



# MBG\*2040 Foundations in Molecular Biology and Genetics

Fall 2021  
Section(s): C01

Department of Molecular and Cellular Biology  
Credit Weight: 0.50  
Version 1.00 - September 07, 2021

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## 1 Course Details

### 1.1 Calendar Description

This course will develop an understanding of the fundamental concepts in genetics, including patterns of inheritance, allelic variation, gene interaction, linkage, gene mapping and changes in chromosome structure and number. This will be followed by in-depth discussions on gene structure, replication, transcription, translation, recombination, mutation and DNA repair, and an introduction to gene regulation.

**Pre-Requisites:** 4.00 credits including BIOL\*1090

### 1.2 Course Description

Course Goals:

This course will provide an introduction to the disciplines of molecular biology and genetics. The first half will serve to develop an understanding of the fundamental concepts in genetics, including patterns of inheritance, allelic variation, gene interaction, linkage, recombination, gene mapping, DNA and chromosome structure and its variations. This will be followed by an introduction to the field of molecular biology and include the topics of DNA replication, transcription, translation, mutation and DNA repair, and gene regulation. (0.5 credits, Prerequisite: BIOL\*1090)

### 1.3 Timetable

**Lectures:**

Lectures are posted each week on the MBG 2040 Courselink site. The scheduled lectures (M/W/F 10:30 am - 11:20 am, - virtual) are asynchronous, meaning that they can be viewed at any time. Lectures for the week will be posted by Mon. at 10:30 am, unless stated otherwise

by the instructor. It is highly recommended that students complete each each set of lectures by the end of the week they are posted. Material in lectures will be expanded upon in the virtual seminars and assessed in weekly quizzes.

**Virtual Seminars:** There are nine virtual seminars throughout the semester beginning the week of Sept. 13th. See the Activities section for a full description and schedule.

**Online Quizzes:** Online quizzes are held each week that seminars run. Ideally students write the quizzes after completing their seminar in order to be fully prepared. Quiz 1 opens Sept. 13th. See the Activities section for a full description and schedule.

**Students are responsible for all material given in lectures and seminars.**

## 1.4 Final Exam

**Online Exam: December 16th, 8:30 am - 10:30 am, requires Respondus Monitor**

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# 2 Instructional Support

## 2.1 Instructional Support Team

**Instructor:** Dr. Jim Uniacke  
**Email:** juniacke@uoguelph.ca  
**Office:** SSC2244  
**Office Hours:** Virtual office hours will be held via Zoom on Wednesdays from 11:30 am - 1:30 pm, beginning Sept 15th. The Zoom link can be accessed from the main navigation bar in the MBG 2040 Courselink site.

Attend these office hours for questions regarding Dr. Uniacke's lecture material.

Dr. Uniacke is the instructor for the first half of MBG\*2040, lectures 1-18 inclusive. Lectures will be posted before class.

**Instructor:** Dr. Mark Baker  
**Email:** mdbaker@uoguelph.ca  
**Office Hours:** Office hours will be held virtually. Details will be announced in Dr. Baker's first lecture.

Attend these office hours for questions regarding the Dr. Bakers lecture material.

Dr. Baker is the instructor for the second half of MBG\*2040, lectures 19 - 36 inclusive. His first week of lectures will be posted on Mon. Oct. 25th and his last set of lectures posted the week of Nov. 29 - Dec. 3.

**Course Co-ordinator:** Catrien Bouwman

**Email:** cbouwman@uoguelph.ca  
**Telephone:** 519-824-4120 ext. 52533  
**Office:** Online via Zoom and in-person in room SSC 3513  
**Office Hours:** **Virtual Office Hours: Wed. 10 am - 11 am via Zoom (accessed through CourseLink) - beginning Sept 15th**

**In-person Office Hours: Thurs. 10 am - 11am in room SSC 3513 - beginning Sept 16th**

## 2.2 Teaching Assistants

The teaching assistants are graduate students in the Department of Molecular and Cellular Biology. Please do not contact them outside of your tutorial sessions unless they have given you permission to do so.

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## 3 Learning Resources

### 3.1 Required Resources

**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. 2019**

MBG\*2040 uses selected chapters from the Pierce - Genetics: A Conceptual Approach portion of the custom textbook package.

This textbook package can be purchased at the U of G Bookstore or Co-op Bookstore. It includes a hard copy of the custom text as well as **4 years** of access to the digital platform ACHIEVE which includes the e-book and additional learning resources. A digital only version of this package is also available.

**All students who took BIOL 1090 in F18 or more recently will have already purchased this textbook and therefore they DO NOT need to purchase a text for MBG\*2040.** These students will receive an email from MacMillan Learning (textbook publisher) with a new access code and instructions to set up their digital ACHIEVE access for both the text and the digital resources required for MBG\*2040.

Questions regarding the MBG\*2040 textbook package can be directed to the course coordinator Catrien Bouwman at cbouwman@uoguelph.ca.

#### Course Website (Website)

<http://courselink.uoguelph.ca>

There is a CourseLink (D2L) site set up for this course. This will allow you to access the course material, post questions on the discussion board (see below), access useful websites, and check your grades. You can access this CourseLink from the link provided. Login with your username which is your Central Login ID and your password is your

university email password.

