZ)  
Regulatory transcription factors and families, enhancers, signal transduction pathways, silencing.
12. RNA Structure, Splicing and Post-Transcriptional Processes (Chapters 5, 14) (SZ)  
The splicing pathway and mechanism. Alternative splicing. Self-splicing introns. RNA editing.
13. Regulatory RNAs (Chapter 20) (SZ)  
RNAi, riboswitches and regulatory RNAs in bacteria and eukaryotes.