



MBG*2040 Foundations in Molecular Biology and Genetics

Winter 2024

Section(s): 01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 1.00 - December 20, 2023

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:

Tuesday/Thursday, 8:30-9:50 am in War Memorial Hall (WMEM) Room 103

Note: Lecture times and Locations are subject to change, Please check WebAdvisor for the

most up to date information

Seminars: There are 10 seminars throughout the semester beginning the week of Jan. 15th. Please refer to WebAdvisor for your scheduled seminar day, time and room.

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 Jan. 15th. 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

Final Exam: April 16, 8.30 am- 10.30 am.

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Muhammad Zaman
Email:	mzaman02@uoguelph.ca
Office:	SSC 4252
Office Hours:	Office Hours: Thursdays 1.00pm - 3.00pm

Dr. Zaman is the instructor for the first half of MBG*2040. Please attend these office hours for questions regarding Dr. Zaman's lecture material.

Instructor:	Terry Van Raay
Email:	tvanraay@uoguelph.ca
Telephone:	+1-519-824-4120 x52864
Office:	SSC 3247
Office Hours:	Office Hours:

Dr. Van Raay is the instructor for the second half of MBG*2040. Please attend these office hours for questions regarding Dr. Van Raay's lecture material.

Course Co-ordinator:	Dr. Satinder Gidda
Email:	mbg2040@uoguelph.ca
Office:	SSC 3520

Office Hours: **Wednesdays 11.00 am to 12.00 pm**

Attend office hours for questions regarding the seminar material and quizzes.

Course Co-ordinator: Akash Jairaj
Email: mbg2040@uoguelph.ca
Office: SSC 4251
Office Hours: **Wednesdays 11.00 am to 12.00 pm**

Attend office hours for questions regarding the seminar material and quizzes.

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.

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. 2021. 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 F21 or more recently will have already purchased this textbook and therefore they DO NOT need to purchase a text for MBG*2040. To access Achieve, you must: Use the link found in MBG 2040 Courselink page and use your University of Guelph email (that is associated with your Courselink account). Questions regarding the MBG 2040 textbook package can be directed to the course coordinators at mbg2040@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.

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.

5 Teaching and Learning Activities

5.1 Lecture

Topics:

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 attend all lectures and attend all seminars. **Lecture Schedule is subject to modification.**

Lecture	Lecture Topic	Pierce - 6th ed.
		Text Chapters
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
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

Lecture Lecture Topic**Pierce - 6th ed.****Text Chapters**

5.2 Seminar

Topics: Seminar and Online Quiz Schedule

Seminars: Seminars are offered in person only. Please refer WebAdvisor to know the date, time and location for your section's seminar. Each week a seminar assignment will be posted under the Seminars tab in CourseLink.

The MBG*2040 seminars are designed to reinforce concepts and terminology introduced in lectures and to improve problem-solving skills. Students should download and review this assignment before their designated seminar time. Seminars are led by Teaching Assistants who will assist the students as they complete the assignments. Completed assignments should be kept as study guides for the midterm and final exams.

Seminar Marks: There are 10 seminar assignments throughout the semester. Seminar marks are based on both attendance and participation. Each seminar is worth 1% of the final grade. The best 7 out of 10 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 10 online quizzes which open each week, 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 30 min. in length and consist of 10 multiple choice, True/False, or short answer questions. Quizzes are worth a total of 21% of the final mark (3% each, best 7 of 10). Once each quiz closes you will be able to review your incorrect responses. The quizzes will re-open as a midterm review/ exam review practice quizzes 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 the Course Coordinators at mbg2040@uoguelph.ca.

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

NOTE: Electronic recording or photographs of lectures and tutorials is expressly forbidden without prior consent of the instructor. When recordings are permitted, they are solely for the use of the authorized students and may not be reproduced, or transmitted to others, without the express written consent of the instructor. You should not be using electronic devices, like cell phones and ipads during lecture. Not only is it distracting you from the lecture, but also distracting to those around you. If you have to use a laptop, it

should be for only lecture related material (e.g. taking notes).

