

BIOL 512/482/631 Functional Genomics Fall 2021

Tuesday & Thursday 16:15-17:30

Classroom: CC 312

Instructor: Dr. Madoka Gray-Mitsumune

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Office hours: Check Moodle for the appointment schedule.

Course description: This course focuses on the functional analysis of expressed genes and their products. Course content includes transcription profiling using microarrays and RNA-Seq, systematic identification of proteins using mass spectrometry, functional analysis by gene knock-outs, localization of gene products by gene knock-ins, recombinant protein synthesis and protein-protein interactions using affinity co-purification and protein complementation assays. Lectures only

Evaluation	% of the final grade
Online quizzes	4 %
Class participation & online lectures	4 %
Reading assignment (class discussion & discussion forum)	4 %
Assignment 1 submission (Oct 7 th) & peer evaluation (Oct 12 th)	8 %
Assignment 2 submission (Oct 28 th) & peer evaluation (Nov 2 nd)	8 %
Assignment 3 submission (Nov 18 th) & peer evaluation (Nov 23 rd)	8 %
Oral presentation & peer evaluation (Nov 30 th)	14 %
Midterm exam (Oct 19)	15 %
Final exam (date determined by the university)	35 %

Grading scheme for graduate students

A⁺: 90 or more, A: 85-89, A⁻: 80-84, B⁺: 77-79, B: 74-76, B⁻: 70-73, C: 60-69, F: <60

Grading scheme for undergraduate students

A⁺: 90 or more, A: 85-89, A⁻: 80-84, B⁺: 77-79, B: 74-76, B⁻: 70-73, C⁺: 67-69, C: 64-66, C⁻: 60-63, D⁺: 57-59, D: 54-56, D⁻: 50-53, F <50

Lectures and lecture attendance:

About half of the lectures will be given in person, and the other half will be given online.

- In person lectures: students attend lectures and participate in class discussions. Students attendance and participation are monitored throughout the term. Dates of in person lectures are indicated in the schedule below.
- Online lectures are uploaded to Moodle. Students view the lecture videos and complete interactive quizzes in the video by the deadline. Videos are open for only one week at a time. So please pay attention and take notes. After that point, students should use lecture slides to review the materials. Student participation is monitored by completions of interactive quizzes embedded in the lectures.

Moodle course portal:

All course materials will be uploaded to Moodle. You can access Moodle course portal via the MyConcordia portal or using this link: <https://moodle.concordia.ca/moodle/> (use your netname & password for login). It is your responsibility to check Moodle regularly.

Online quizzes:

Online quizzes are completed on Moodle.

Group activities:

Students are assigned to a group consisting of 4-5 students. Some class activities and assignments are completed with group members.

Reading assignments:

Read the assigned article. Participate in the pre-class discussion in the discussion forum. Participate in the class discussions.

Assignment 1, 2 & 3

(Individual work) You will study and characterize a gene assigned to your group, using publically available expression databases. Half of the group members will investigate a mouse gene, and the other half will investigate a human gene. After the assignment submission, you must evaluate other students' work.

Oral presentation

(Group work) Each group will present one or two research articles describing functional analyses of the gene assigned to the group.

Midterm exam

4 pages long. Lectures 1-12 + Reading assignment 1. You may bring **handwritten** cheat sheets (3 pages max). Time limit is 75 min.

Final Exam (Date & time determined by Exam office)

All lectures & reading assignments. You may bring **handwritten** cheat sheets (6 pages max) to the exam. Time limit is 3 hours.

