UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. Course: CMMB 451 – MOLECULAR ANALYSIS OR BIOLOGICAL SYSTEMS

Lecture Sections: L01 TR 12:30-13:45 ST 055 WINTER 2015

Instructor(s):	Dr. L. Gedamu (Coordinator)	BI 350	220-5556	lgedamu@ucalgary.ca
	Dr. S.L. Wong	BI 178A	220-5721	slwong@ucalgary.ca

Course website or Desire 2 Learn (D2L): CMMB 451 L01 - (Winter 2015) - Molecular Analysis of BioSystems
Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

2. PREREQUISITE(S): CMMB 411
See section 3.5.C in the Faculty of Science section of the online Calendar
(http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html)

ANTIREQUISITE(S): Credit for both CMMB 451 and either Biochemistry 401 or 541 will not be allowed.

NOTE: Only open to Majors in Cellular, Molecular and Microbial Biology or to Majors in the Biological Sciences Honours program.

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:

Laboratory work	10%	
Laboratory report	50%	
MT Exam	25%	In Class (March 12)
Final Exam	15%	

(There will be a final examination scheduled by the Registrar office.)

"Each piece of work (laboratory report, midterm test or 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. N/A

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: N/A

Online Course Components: List online tools being used in the class outside of those provided by the University course Management system and Top Hat classroom response system. Note: Top Hat is allowed for all classes and may be used for grades. Instructors using Top Hat should plan to accommodate students who do not have access to a cell phone or portable computing device. Course components that are free to all students and that are not dependent on prior accesses are allowed. Those with APPROVED associated optional or mandatory course fees must be listed in section 8.

7. **Examination Policy**: Students should also read the Calendar, Section G, on Examinations. N/A

8. **Writing across the curriculum statement:** e.g. "In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports." See also Section E.2 of the University Calendar.

9. **Human studies statement:** indicating whether students in the course may be expected to participate as subjects or researchers. See also Section E.5 of the University Calendar.

   STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS. Students are expected to be familiar with http://www.ucalgary.ca/pubs/calendar/current/sc-5-1.html of the on-line calendar.

   See also http://www.ucalgary.ca/pubs/calendar/current/e-5.html.

10. OTHER IMPORTANT INFORMATION FOR STUDENTS:

(a) Misconduct: 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: Students with Disabilities: http://www.ucalgary.ca/pubs/calendar/current/b-1.html B.1 and Student Accessibility Services: http://www.ucalgary.ca/access/.

(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: 220-3911 Email: suvpaca@ucagary.ca.
SU Faculty Rep. Phone: 220-3913 Email: sciencerep@su.ucalgary.ca; Student Ombudsman

(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) U.S.R.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 _____ORIGINAL SIGNED_____Date_____

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UNIVERSITY OF CALGARY
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE
CMMB 451

MOLECULAR ANALYSIS OF BIOLOGICAL SYSTEMS

A laboratory course emphasizing the molecular approach to genetic analysis of Biological Systems.

TERM: Winter 2015 SECTION NO: 01

PREREQUISITE: CMMB 411

ANTIREQUISITES: Credit for both CMMB 451 and either Biochemistry 401 or 541 will not be allowed.

NOTE: Open only to Majors in Cellular, Molecular and Microbial Biology or to Majors in the Biological Sciences Honours program.

A student may not register in a course unless they have a grade of at least C- in each prerequisite course.

LECTURERS:	Dr. L. Gedamu	BI 350	220-5556	lgedamu@ucalgary.ca
	Dr. S.L. Wong	BI 178A	220-5721	slwong@ucalgary.ca

LECTURES:	T & R	12:30 – 13:45	ST 055
LABS:	B01 T	14:00 – 18:50	BI 138
	B02 R	14:00 – 18:50	BI 138

RESERVE READING ROOM: See attached sheet. These books are recommended as optional reading or for more information on aspects of molecular approach of genetic analysis not covered in this course. They are available in the Reserve Reading Room in the main Library.

