



# MBG\*3040 Molecular Biology of the Gene

Fall 2023

Section(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 1.00 - August 30, 2023

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## 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 and RNA 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 assignments.

### 1.3 Timetable

**Lectures:** Tuesdays and Thursdays, 11:30-12:50, Room LA 204

**Instructor's Office Hours:** Jim Uniacke - Starting Oct. 26 - Thursdays, 1:00 pm -3:00 pm, In person (SSC 2244) or virtual via Zoom.

**Key Dates**

- Thu Sept 7: First day of class
- Thu Sept 21: Quiz 1
- Thu Oct 5: Quiz 2
- Tue Oct 10: No class
- **Thu Oct 19: Midterm**
- Thu Nov 2: Quiz 3
- Thu Nov 16: Quiz 4
- **Final exam - due December 4**

## 1.4 Final Exam

**Monday December 4 - Take home Final assignment due by 11:59PM in Dropbox (Not Cumulative)**

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## 2 Instructional Support

### 2.1 Instructional Support Team

**Instructor:** Renuka Karunagoda  
**Email:** renukek@uoguelph.ca  
**Office:** SSC 3456  
**Office Hours:** Thursdays 1:00-3:00pm until October 19th

**Instructor:** James Uniacke  
**Email:** juniacke@uoguelph.ca  
**Telephone:** +1-519-824-4120 x54739  
**Office:** SC1 2244  
**Office Hours:** Starting Oct. 26 - Thursdays, 1:00 pm -3:00 pm, In person (SSC 2244) or virtual via Zoom.

### 2.2 Teaching Assistants

**Teaching Assistant (GTA):** Colin Guth  
**Email:** cguth@uoguelph.ca  
**Teaching Assistant (GTA):** Madison Van Zyl  
**Email:** mvanzyl@uoguelph.ca

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## 3 Learning Resources

### 3.1 Required Resources

#### 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

#### Molecular Biology (Textbook)

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

On reserve in the Library.

#### 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, 7<sup>th</sup> (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.

#### INTRODUCTION TO MOLECULAR BIOLOGY, CELL BIOLOGY AND GENETICS (Textbook)

INTRODUCTION TO MOLECULAR BIOLOGY, CELL BIOLOGY AND GENETICS (TEXTBOOK)

**Department of MCB, University of Guelph Custom Text for BIOL 1090/MBG 2040/MCB 2050 - MacMillan. 2021**

MBG\*3040 refers to material in chapters 8 and 9 from the Lodish textbook within this custom textbook package.

**All students who took BIOL 1090 in F20 (or MBG\*2040 or MCB\*2050) or more recently will have already purchased this textbook**

## 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 newly presented problems and practice working effectively in small groups
  5. Use online tools to research a particular topic, and critically review primary research articles in molecular genetics in working groups or individually
  6. Communicate science in written form effectively
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## 5 Teaching and Learning Activities

### 5.1 Lecture

#### Week 1

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

#### Week 2

**Topics:** **Eukaryotic Transcription and Transcriptional Regulation**  
RNA polymerases and promoters  
General transcription factors

#### Week 3

**Topics:** Transcription activators and repressors

Quiz 1 due - Thursday September 21

**Week 4**

**Topics:** Chromatin structure and epigenetics

**Week 5**

**Topics:** RNA splicing and processing

Quiz 2 due - Thursday October 5

**Week 6**

**Topics:** Midterm Oct. 19

**Week 7**

**Topics:** RNA Editing

**Week 8**

**Topics:** mRNA stability

Quiz 3 due Nov. 2

**Week 9**

**Topics:** mRNA localization

**Week 10**

**Topics:** RNA interference

Quiz 4 due Nov. 16

**Week 11**

**Topics:** Translational control mechanisms

**Week 12**

**Topics:** Final Exam due December 4

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## 6 Assessments

### 6.1 Marking Schemes & Distributions

#### Quizzes and exams

These will be a mix of in-class and take home exams/assignments. Instructions will be provided on the assignments.

The two halves of the course are separate and the material from the first half will not carry over into the assessments for the second half.

Quizzes 40% (four quizzes of 10% each)

Midterm 30%

Final 30%

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## 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 in-person or through 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 make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

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

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

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