**You are responsible for all information posted on the CourseLink page for MBG\*2040. Please check it regularly.**

### **3.2 4 Steps to Getting Help in MBG\*2040**

Step 1: Read all posted instructions relevant to your question.

Step 2: Consult the discussion board on CourseLink.

The discussion board is an open forum to promote exchange of information between students.

You are encouraged to post clear, concise questions and to try to answer other students' posts. When posting a question please use a subject line that clearly indicates the topic of your question, making it easy for other students to find topics they wish to discuss. The teaching team will monitor the discussion board and provide input when deemed appropriate. Please keep all questions and comments relevant to the course. Inappropriate postings will not be tolerated.

Step 3: Post your question to the relevant discussion board on CourseLink.

Step 4: If you are not satisfied by the responses, see an instructor during office hours.

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## **4 Learning Outcomes**

### **4.1 Course Learning Outcomes**

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

1. Understand and predict how single-gene traits can be tracked in multigenerational pedigrees.
2. Understand that phenotype is the result of interactions between genetic and environmental factors.
3. Explain how chromosome assortment and recombination result in gametes with new allele combinations.
4. Understand how polyploidy is common in plants and rare in animals.
5. Explain how chromosomal nondisjunction events can cause aneuploidy.
6. Describe and discuss how structural changes in chromosomes can have medical and evolutionary significance.

7. Understand and describe the processes of DNA replication, transcription and RNA processing, translation and the genetic code.
  8. Explain factors that contribute to genetic mutations and describe repair mechanisms and recombination events.
  9. Describe bacterial genetics and viruses.
  10. Understand the basic principles of genetic regulation.
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## 5 Teaching and Learning Activities

### 5.1 Lecture

**Topics:** Lecture Schedule

A provisional schedule of lecture topics and text chapter readings can be found below. Material given in the lectures is the responsibility of the student. Students are expected to view all lectures and attend all seminars. Lecture recordings are solely for the use of the F21 MBG\*2040 students and may not be reproduced or transmitted to others without the written consent of the instructors. **Lecture Schedule is subject to modification.**

| <b>Lecture</b> | <b>Lecture Topic</b>                                     | <b>Pierce - 6th ed.</b> |
|----------------|--|-------------------------|
|                |  | <b>Text Chapters</b>    |
| 1-5            | Review, Extensions and Modifications of Basic Principles | 3, 4.3, 6, 5, 25.2      |
| 6-8            | Chromosome Variation                                     | 8                       |
| 9-12           | Linkage and Recombination                                | 7                       |
| 13-15          | Bacterial and Viral Genetic Systems                      | 9                       |
| 16-18          | DNA and Chromosome Structure                             | 10-11                   |
| 19-21          | DNA Replication  | 12                      |
| 22-25          | Transcription and RNA Processing                         | 13-14                   |

| <b>Lecture</b> | <b>Lecture Topic</b>                   | <b>Pierce - 6th ed.</b> |
|----------------|--|-------------------------|
|                |  | <b>Text Chapters</b>    |
| 26-28          | The Genetic Code and Translation       | 15                      |
| 29-33          | Gene Mutations and DNA Repair          | 18                      |
| 34-36          | Control of Gene Expression in Bacteria | 16                      |

## 5.2 Seminar

**Topics:** Seminar and Online Quiz Schedule

**Seminars:** The MBG\*2040 seminars are designed to reinforce concepts and terminology introduced in lectures and to improve problem-solving skills. Tutorials will be held virtually via Zoom. All students require a free basic Zoom account to attend seminars. Links to the Zoom/Teams seminar meetings can be found in Courselink under Content - Link to Zoom Seminars. Each week a seminar assignment will be posted in Seminars. Students should download and review this assignment *before* their designated seminar time. Virtual seminars are led by Teaching Assistants who will assist the students in real time as they complete the assignments. Completed assignments should be kept as study guides for the midterm and final exams.

**Seminar Marks:** There are 9 seminars throughout the semester each with a corresponding assignment. Seminar marks are based on both attendance and participation. Each seminar is worth 1% of the final grade. The best 7 out of 9 marks make up the overall Seminar grade for a total of 7%.

**Students must attend the seminar which they are registered for and will not receive marks for attending an incorrect section.** Students are responsible for ALL material covered in seminars.

**Online Quizzes:** There are a total of 9 online quizzes which open each week of tutorials, Mondays at 12:00 am and close that Friday at 11:59 pm. These quizzes are designed to both assess your knowledge of the seminar and lecture material for each unit, as well as provide practice for the midterm and final. Each quiz will be 60 min. in length and consist of 10 multiple choice, True/False, or short answer questions.

Quizzes are worth a total of 14% of the final mark (2% each, best 7 of 9). Once each quiz closes you will be able to review your incorrect responses. The quizzes will re-open as a midterm/final exam practice tool and you will have unlimited attempts for each quiz, however, your original quiz grade will be final. Any questions regarding the online quizzes

should be directed to Catrien Bouwman, the Course Coordinator: cbouwman@uoguelph.ca.

