

## Department of Biology Course Outline

### SC/BIOL 3130 3.00 Molecular Biology II: Regulation of Gene Expression Fall 2018

#### 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

Dr. Emanuel Rosonina  
Life Sciences Building (LSB) 329D (Note that this floor is not accessible without access card)  
rosonina@yorku.ca  
Phone: 416-736-2100 x44702

**Office hours** will usually be held on Tuesdays from 3:30 – 4:30 PM in room LSB 213. However, please check the course Moodle site for available times, and to sign-up for office hours.

Questions regarding the course and about course material should primarily be made during/after class or during office hours. Generally, emails will be answered within a day. However, emails will not be answered for the 24 hours prior to the start of midterm and final exams. Please indicate *BIOL3130* or *BCHM3130* in the subject of emails.

#### Schedule

Wednesdays in Curtis Lecture Hall D (CLH D), 7:00 PM – 10:00 PM

#### Evaluation

**25%** Midterm Exam 1 (Based on Part I: Lectures 1 - 4)      **October 3, 2018**  
**25%** Midterm Exam 2 (Based on Part II: Lectures 5 - 8)      **November 7, 2018**  
**50%** Final Exam (Cumulative, with a focus on Part III: Lectures 9 - 11)

Tentatively, exams will be composed of a combination of multiple choice and short-answer questions.

#### Clickers (iClicker Reef)

The iClicker system will be used during class to answer review questions on material taught in the previous or current class. Three to six questions will be posed per class. Participation is recommended, but not mandatory. Please download the iClicker app for your phone or laptop in order to participate.

Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

## Important Dates

**October 3, 2018** Midterm 1 (Based on Part I: Lectures 1 – 4)  
**November 7, 2018** Midterm 2 (Based on Part II: Lectures 5 – 8)  
**November 9, 2018** Final date to drop the course without receiving a grade

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

## Resources

**COURSE WEBSITE:** Moodle (moodle.yorku.ca)  
 A basic version of the slides presented in class will be posted as a static PDF file prior to each class. Full slides will be shown only in class.

**REQUIRED TEXT:** *Molecular Biology*, Fifth Edition, (2012) by Robert F. Weaver. McGraw Hill.

## Course Content

The following table shows a tentative list of topics to be covered. Some changes are likely to be made during the course, at the discretion of the course director. Changes will be posted on the course web site (Moodle).

SECTION	DATE	LECTURE #	TOPICS	CHAPTER (Weaver)
<b>Part I: Review, Techniques, and Prokaryotic Transcription</b>	Sep. 5	1	Introduction and Review Molecular Tools for Studying Genes I	1,2 5
	Sep. 12	2	Molecular Tools for Studying Genes II Transcription in Bacteria I	5 6
	Sep. 19	3	Transcription in Bacteria II Operons	6 7
	Sep. 26	4	Shifts in Bacterial Gene Expression DNA-Protein Interactions in Bacteria	8 9
	Oct. 3	<b>Midterm Exam 1 (Lectures 1 - 4)</b>		
<b>Part II: Eukaryotic Transcription and Gene Expression</b>	Oct. 3	5	RNA Polymerases	10
	Oct. 17	6	Promoters and General Transcription Factors Mediator and Promoter Clearance	10 11
	Oct. 24	7	Transcriptional Activators Pre-mRNA Splicing	12, 13 14
	Oct. 31	8	Capping and 3'-End Formation Coordination of Gene Expression	15
	Nov. 7	<b>Midterm Exam 2 (Lectures 5 - 8)</b>		
<b>Part III: Translation and Techniques for Modulating Gene Expression</b>	Nov. 14	9	Translational Initiation Genetic Code, Translational Elongation	3, 17 18
	Nov. 21	10	Termination and mRNA Quality Control Processing and Regulation of RNAs	18 16, 19
	Nov. 28	11	Modulating Gene Expression in the Lab	

Chapters correspond to Weaver, *Molecular Biology, Fifth Edition*. Coverage of chapters will not be complete, and not all topics presented in class are covered in the text book. Students are advised to attend all lectures and study those sections of the text relevant to the lecture topics. Exam questions will relate to material presented in lectures. However, students are responsible for all material covered in the course, and are encouraged to search for other reference material that complements the lectures.

## Learning Outcomes

Upon successful completion of this course, students should be able to:

- Describe multiple levels of regulation of gene expression in prokaryotes and eukaryotes,
- Interpret and critically analyze a variety of molecular biology experiments, such as those presented in current scientific publications, and explain the techniques used in those experiments,
- Design molecular biology experiments for addressing questions related to gene expression.

## Course Policies

1. **Missed Midterm Exams.** For students who miss a midterm exam with a valid, documented reason (unplanned medical or family emergency), the weight of the midterm will be transferred to the final exam. No make-up exam will be available for midterms. If both midterm exams are missed with valid, documented reasons, the final exam will be worth 100% of the final grade.

In the event of a missed midterm exam, please provide the course director with legitimate documentation (e.g. Attending Physician's Statement) explaining the absence, within one week of the missed exam. Submit documents using the Department of Biology Document Submission System: <http://science.apps01.yorku.ca/machform/view.php?id=84113>. Failure to provide acceptable documentation will result in a grade of zero on the exam.

2. **Missed Final Exam.** Students who write both midterm exams but miss the final exam for valid, documented reasons may request to write a deferred exam, at the discretion of the course director. A Deferred Standing Agreement form must be completed and provided to the course director. Please see the registrar's website for more information (<http://myacademicrecord.students.yorku.ca/deferred-standing>). Student's whose requests are declined may then petition to their home faculty. Please note that it can take **several weeks** for final grades to be posted for students who write the deferred exam.

Students who missed one or both midterm exams and miss the final exam are not permitted to write the standard deferred exam. These students must submit a petition to their home faculty. If approved by their Petitions Committee, students will then be permitted to write a deferred exam at a future date (often months after the regular exam).

Please note that in all cases the format of the deferred exam might be different from the regular exam (e.g. short answers, oral exam, one or more essay questions, etc. instead of multiple choice format).

3. **Important Information for Students. There is a no-tolerance policy for breaches of academic honesty (e.g. cheating) in this course.** Students who are caught cheating in any way, no matter how minor, will be reported to the Associate Dean for Students. Note that students convicted of breaches of academic honesty will have a permanent internal record of the incident and may have a notation indicated on their transcript, in addition to penalties such as an assigned failure in the course or suspension.

Examples of breaches of academic honesty in BIOL/BCHM 3130 may include:

- Viewing another student's answer sheet during an exam;
- Allowing another student to view your answer sheet during an exam;
- Communicating with anyone other than the instructor/invigilators during exams;
- Possessing or accessing an unauthorized aid during an exam, for example, paper notes, notes written on your body or clothing, notes stored electronically on calculators or other devices (e.g. smart watch), or using your cell phone in the washroom during an exam;
- Recording final exam questions in any way with the intention of sharing this with other students;
- Accessing exam questions prior to exams.

### **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/academicintegrity/>

### **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.html>

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) (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/>