



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

1. **Course:** CMMB 461, Functional Genomics and Molecular Networks -- Fall 2018

Instructor Name	Email	Phone	Office	Hours
L01: (MWF 11:00 - 11:50 in SA 106) Gordon Chua	gchua@ucalgary.ca	403-220-7769	BI 560	Tuesday: 1-3 PM

Course Site:

D2L: CMMB 461 L01-(Fall 2018)-Funct'l Genomics & Molec Ntwrk

Department of Biological Sciences:

Office: BIO 186
 Phone: 403 220-3140
 Email: biosci@ucalgary.ca

Note:

Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s): Biology 331. Also known as: (formerly Biology 461)

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Component(s)	Weighting %	Date
Assignments	30%	
Midterm Exam	25%	In-Class Oct 24
Final Exam	45%	

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

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component 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.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	90 %	85 %	80%	75%	70 %	65 %	60%	55%	53 %	50 %

This course has a registrar scheduled final exam.

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/themself with these regulations. See also [Section E.3](#) of the University Calendar.

5. **Scheduled out-of-class activities:**

There are no scheduled out of class activities for this course.

6. **Course Materials:**

There is no course textbook. All required and recommended readings will come from the primary literature and review articles indicated in the lecture notes and assignment.

7. **Examination Policy:**

No aids are allowed on tests or examinations.

Students should also read the Calendar, [Section G](#), on Examinations.

8. **Approved Mandatory and Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing across the Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also [Section E.2](#) of the University Calendar.

10. **Human & living organism studies statements:**

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

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.

Students are expected to be familiar with [Section SC.4.1](#) of the University Calendar.

11. **Reappraisal of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

1. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **15 days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections [I.1](#) and [I.2](#) of the University Calendar

2. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as

counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).

- b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at [403-220-2208](tel:403-220-2208).
- d. **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. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. **These are only examples.**
- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- f. **Academic Accommodation Policy:** 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 [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy by email addy@ucalgary.ca or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.
- g. **Safewalk:** Campus Security will escort individuals day or night (See the [Campus Safewalk](#) website). Call [403-220-5333](tel:403-220-5333) for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). 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 [Legal Services](#) website.
- i. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: suvpaca@ucalgary.ca.
- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

Schedule	Preliminary Title
Sept 7	Introduction to Systems Biology, Functional Genomics and Molecular Networks
Sept 10	Genome Sequencing 1: Shotgun Sanger Sequencing
Sept 12	Genome Sequencing 2: Sequence Assembly and Gene Finding
Sept 14	Genome Sequencing 3: Next Generation Sequencing 1
Sept 17	Genome Sequencing 4: Next Generation Sequencing 2
Sept 19	Genome Sequencing 5: Genome structure and evolution
Sept 21	Expression Microarrays 1: Transcriptome, platforms and procedure
Sept 24	Expression Microarrays 2: Data normalization and clustering analysis
Sept 26	Tiling Microarrays
Sept 28	Forward Genetics 1: Mutagenesis and mutant alleles
Oct 1	Forward Genetics 2: Gene Mapping and Plasmid Complementation
Oct 3	Reverse Genetics 1: Construction and characterization of the yeast deletion collection
Oct 5	Reverse Genetics 2: Chemical genetic profiling
Oct 8	THANKSGIVING DAY: NO LECTURES
Oct 10	Reverse Genetics 3: Essential genes (TET, DAMP and TS alleles)
Oct 12	Reverse Genetics 4: Multicellular organisms
Oct 15	Reverse Genetics 5: RNAi and CRISPR screening in cancer cells
Oct 17	Introduction to Transcriptional-Regulatory Networks
Oct 19	Transcription Factor Overexpression 1: Phenotypic activation of yeast transcription factors
Oct 22	Transcription Factor Overexpression 2: Motif-finding algorithms and validation of target genes
Oct 24	IN-CLASS MIDTERM
Oct 26	Workshop: How to get the most of your degree and career planning
Oct 29	Transcription Factor Overexpression 3: Reprogramming differentiated cells into embryonic stem cells
Oct 31	Chromatin Immunoprecipitation 1: ChIP-chip analysis of transcription factors
Nov 2	Chromatin Immunoprecipitation 2: Global analysis of chromatin-modifying proteins
Nov 5	One Hybrid Yeast Assay
Nov 7	Introduction to Posttranscriptional Regulation and RNA-Binding Proteins
Nov 9	Protein-RNA Interactions 1: RIP-Chip/Seq
Nov 12	REMEMBRANCE DAY: NO LECTURES
Nov 14	READING BREAK: NO LECTURES
Nov 16	READING BREAK: NO LECTURES
Nov 19	Translational Control and Ribosome Profiling/Ribo-Seq
Nov 21	Approaches in Proteomics 1: Antibody-based tissue profiling and yeast two hybrid assay
Nov 23	Approaches in Proteomics 2: Mass spectrometry
Nov 26	Approaches in Proteomics 3: Protein microarrays
Nov 28	Protein-Protein Interaction Networks: Topology and conservation
Nov 30	Synthetic Genetic Array Analysis 1: Large-scale genetic interaction mapping in yeast 1
Dec 3	Synthetic Genetic Array Analysis 2: Large-scale genetic interaction mapping in yeast 2
Dec 5	Synthetic Genetic Array Analysis 3: Genetic interaction networks in <i>C. elegans</i>
Dec 7	Review

Department Approval:

Electronically Approved

Date: 2018-08-15 13:03

Course Outcomes

- Describe and compare technologies for whole genome sequencing including Sanger and Next-Generation Sequencing
- Describe approaches in forward and reverse genetics to determine gene function in eukaryotic model systems
- Describe genome-wide methods to identify target genes of transcription factors and the topology of transcriptional-regulatory networks
- Apply knowledge learned from expression microarrays to normalize and analyze transcriptome data
- Explain the concept of synthetic lethality and describe large-scale genetic mapping by synthetic genetic array technology in the yeast model system

- Describe proteomic methods to identify protein interactions and complexes.
- Explain functional genomic experimentation and data from the primary literature.