Any dispute regarding your tutorial or quiz grade must be brought to the attention of the Course Coordinator within one week after the grade has been posted on CourseLink.

**NOTE: Posting any tutorial or quiz questions on any social media or course material sharing websites violates University of Guelph copyright and Academic Integrity policies and will be considered academic misconduct. Please refer to the section on Academic Integrity below for more information regarding expectations and penalties.**

| <b>Week of</b> | <b>Topic</b>   | <b>Quiz Opens/Close Dates</b>  |
|----------------|--|--|
|                |  | <b>All quizzes open at 12:00 am/<br/>close at 11:59 pm on the<br/>dates listed</b> |
| Sept. 8        | <b>No seminar/quiz</b>                                       |  |
| Sept.13        | Tutorial 1: Review questions on Mendelian principles         | Quiz 1: Sept. 13th/17th  |
| Sept.20        | Tutorial 2: Extensions of Mendelism                          | Quiz 2: Sept. 20th/24th  |
| Sept.27        | Tutorial 3: Variation in Chromosome Number and Structure     | Quiz 3: Sept. 27th/Oct. 1st  |
| Oct. 4         | Tutorial 4: Linkage and Recombination                        | Quiz 4: Oct. 4th/8th   |
| Oct. 11        | <b>FALL STUDY BREAK - No seminar/quiz</b>                    |  |
| Oct. 18        | Tutorial 5: Bacterial Genetics                               | Quiz 5: Oct. 18th/22nd   |
| Oct. 25        | <b>Midterm: Sat. Oct. 30th, 9 am - 10:30 am<br/>(Online)</b> |  |
|                | <b>No Seminar/quiz</b>                                       |  |
| Nov. 1         | Tutorial 6: DNA Replication                                  | Quiz 6: Nov. 1st/5th   |

|         |                           |                        |
|---------|---------------------------|------------------------|
| Nov. 8  | Tutorial 7: Transcription | Quiz 7: Nov. 8th/12th  |
| Nov.15  | Tutorial 8: Translation   | Quiz 8: Nov.15th/19th  |
| Nov. 22 | Tutorial 9: Mutation      | Quiz 9: Nov. 22nd/26th |
| Nov. 29 | <b>No seminar/quiz</b>    |                        |

**Final Exam: Thurs. Dec. 16th, 8:30 am - 10:30  
am (Online)**

## 6 Assessments

Grades will be assigned according to the standards outlined in the U of G Undergraduate Calendar (p40H41).

### 6.1 Assessment Details

#### Seminars (7%)

**Date:** During weeks with scheduled tutorials (9 total)

**Learning Outcome:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Best 7 out of 9

**Students must attend the seminar section which they are registered for AND participate in 'break-out' rooms to receive the seminar mark.**

#### Online Quizzes (14%)

**Date:** Open each week of the associated tutorial, Mon. 12:00 am/ Close that Friday, 11:59 pm

**Learning Outcome:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Best 7 out of 9

#### Midterm Examination (35%)

**Date:** Online

**Learning Outcome:** 1, 2, 3, 4, 5, 6

The midterm exam will be held online on **Sat. Oct 30th, 9 am - 10:30 am**. This exam will cover content from lectures 1-18 and seminar assignment 1-5. The midterm exam is



**compulsory** and will count for 35% of your final grade. The format of this exam will be multiple choice and short answer. Alternate times will be set for midterm exams if there is a direct conflict with another course or with a Gryphon Varsity event that is confirmed by the coach. **Conflicts of this nature must be reported to the course coordinator by Friday Oct. 1st.** If a student does not write the midterm exam they will receive a grade of 0% unless proper documentation is provided to the course coordinator **by 4:30 on Wed. Nov. 3rd.**

**This course will be using Respondus invigilation software for the midterm exam. All students will require reliable internet access and a webcam. More details will be provided on CourseLink.**

### Final Exam (44%)

**Date:** Thu, Dec 16, 8:30 AM - , 10:30 AM, Online

**Learning Outcome:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

The final exam will be held online on **Thurs. Dec 16th, 8:30 am - 10:30 am.** The final exam is a compulsory examination and will cover content from the entire course. The format of this exam will be multiple choice and short answer.

**This course will be using Respondus invigilation software for the Final exam. All students will require reliable internet access and a webcam. More details will be provided on CourseLink.**

## 6.2 Missed Tutorials or Quizzes

The mark for your tutorials and quizzes will be calculated from your best 7 of 9 marks. The first two missed tutorials or quizzes will be dropped as your lowest mark regardless of the reason for absence. If more than two tutorials or quizzes are missed the weight of either one can be transferred to the weight of the exam, provided acceptable documentation has been received. Acceptable documentation needs to be sent to the course coordinator within 1 week of your missed assessment. Please note that the tutorials and quizzes are separate grade items therefore you can write a quiz even if you miss the corresponding tutorial.

## 6.3 Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/undergraduate/20152016/c08/c08-ac.shtml>

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# 7 Course Statements

## 7.1 Grading

If you are absent from seminars during the semester, you will be expected to make up the missed material on your own.

# 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.

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