

## Department of Biology Course Outline

SC/BIOL3130M 3.00, Molecular Biology II: Regulation of Gene Expression  
Winter, 2022

### Course Description

Gene structure and function. Mechanisms of gene expression in prokaryotes and eukaryotes. Storage and retrieval of genetic information; transcription, translation and their control. Three lecture hours. One term. Three credits.

### Prerequisites

SC/BIOL 3110 3.00 or SC/BCHM 3110 3.00.

### Course Instructors and Contact Information

Course Director: Dr. Mark Bayfield, LSB327E  
Email: bayfield@yorku.ca

### Schedule

Lectures: Tuesdays and Thursdays, 11:30 am – 1:00 pm. Synchronous, recorded.

Office hours 1pm – 2 pm, Thursdays, over Zoom if online or 1<sup>st</sup> floor LSB if in person. No private office hours. No office hours on same days as exams.

### Evaluation

#### Grading:

Midterm 1: 20%

Midterm 2: 20%

Timed group exam: 15%

Clicker questions/participation OR Optional written assignment: 15%

Final exam: 30%

Section 1 will be tested on Midterm 1 and Section 2 will be tested on Midterm 2. The final exam will prioritize material from Section 3 but will also cover **methods** we covered in Sections 1 & 2.

### Important Dates

**DROP DEADLINE FOR THIS COURSE IS March 18<sup>th</sup>, 2022**

**Midterm 1: February 10<sup>th</sup>, during the synchronous class time**

**Midterm 2: March 17<sup>th</sup>, during the synchronous class time**

**Timed group exam: April 5<sup>th</sup>, during the synchronous class time**

NOTE: for additional important dates such as holidays, refer to the “Important Dates” section of the Registrar’s Website at <https://registrar.yorku.ca/enrol/dates/fw20>

## Resources

Optional Text: There is no text but this course has previously used “Molecular Biology” by Robert Weaver (2011), Fifth edition, WCB/McGraw Hill, on reserve in Steacie Library. It may be helpful to you.

Lecture slides available via course website accessible via Moodle @ York

## Learning Outcomes

1. Understand the mechanisms by which several important cellular factors function in the control of gene expression and regulation. Particular focus will be placed on the mechanisms of transcription and translation and how these differ between prokaryotes and eukaryotes. The course will also cover several levels of gene regulation that have only been discovered more recently.
2. Understand the nature of the experimental methods that were used to generate the data that provided us with our current understanding of the mechanisms of gene regulation. You should be able to describe the rationale for these methods and apply your understanding of these to predict outcomes of hypothetical experiments.

## Course Policies

Let's talk a bit about COVID:

I was really, really looking forward to seeing you all in person this year, and perhaps that will be possible later in the term. For now, we have to plan for virtual learning.

Even if we return to “in person”, the way the course runs will not change very much. I will be presenting the lectures synchronously over Zoom, Tuesdays and Thursdays, 11:30 am to 1:00 pm. If we return to in person, I will be presenting the lectures from the classroom; you will be able to come to the class or watch the lecture (synchronously) from home. They will be recorded, but it is important you attend (online or in person) while the lecture is running depending on whether you want to participate in the iClicker participation component (more below).

The things that might substantially change in how we do things if we go back to in person are the midterms and final exams. If we stay online, we will be doing the midterms and final exam through eClass. If we go back in person, we will be doing in person exams. More details below.

***Here's how I plan for course will work. It could change; if so I will let you know ASAP:***

**1. Material:** You must have access to reliable high-speed internet connection (wi-fi) and a computer in order to take this course, including access to audio (including microphone). Some aspects of the course will involve video conferencing software (e.g. Zoom). We will not be using a ProctorTrack or a similar online proctoring service.

Reliable access to eClass and ability to stream videos from eClass are required.

Here's how the course, in general, will work: Each week, I will post a **paper** for you to read on eClass. This will be assigned by the weekend prior to the week we will be discussing it, and I will tell you what figures of the paper to focus on. There is no paper assigned the first week or in any week there is an exam. I will also post slides for that week.

We will then meet in a synchronous lecture, Tuesdays and Thursdays, 11:30 am to 1 pm. This is **also the time we will have an iClicker based participation component**, in which I will use iClicker to ask questions that students will answer in real time. For more information on how this will work, see “assessment”, below. You can access iClicker using your smartphone or your computer. Go to <https://uit.yorku.ca/student-services/technology-used-in-courses/iclicker-reef/> to learn how if you have not used iClicker previously. **Since the questions that will be asked on iClicker will be about the**

**material in the paper and the slides, it is really in your best interest to read the paper and have a look at the slides before you show up for class.**

**2. Assessment:** There are a number of assessments we will be having in the course.

- a) The iClicker participation component (15% of the course final grade): I will be grading the responses on the iClicker during the synchronous discussion sessions. For each question, you will receive 1 point for answering at all, and 1 point for answering the question correctly. Thus, in theory, you could receive a perfect 7.5% of the course weight simply by coming to class and answering the questions, even if you don't get any of these correct!

