UNIVERSITY OF CALGARY

DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

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

Lecture Section(s)	L01	MWF	15:00	ST 141	Fall 2014

Instructor(s):	Dr. S.-L. Wong	BI 178A	220-5721	slwong@ucalgary.ca
	Dr. M. Kapoor	BI 484	220-6788	mkapoor@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 2014) - 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

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:

In-class quiz 1	**10%**	**(September 29, 2014)**
In-class quiz 2	**10 %**	**(November 17, 2014)**
Midterm Exam	**40 %**	**(November 1, 2014) SB 103**
Final Exam	**40 % (**There will be a final exam scheduled by the Registrar's office.)	

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.

Midterm: Saturday, November 1, 2014; 14:00-17:00 SB 103

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, 7th 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) **Academic Accommodation Policy:** Students with documentable disabilities are referred to the following links: Calendar entry on students with disabilities and Student Accessibility Services.

(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

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

(g) **Student Union Information:** VP Academic Phone: 220-3911 Email: suvpaca@ucagary.ca.
SU Faculty Rep. Phone: 220-3913 Email: sciencerep@su.ucalgary.ca; Student Ombudsman

(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). Your responses make a difference - please participate in USRI Surveys.

Department Approval_____Date_____

Associate Dean's Approval for
out of regular class-time activity: _____Date:_____
C411 F14; 8/21/2014 11:01 AM

UNIVERSITY OF CALGARY
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

CMMB 411
Molecular Genetics

TERM: Fall 2014 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
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LECTURES: M W F 15:00 ST 141

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

RESERVE READING ROOM: Please see attached Reserved Reading List.

MARK DISTRIBUTION:

A. Composition of Final Grade

In-class quiz 1	**10%**	
In-class quiz 2	**10 %**	
Midterm Exam	**40 %**	**SB 103**
Final Exam	**40 %**	

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 both the lecture portion of the course (average of the midterm and final exams) **and** the laboratory portion of the course 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
< 48 % F

COURSE OUTLINE CMMB 411

1. DNA (SLW)
   DNA topology and topoisomerases
   (7th edition: Chapter 4, pp 77-89, pp 92-105; Chapter 9, pp 303; 6th edition: Chapter 6, pp 117-127).

2. Prokaryotic DNA Replication (SLW)
   DNA polymerases, sliding clamp and clamp loader, replication fork, origins of replication, regulation of initiation. (7th edition: Chapter 9, pp 257-296; Chapter 10, pp 320; 6th edition: Chapter 8, pp 195-239)

3. Prokaryotic Mechanisms of Transcription (SLW)
   RNA polymerases, structural features of promoters and terminators, prokaryotic transcription process.
   (7th edition: Chapter 13, pp 429-447; 6th edition: Chapter 12, pp 377-397)

4. Gene regulation in Prokaryotes (SLW)
   Regulatory proteins, regulatory mechanisms at transcription initiation, elongation and termination.
   (7th edition: Chapter 18, pp 615-631, 634; 6th edition: Chapter 16, pp 547-567)

5. Translation (SLW)
   Structural and functional features of mRNA and tRNA, tRNA processing and maturation, amino acid charging, codon recognition and decoding, structure of ribosome, translation process (initiation, elongation and mRNA translocation, termination and ribosome recycling).
   (7th edition: Chapters 15, pp509-549, Chapter 16; 6th 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.
   (7th edition: Chapter 11, pp341-366; 6th edition: Chapter 10, pp 284-303, Chapter 11, pp 319-334)

7. Lambda phage and gene regulation network (MK)
   Regulation of gene expression, Establishment and maintenance of lysogeny. The genetic switch. Immunity to infection. (7th ed. Chapter 18, pp 636-653, 6th ed. Chapter 16, pp 568-586)

8. DNA damage, mutagenesis and repair mechanisms (MK)
   Types of DNA damage. Spontaneous and induced mutations. Damage by alkylation, oxidation, radiation and intercalating agents. The photochemical action of UV on DNA. Base excision and nucleotide excision repair in bacteria and mammalian cells. Transcription-coupled repair. Repair of oxidative damage. Bacterial Methyl-Directed Mismatch repair system. Mismatch repair in eukaryotes. Repair of double-strand breaks. Recombination-repair. The bacterial SOS network. Error-prone repair and mutagenesis. Y-family DNA polymerases. DNA damage, repair and cancer. (7th ed. Chapter 10, 6th ed. Chapter 9)

9. Eukaryotic Chromosomes and Nucleosomes (Chapter 8) (SZ)
   Eukaryotic genome and chromosome structure. Chromatin, nucleosomes and their effect on transcription.

10. 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.

11. Mechanisms of Eukaryotic Transcription (Chapter 13) (SZ)
    RNA polymerases I, II and III, the basic transcriptional machinery and transcription factors.

12. Gene Regulation in Eukaryotes (Chapters 19, 20) (SZ)
    Regulatory transcription factors and families, enhancers, signal transduction pathways, silencing, RNAi.

13. RNA Structure, Splicing and Post-Transcriptional Processes (Chapters 5, 14, 20) (SZ)
    The splicing pathway and mechanism. Alternative splicing. Self-splicing introns. RNA editing.