MARK DISTRIBUTION:

A. Composition of Final Grade

Laboratory work[1]	**10%**	
Laboratory report[2]	**50%**	
MT Exam	**25%**	**In-Class (March 12)**
Final Exam	**15%**	

[1]There will be 10 weeks of laboratory work.
[2]There will be 3 laboratory reports.

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

N.B. Completion of the laboratory (3 lab reports) is essential in order to pass the course as a whole.

CMMB 451 - 2015 Tentative Lab Schedule

Week	Date	Experiment
1	Jan 13/15	Lab set-up
2	Jan 20/22	**Experiment #1: Southern blot analysis of a candidate gene from *Leishmania.*** Genomic DNA digestion/Probe preparation/Check genomic digestions on agarose gel/Isolate probe fragment on LMP gel/Prepare Southern blot solutions/Transfer DNA.
3	Jan 27/29	Probe purification/Prepare DIG probe/Quantitate/Prepare DIG solutions
4	Feb 03/05	DIG hybridization/Washing/Developing/cDNA digestions for next week/Run out on agarose and transfer **(End of Experiment #1)**
5	Feb 10/12	**Experiment #2: Restriction mapping of the cDNA candidate gene from *Leishmania.*** Southern blot pre-hybridization/Preparation of DIG probe/Probe quantification/Make solutions/Hybridize/Wash and expose. **End of Experiment #2** **LAB REPORT #1 DUE Feb 24/26 [20%]**
6	Feb 15/22	Reading week
7	Feb 24/26	**Experiment #3: Subcloning and sequencing of candidate gene from *Leishmania.*** PCR/Vector and insert preparation (digestion, dephosphorylation, purification)/Preparation of competent cells/Ligation
8	March 03/05	Alkali-lysis mini-prep of plasmid DNA/DNA quantification/Orientation check of subcloned insert via PCR and restriction digestion
9	March 10/12	DNA sequencing/Sequence analysis/Bioinformatics **End of Experiment #3** **LAB REPORT #2 DUE MARCH 17/19 [15%]**
10	March 17/19	**Experiment #4: Northern and Western blot analysis of a candidate gene/protein from *Leishmania.*** NORTHERN BLOT: Isolate total RNA from *Leishmania* parasites/Pour formaldehyde gels/Run and transfer RNA samples
11	March 24/26	Prehybridization/DIG probes/Hybridize/Wash/Expose/GST – fusion expression in *E. coli*
12	March 31/April 02	Purification of GST – fusion and Analysis on SDS - gel
		End of Experiment #4 **LAB REPORT #3 DUE APR 07/09 before NOON [15%]**

MT EXAM (25%) March 12, 2015 In Class
FINAL EXAM (15%)

CMMB 451
MOLECULAR ANALYSES OF BIOLOGICAL SYSTEMS

WINTER 2015 – TENTATIVE LECTURE TOPICS

MOLECULAR BIOLOGY TECHNIQUES (Dr. Lashitew Gedamu)

Cloning overview
Enzymes in molecular biology
Cloning vectors
Isolation of nucleic acids (DNA/RNA)
Analysis of nucleic acids/hybridization: Principles and applications
Transfer of nucleic acids to solid supports/ Southern & Northern
Labeling of Probes
Gene libraries
DNA sequence assembly and analysis
Polymerase chain reaction (PCR): Principles and Applications
Specialty nucleic acid techniques: Real Time PCR
Micro Array
Site-directed mutagenesis
Gene manipulation by PCR
Protein Expression Vectors

PROTEIN ENGINEERING AND PURIFICATION (Dr. S.-L. Wong)

Protein Purification strategies/protocol development
Sample preparation
Salt-in, salt-out and protein fractionation
Protein quantification
Principle of chromatography
-Affinity chromatography
-Ion exchange chromatography
-Size exclusion chromatography
Protein engineering of streptavidin for protein purification
Summary and linking techniques
Electrophoresis

NOTE: MT Exam will include lectures covered by Dr. L. Gedamu.
Final Exam will include lectures covered by Dr. S.-L. Wong.

Grading Scale

95 =	A+
90 =	A
85 =	A-
80 =	B+
75 =	B
70 =	B-
65 =	C+
60 =	C
55 =	C-
50 =	D+
45 =	D
40 =	D-

Below 40 F