There are no clickers that count for grades in week 1.

I appreciate that there may be times that your internet/data might cut out and you are not able to answer a question. To accommodate students that miss some questions, **I will drop the two days (lectures) where your score was lowest for all students.** If you attend all lectures and answer all the questions, you will still have your two lowest scores (for example, on a day where you got some questions wrong) dropped. If you miss more than two classes, you will still only have two classes dropped. So it is still in your best interest to make sure that your data connection is stable – the accommodation for missing classes is not unlimited.

There may be students attending from other time zones for whom attending the synchronous class may be challenging, or for whom a stable internet is a real problem. In lieu of the iClicker participation grade, any student can perform an optional written assignment, also worth 15% of the grade. Any student can perform this assignment at any time, but if a student elects to do this assignment then the grade they receive for the assignment will be the grade that is used instead of their iClicker score. Students cannot do the optional written assignment as well as the iClicker questions and then pick the better score. The intent of the optional written assignment is for students whose circumstances make it difficult to attend the synchronous classes. More info on the optional written assignment is below.

- b) The midterms and final exam: There will be two midterms, each worth 20% of the final grade, and one final exam, worth 30%. All exams will be **multiple choice**. The midterms will be delivered **synchronously during class time** (see class schedule for exact dates). If we are in person, these exams will be delivered **in class**. If we are still online, they will be delivered over eClass. If we are still online, **it is crucial that you have stable internet during the exams.** **The dates and the times (same time as our classes) are provided well in advance (see schedule and dates listed above).** **Make sure you plan to have stable internet at those times.**

The multiple-choice midterms and final exam will be timed. If we are **online**, the exams will be **open book**, the questions will be delivered in random order and without the ability of students to go back and change their answers. If we are in person, the exams be on paper (Scantron), will **not be open book**, but students will be able to change their answers and go back to previous questions. Whether the exams are online or in person, students are **not allowed to consult or communicate with other students**. Evidence that students have collaborated during exams will be followed up as a breach of the academic honesty policy.

**Students that miss a midterm or final will be given a deferred oral exam midterm at a later date in which the student will be asked questions live over Zoom by myself or one of the course TAs. The format of the oral makeup will not be the same as the normal exams. It will be oral questions, one on one, and not open book.**

- c) The timed group exam: There will be a timed group exam in place of the second to last class (**Tuesday, April 5<sup>th</sup> from 11:30 to 1:00 pm**) that is worth 15% of the final course grade. Students will be randomly assigned into groups of four, and one week before the exam (by March 29<sup>th</sup>) groups will be assigned a paper that uses methods covered in the course that they can all read together in advance of the exam. On April 5<sup>th</sup> at 11:30 am, a set of five questions about the paper will be released on eClass for each group. Groups will have 90 minutes to answer the five questions and then upload their answers to eClass through TurnItIn. One

exam and one grade will be assigned for the whole group. **Collaboration before or during the exam within groups using any platform is permitted (and encouraged!) but collaboration between groups is not.** There will be mechanisms in place for students to report fellow group members that do not substantially participate in this assessment, and grade penalties for non-participants may be applied in these cases.

- d) The optional written assignment (15% in lieu of the iClicker participation component). Students will have the option of writing a five-page assignment that will be worth 15% of their final grade, should they not wish to participate in the live iClicker component. If students elect to write the optional assignment then the score for the assignment must be included in their grade. **The assignment is due on TurnItIn on the last day of class (April 7<sup>th</sup>, 2021)** and extensions will not be given. **Students will only be allowed to submit their assignment to TurnItIn once.** Assignments that have unacceptable levels of similarity to other written work will be penalized and/or treated as a breach of the academic honesty policy. Late assignments will be assessed a penalty of minus 10% per late day. Instructions for how to complete the assignment will be posted on eClass.

### 3. A note about Academic Honesty

One issue that has really become a major issue with the shift to online learning is academic honesty. This is very concerning. One fundamental principle that all of us have a critical interest in is the idea that the degree you are performing is legitimate. It's important that people believe your degree is not a joke. When students cheat, this legitimacy is damaged. If a future professional school or employer doesn't believe that your degree has any value because there is a sense that a substantial number of students acquired their degree or their marks by cheating, the degree then becomes damaged or worthless for everyone.