Tentative schedule (subject to change)

	Class meeting	Class activity	Topic	
1	Sep 7 (Tue)	Course structure	Gene discovery, gene annotation	Gene discovery, gene annotation
2				
3	Sep 14 (Tue)	Review	Transcriptome analysis	Microarray RNAseq
4				
5	Sep 21 (Tue)	Article 1 discussion		
6	Sep 23 (Thu)			
7	Sep 28 (Tue)	Review		
8			Proteomics	2D-gel, DIGE Mass spectrometry (MS), LC-MS ICAT, iTRAQ, SILAC
9	Oct 5 (Tue)	Class activity		
10				
11	Oct 12 (Tue)	Review		
12			Protein & RNA localization	<i>in situ</i> RNA hybridization, antibody production
	Oct 19 (Tue)	Midterm exam		
13			Protein & RNA localization	GFP and other protein tags, laser dissection
14	Oct 26 (Tue)	Review	Reverse genetics	Targeted deletion CRISPR-CAS RNAi Random insertion
15				
16	Nov 2 (Tue)	Review		
17				
18	Nov 9 (Tue)	Article 2 discussion	Protein expression	Recombinant protein production
19	Nov 11 (Thu)			
20	Nov 16 (Tue)	Class activity		
21				Affinity purification
22	Nov 23 (Tue)	Review		Cell-free protein synthesis
	Nov 30 (Tue)	Oral presentation day (15:00-17:30, or until finished)		
23	Complete by Dec 7		Protein Interactions	Two-hybrid assay, BiFC, Tandem affinity purification (TAP), Synthetic interactions
24				
	Date & time to be determined	Final exam		

Dates denoted by asterisks are the days that require mandatory attendance (in-person lectures).

Sep 20: Last day of withdrawal with tuition refund (DNE).

Nov 8: Last day of withdrawal. No refund. DISC notation on the transcript.

Avoiding Plagiarism

Since the course work requires written works (presentation slides and assignment), I need to remind of you of good citation practice. Throughout the text, you should be clear on what part has been cited from which articles. Please visit the Academic Integrity Website

<http://www.concordia.ca/students/academic-integrity/plagiarism.html>

The following statements are taken from The Academic Integrity Website:

"Plagiarism:

The most common offense under the Academic Code of Conduct is Plagiarism which the Code defines as "the presentation of the work of another person as one's own or without proper acknowledgement." This could be material copied word for word from books, journals, internet sites, professor's course notes, etc. It could be material that is paraphrased but closely resembles the original source. It could be the work of a fellow student, for example, an answer on a quiz, data for a lab report, a paper or assignment completed by another student. It might be a paper purchased through one of the many available sources. Plagiarism does not refer to words alone - it can also refer to copying images, graphs, tables, and ideas. "Presentation" is not limited to written work. It also includes oral presentations, computer assignments and artistic works. Finally, if you translate the work of another person into French or English and do not cite the source, this is also Plagiarism.

In Simple Words:

DO NOT COPY, PARAPHRASE OR TRANSLATE ANYTHING FROM ANYWHERE WITHOUT SAYING FROM WHERE YOU OBTAINED IT!"

Please note all of your course work will be scanned by plagiarism detection software. Suspected plagiarism cases must be reported to the Code Administrator of the Faculty of Arts and Science (for undergraduate students) or School of Graduate Studies (for graduate students).

If you are not sure how to paraphrase without plagiarizing, please refer to this example given by the Academic Integrity information: <http://www.concordia.ca/students/academic-integrity/plagiarism.html> . Examples are shown near the end of the web page.

LIST OF SERVICES

- **Birks Student Service Centre:** <http://www.concordia.ca/students/birks.html>
- **Examination Office:** <http://www.concordia.ca/students/exams.html>
- **International Students Office:** <http://www.concordia.ca/students/international.html>
- **Health Services:** <https://www.concordia.ca/health.html>
- **Counselling Service:** <https://www.concordia.ca/health/mental.html>
- **Student Success Centre:** <http://www.concordia.ca/students/success.html>
- **Advocacy and Support Services:** <https://www.concordia.ca/students/success/advocacy.html>
- **Financial Aid & Awards:** <http://www.concordia.ca/offices/faao.html>
- **Concordia Library:** <https://library.concordia.ca/>
- **Citation and Style Guides:** <http://library.concordia.ca/help/citing/index.php>