



MBG*3040 Molecular Biology of the Gene

Fall 2021

Section(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 1.00 - September 04, 2021

1 Course Details

1.1 Calendar Description

In this course, the structure, expression, control and modification of eukaryotic genes will be discussed with an emphasis on the underlying mechanisms and structure/function relationships. Many topics covered in introductory courses are included but discussed at a more advanced level. Students will have the opportunity to learn current genetic concepts and principles through lectures, as well as the application of this knowledge in the real world through primary literature reading and group research projects.

Pre-Requisites: MCB*2050

Restrictions: MBG*4080

1.2 Course Description

This is an advanced genetics course focused on eukaryotic gene expression and regulation. The structure, expression, control and modification of genes will be discussed with an emphasis on the underlying mechanisms and structure/function relationships. Many topics covered in introductory courses are included but discussed at a much more advanced level. Students will have the opportunity to learn current genetic concepts and principles through lectures, as well as application of this knowledge in the real world through primary literature reading and group research projects.

1.3 Timetable

Lectures: Tuesdays and Thursdays, 11:30-12:50, Room RICH 2520

Instructor's Office Hours: Wednesdays, 11:00 am -12:00 pm or by appointment. Virtual via Zoom

Key Dates

- Tue Sep 21: Quiz 1
- Sep 20 - Sep 26: Discussion 1 (online)
- Tue Sep 28: Quiz 2
- Tue Oct 5: Quiz 3
- Oct 13 - Oct 19: Discussion 2 (online)
- **Thu Oct 7: Midterm exam**
- Thu Oct 14: Due date for approval of the research article
- Tue Oct 26: Quiz 4
- Tue Nov 2: Quiz 5
- Nov 1 - Nov 7: Discussion 3 (online)
- Tue Nov 9: Quiz 6
- Thu Nov 11: Due date for written essay
- Thu Dec 2: Due date for Peer Assessment
- **Final exam - December 16; 8:30-10:30 am**

1.4 Final Exam

Thursday, Dec 16; 8:30-10:30 am (non-cumulative)

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Renuka Karunagoda
Email:	renukak@uoguelph.ca
Office Hours:	Wednesdays 11:00 am -12:00 pm or by appointment via Zoom or email

2.2 Teaching Assistants

Teaching Assistant (GTA):	Briana Locke
Email:	blockc@uoguelph.ca

3 Learning Resources

3.1 Required Resources

Molecular Biology (Textbook)

Molecular Biology. R.F. Weaver, McGraw-Hill Higher Education, 5th (2012) edition.

On reserve in the Library.

Courselink (Website)

<https://courselink.uoguelph.ca>

This course will make use of the University of Guelph's course website Courselink. Consequently, you are responsible for all information posted on the Courselink page for MBG*3040. Please check it regularly.

3.2 Recommended Resources

Lewin's Genes (Textbook)

Lewin's Genes XI (2014), Krebs, Goldstein and Kilpatrick, Jones & Bartlett Learning.

On reserve at the Library.

Molecular Biology of the Gene (Textbook)

Molecular Biology of the Gene, J.D. Watson, T.A. Baker, S.P. Bell, A. Gann, M. Levine, R. Losick, 7th (2014) Edition, CSH Press.

On reserve in the Library.

Undergraduate Calendar (Website)

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/>

The Undergraduate Calendar is the source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs.

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Describe molecular structure and properties of genes and chromosomes
2. Recognize and describe complex eukaryotic gene regulation at the transcriptional, post-transcriptional, translational and post-translational levels
3. Classify and explain macromolecular interactions involved in specific gene regulatory mechanisms
4. Apply the knowledge of cell and molecular biology to real-life situations and practice

- working effectively in small groups and peer facilitation
5. Use online tools to research a particular topic, and critically review primary research articles in molecular genetics in working groups and individually
 6. Communicate science (in both written and oral forms) effectively
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5 Teaching and Learning Activities

5.1 Lecture

Week 1

Topics: **1. Introduction to the course**

Week 2

Topics: **2. Eukaryotic Transcription and Transcriptional Regulation**
 2.1. RNA polymerases and promoters
 2.2. General transcription factors

Week 3

Topics: 2.3. Transcription activators and repressors

Discussion 1

Tue, Sep 21, 11:30 AM

Topics: **QUIZ 1**

Week 4

Topics: 2.4. Chromatin structure and epigenetics

Tue, Sep 28, 11:30 AM

Topics: QUIZ 2

Week 5

Topics: 2.5. RNA splicing and processing

Tue, Oct 5, 11:30 AM

Topics: QUIZ 3

Week 6

Topics: 3. Post-Transcriptional Events and Regulation
3.1. mRNA stability and localization

Discussion 2

Week 7

Topics: 3.2. RNA interference

Week 8

Topics: 4. Translation and Post-translational Regulation
4.1. Initiation of Translation in Eukaryotes