Furthermore **the grades of non-cheaters are negatively affected by cheaters: cheating causes the class average to illegitimately go up, which can either decrease pressure to bell curve a low class average up, or can increase pressure to bell curve a high class average down.**

You are certainly welcome to form study groups and to help one another out while preparing for assessments, but **collaboration during any assessment is not permitted**, with the exception of collaboration within a group prior to and during the group exam. With the exception of the group exam, it is expected that all work submitted by a student is the work of that student working alone. If it's not clear to you whether what you're doing might be considered cheating, a good rule of thumb is to ask: Would I want the professor to know I was doing this? If something is still not clear to you, please ask me. I'm always happy to answer your questions or concerns. You should be familiar with all forms of violation of the academic honesty policy, including plagiarism and collaboration, as you will be held accountable to it (<https://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>).

Every year, students in this class are caught violating the academic honesty policy, and the consequences are serious. The consequences are always worse than if that student had just received a grade of zero on their exam or assignment. Every year, there are tears and regret and the final outcome is never happy. It sucks. **Please, don't.**

Students will be required to sign and submit an academic honesty statement before receiving any grade in the course. The statement and the submission link will be provided on eClass.

#### Other class policies:

- a) In the event of a missed final exam with a valid, documented reason, a deferred final exam will be offered. Students who do not write the final exam must contact me for permission to write a deferred exam (i.e. sign the Deferred Standing Agreement form). It is Senate Policy that "Normal requests for deferred standing must be communicated **within one week** following a missed examination, or on the last day to submit course work". Please check out the Registrar's Office Deferred Standing FAQs (<https://myacademicrecord.students.yorku.ca/deferred-standing>) for more details.

- b) Students **must** have taken all prerequisites in order to stay in the course. You should not enroll in the course if you do not have the prerequisites. Students that have enrolled without the required prerequisites will be required to leave the course.
- c) In order to be fair and consistent with regards to the entire class, individual grades are not negotiable and all students will be graded only as per the marking scheme. Contact me about marks **ONLY** if there is a clear error in your mark (calculation, clerical, etc.) as soon as possible at bayfield@yorku.ca. It is highly unlikely that you will receive a response regarding any other mark-related queries.

## Course Content

Section	Date	Topic
Introduction, Techniques	January 11 <sup>th</sup>	Intro, Review of Previous Material
	January 13 <sup>th</sup>	Molecular Tools for Studying Genes
Prokaryotic Transcription	January 18 <sup>th</sup>	Transcription in Prokaryotes I - Promoters
	January 20 <sup>th</sup>	Transcription in Prokaryotes II
	January 25 <sup>th</sup>	Operons
	January 27 <sup>th</sup>	DNA-Protein Binding in Bacteria
	February 1 <sup>st</sup>	Eukaryotic Polymerases
	February 3 <sup>rd</sup>	Eukaryotic Promoters, Class II Factors
	February 8 <sup>th</sup>	Class I & Class III Factors
Eukaryotic Transcription	February 10 <sup>th</sup>	<b>Midterm 1</b>
	February 15 <sup>th</sup>	Eukaryotic Transcriptional Activators
	February 17 <sup>th</sup>	Chromatin
	March 1 <sup>st</sup>	Splicing and Alternative Splicing
	March 3 <sup>rd</sup>	rRNA & tRNA processing
	March 8 <sup>th</sup>	mRNA Capping and Polyadenylation
	March 10 <sup>th</sup>	Coordination of mRNA processing
	March 15 <sup>th</sup>	RNA Turnover and NMD
Translation	March 17 <sup>th</sup>	<b>Midterm 2</b>
	March 22 <sup>nd</sup>	Initiation of Translation
	March 24 <sup>th</sup>	Translational Control
	March 29 <sup>th</sup>	Ribosomes and tRNA structure
Post-transcriptional control of gene expression	March 31 <sup>st</sup>	RNAi
	April 5 <sup>th</sup>	Group Exam
	April 7 <sup>th</sup>	Review

The red and green shaded lectures will be tested on midterms 1 & 2, respectively. The final exam is based on the blue section but will use methods we have covered through the entire course.

## University Policies

### Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - [http://www.yorku.ca/spark/academic\\_integrity/index.html](http://www.yorku.ca/spark/academic_integrity/index.html)

### Access/Disability

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including

physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

**Additional information is available at the following websites:**

Counselling & Disability Services - <http://cds.info.yorku.ca/>

Counselling & Disability Services at Glendon –

<http://www.glendon.yorku.ca/counselling/personal-counselling/what-is-counselling/>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

**Ethics Review Process**

York students are subject to the York University *Policy for the Ethics Review Process for Research Involving Human Participants*. In particular, students proposing to undertake research involving human participants (e.g., interviewing the director of a company or government agency, having students complete a questionnaire, etc.) are required to submit an *Application for Ethical Approval of Research Involving Human Participants* at least one month before you plan to begin the research. If you are in doubt as to whether this requirement applies to you, contact your Course Director immediately.

**Religious Observance Accommodation**

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at [http://www.registrar.yorku.ca/pdf/exam\\_accommodation.pdf](http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf)

**Student Conduct in Academic Situations**

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-and-or-harassing-behaviour-in-academic-situations-senate-policy/>