Posting any Seminar 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.

Week of	Topic	Quiz Opens/Close Dates
		All quizzes open 12:00 am and close 11.59pm
Jan 8	No seminar/quiz	
Jan 15	Seminar1: Review questions on Mendelian principles	Quiz 1: Jan. 15 - 19
Jan 22	Seminar 2: Extensions of Basic Principles	Quiz 2: Jan 22- 26
Jan 29	Seminar 3: Chromosome Variation	Quiz 3: Jan 29- Feb 2
Feb 5	Seminar 4: Linkage and Recombination	Quiz 4: Feb 5 - 9
Feb 12	Seminar 5: Bacterial and Viral Genetics	Quiz 5: Feb 12 - 16
Feb 19	Winter Break - No seminar/quiz	
Feb 26	Seminar 6: Career Readiness: Building a Meaningful Career	Quiz 6: Feb 26 - Mar15
	Feb 29, Midterm: 8.30 am -9.50 am in class	
Mar 4	Seminar 7: DNA Replication	Quiz 7: Mar 4 - 8
Mar 11	Seminar 8: Transcription	Quiz 8: Mar 11 - 15
Mar 18	Seminar 9: Translation	Quiz 9: Mar 18 - 22

Mar 25 Seminar 10: Mutation

Quiz 10: Mar 25 -April 1

April 1

No seminar/quiz**Final Exam: April 16, 8.30 am**

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 (10 total)

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

Best 7 out of 10

Students must attend the seminar section which they are registered for AND participate in seminar discussions. No accommodations will be granted if more than three seminars are missed.

Online Quizzes (21%)

Date: Open each week of the associated seminar, 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 10

No accommodations will be granted if more than three quizzes are missed. The quizzes cannot be extended beyond the 5 day period they are open. Students with medical or compassionate issues that cover the entire one-week period the quiz is open, will be granted a changed mark weighting.

Midterm Examination (36%)

Date: Thu, Feb 29, 8:30 AM - 9:50 AM, In Class (WMEM 103)

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

This exam will cover content from Week 1-6 Lecture material and seminar assignment 1-5. The midterm exam is **compulsory** and will count for 36% of your final grade. The format of this exam will be multiple choice. Alternate times will be set for midterm exams only if there is a direct conflict of exam time with another course or if there is a Gryphon Varsity

event on the day of scheduled exam (has to be confirmed by the team coach). Conflicts of this nature must be reported to the course coordinator no later than Friday Feb 2nd. **Only one alternative date will be provided.**

If a student does not write the midterm they will receive a grade of 0% unless proper documentation is presented to the course instructors no later than three days after the scheduled exam. Students who are unable to write the midterm exam and provide proper documentation, the final exam will be reweighted to 72% and will be required to write a separate final exam with 50% content from the first half of the course and 50% content from the second half of the course. Documents must be provided to the course coordinator to be considered.

Final Exam (36%)

Date: Tue, Apr 16, 8:30 AM - 10:30 AM, TBD

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

The final exam is a compulsory examination and will cover content from the second half of the course. Students who are unable to write the midterm exam, for a good reason, the weight of the midterm will be transferred to the final exam. This final exam will be worth 72% with 50% content from the first half of the course and 50% from second half of the course.

Deferral Policy: If you are unable to write the final exam at the scheduled time due to a valid medical or compassionate reason, please contact your program counsellor as soon as possible to apply for a deferred exam. Deferred exams will be held during the deferred exam period scheduled by the Registrar's Office the following semester. Instructors are not able to provide alternate exam times for final exams.

6.2 Missed Seminars or Quizzes

The mark for your seminars and quizzes will be calculated from your best 7 of 10 marks. The first three missed seminars or quizzes will be dropped as your lowest mark regardless of the reason for absence. No accommodation will be granted for more than three missed seminars or quizzes. Please note that the seminars and quizzes are separate grade items therefore you can write a quiz even if you miss the corresponding Seminar.

6.3 Academic Consideration

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

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 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 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).