Tue, Oct 26, 11:30 AM

Topics: QUIZ 4

Week 9

Topics: 4.2. Mechanisms of Eukaryotic Initiation Control

Discussion 3

Tue, Nov 2, 11:30 AM

Topics: QUIZ 5

Week 10

Topics: 4.2. Post-translational control mechanisms

Tue, Nov 9, 11:30 AM

Topics: QUIZ 6

Tue, Nov 16

Topics: Presentations - Groups 1 and 2

Thu, Nov 18

Topics: Presentations - Groups 3 and 4

Tue, Nov 23

Topics: Presentations - Groups 5 and 6

Thu, Nov 25

Topics: Presentations - Groups 7 and 8

Tue, Nov 30

Topics: Presentations - Groups 9 and 10

Thu, Dec 2

Topics: Presentations - Groups 11 and 12

5.2 Seminar

Thu, Sep 23

Topics: Tutorial by TA

Tue, Oct 26

Topics: Tutorial by TA

5.3 Mid-term exam

Thu, Oct 7, 11:35 AM - 12:35 PM

(covers materials from Week 1-5)

6 Assessments

6.1 Marking Schemes & Distributions

1. Oral Presentation OR Written Essay

Students will form groups of 6 members. Students can pick their group members during the first week (until Sep 16). After that, the rest of the students will be automatically assigned to a group.

Each group has to select a primary research article (published within the last five years) on a particular gene regulation for the oral presentation or written essay. The groups have to submit it **on or before October 14 to get approval**. There will be a dropbox to submit the articles.

Once you form your groups, you can indicate the preference of your group, whether you would like to do a presentation or an essay. The groups can state the preference of their choice between September 16-23. Approximately 10 groups will get to choose the 'Written essay', while about 12 groups will get to do the 'Oral presentation'. The opportunity to pick the preferred mode of the group activity will be given on a first-come-first-serve basis.

Detailed instructions and rubrics for the oral presentation and the written essay will be posted on CourseLink.

Oral presentations - This will take place during **Week 10, 11, and 12**. Each group will be given 20-22 minutes for the presentations.

Written essay - Due on **Thursday, November 11**, to a designated group Dropbox folder on the CourseLink. Rubrics and the format for the written essays (10 pages; Arial 11, double-spaced) will be posted on CourseLink. Each group needs to submit a single copy of the essay (one member can submit the written essay on behalf of the whole group).

Peer assessment - Each student has to assess his/her group members on how the members work together for the group project and reflect on the process of preparing the presentation/written essay. Each student will get the average of the marks given by their peers. Please note that **each student has to submit his/her own peer assessment** in order to receive his/her mark.

The peer assessment is due on December 1.

Submission of the primary research article, written essay, and peer assessments are due by **11:59 pm on due dates** via submission to designated folders on the CourseLink websites. Late submission will not be accepted unless there is a legitimate reason.

2. Quizzes

There are six online quizzes and the mark of the lowest one will be dropped. The quizzes will start at 11:30 am on the designated day. Once you start the quiz, you will have 20-30 minutes to complete each quiz depending on the number of questions. The quizzes will be administered online through CourseLink using the Lockdown Browser.

3. Online Group Discussions

There are **three online discussions (Weeks 3, 6, and 9)**. Each discussion will be available for one week. Discuss the posted questions within your group, and submit the answers as a team. Your group has to post **one comment of your own and two replies** to some other group's comment. Your comments should be original and should facilitate the discussion. One member of the group has to post the comments/replies on behalf of the all members.

4. Examinations

The midterm exam will be held in the class through MyLS using the Lockdown Browser.

The final exam is non-cumulative, will be held in-person, through MyLS using the Lockdown Browser.

Assessments:

Form of Assessment		Weight of Assessment (% of final)	Course Content /Activity	Learning Outcome (see above)
Discussions (3)		10%	Lectures 1-10	1-6
Mid-term Exam		25%	Lectures Week 1-5	1-4
Option 1	Oral presentation	18%	Non-lecture	1-6
	Peer assessment	2%	Non-lecture	4-5
Option 2	Written essay	18%	Non-lecture	1-6
	Peer assessment	2%	Non-lecture	4-5
Quizzes (5 out of 6)		15%	Lectures Week 1-10	1-4

Form of Assessment	Weight of Assessment (% of final)	Course Content /Activity	Learning Outcome (see above)
Final Exam	30%	Lectures Week 6-10 and non-lecture materials	1-6

7 Course Statements

7.1 Other important information

Please refer to CourseLink often for lecture notes, announcements etc. The lectures will be offered in-person unless the university advises otherwise.

Office hours will be available through a video conferencing platform supported by the university, such as Zoom. For more information about Zoom, please visit relevant websites.

8 Department of Molecular and Cellular Biology Statements

8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. <http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. <https://www.uoguelph.ca/counselling/>
- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.selfregulationskills.ca/>

8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) <http://www.e-laws.gov.on.ca/index.html>. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar.

(<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml>)

8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg->

regchg.shtml

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

9.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>

- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
