MCB*2050 Molecular Biology of the Cell

Fall 2021
Section(s): C01

Department of Molecular and Cellular Biology
Credit Weight: 0.50
Version 2.00 - October 21, 2021

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1 Course Details

1.1 Calendar Description

This course will develop an understanding of the key concepts of the molecular biology of the cell, integrating principles of cell structure and function with the underlying molecular mechanism(s). Discussions will focus on aspects of gene regulation, genomics, cell cycle control, protein synthesis, intracellular protein trafficking and protein degradation in eukaryotic cells. Many of these concepts will be discussed in the context of how defects in cellular processes give rise to disease.

Pre-Requisites: BIOC*2580, MBG*2040

1.2 Course Description

Course Objectives:

This course builds on the fundamental concepts of genes, genetics and molecular biology that are covered in MBG*2040, and continues to develop a deeper understanding of the molecular biology of the cell by integrating principles of cell structure and function with the underlying molecular mechanisms. Discussions will focus on aspects of gene regulation, cell cycle control, protein synthesis, intracellular protein trafficking and protein degradation in eukaryotic cells and techniques used to study them. Many of these concepts will be discussed in the context of diseases that are caused by defects in these cellular processes. (0.5 credits, Prerequisites: BIOC*2580, MBG*2040)

1.3 Timetable

Lectures:

All lecture recordings will be posted on the MCB*2050 Courselink site on Mondays, Wednesdays and Fridays, beginning on Friday Sept. 10th. The scheduled lectures (M/W/F 1:30 pm - 2:20pm - virtual) are asynchronous, meaning students can view them at anytime.

However, it is recommended that students view them on the day they are posted in order to stay on track.

Lectures representing the basic course material are further clarified and amplified by textbook, tutorial and seminar material. Students are responsible for all content covered in lectures and tutorials.

Seminars:

Weekly synchronous seminars are held on Tuesdays beginning on Sept. 28th. Students must attend the seminar section in which they are registered.

1.4 Final Exam

Online Exam:

Wed. Dec. 15th, 7 pm - 9 pm

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2 Instructional Support

2.1 Instructional Support Team

Instructor:	Dr. John Vessey
Email:	jvessey@uoguelph.ca
Office Hours:	Virtual Office Hours: Day and time will be announced in the first lecture. Attend these office hours for questions regarding the lecture material.
Course Co-ordinator:	Catrien Bouwman
Email:	cbouwman@uoguelph.ca
Telephone:	519-824-4120 ex. 52533
Office:	Virtual via Zoom, in-person room SSC 3513
Office Hours:	**Virtual Office Hours: Zoom (link will be posted on CourseLink) - Wed. 11 am - 12 pm, beginning Sept 15th.** **In-person Office Hours: SSC 3513 - Thurs. 11 am - 12 pm, beginning Sept 16th** Attend these office hours for questions regarding the Tutorial material, seminars or quizzes. Questions or concerns of a private nature should be emailed in order to protect student privacy.

2.2 Teaching Assistants

The tutorial instructors are graduate students from the Department of Molecular and Cellular Biology. Please do not contact them outside of your tutorial hours 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. MCB*2050 uses selected chapters from the Molecular Cell Biology, Lodish 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 therefore they DO NOT need to purchase a text for MCB*2050.** 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 MCB 2050. Questions regarding the MCB 2050 textbook package can be directed to the course coordinator Catrien Bouwman at cbouwman@uoguelph.ca.

Courselink (Website)

https://courselink.uoguelph.ca

There is a CourseLink web site set up for this course. You can access this CourseLink from http://courselink.uoguelph.ca. Your username is your Central Login ID and your password is your uoguelph email password. All lectures, tutorial material and course assessments can be found on the MCB*2050 Courselink site. Please login regularly to receive course announcements and updates.

The online forums are meant for discussions concerning course material only. Non-course related postings are not permitted. We always appreciate your comments to improve our teaching; however, suggestions or cocerns about the course should be brought up to the instructors directly, but not to be posted onto the forum. All postings deemed inappropriate will be removed.

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4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Describe a gene and explain the key molecular mechanisms of eukaryotic gene regulation and expression at various levels from DNA to chromosomes and final products.
2. Apply genetic and molecular principles to analyzing and interpreting experimental data.
3. Explain the conceptual and technical aspects of various molecular techniques and bioinformatics and be able to apply them to analysis of genes, genomes and gene products.
4. Describe, with examples, the molecular basis of select genetic diseases, how to map them to the genome and how to apply molecular techniques for their diagnoses and perhaps treatment.
5. Describe the basis of biotechnology as applied to microbes, animals and plants.
6. Explain the genetic/molecular principles underlying cell cycle control and cancer.
7. Explain the relationship between structure and function of the endomembrane system and nucleus.
8. Explain the synthesis, quality control and intracellular trafficking of biological molecules to specific subcellular compartments.
9. Synthesize ideas and communicate concepts in cellular and molecular biology using written communication skills in written assignments and examinations.
10. Manage time effectively and follow instructions to meet deadlines for course requirements.

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5 Teaching and Learning Activities

5.1 Lecture

Topics: Tentative Lecture Schedule

Lectures	**Topic**	**Lodish Textbook Chapter**
1-4	Overview gene expression, gene regulation in eukaryotes.	9
5-7	Gene repression and activation	9

8-9	RNA processing	10
10-12	Signal Transduction	15,16
13-18	Cell cycle, Cell Death and Cancer	19,21,25
19-21	Nucleus and Nuclear Transport	13,19
22-24	Endomembrane System	7,13
25-27	Vesicular Trafficking – ER to Golgi	13,14
28-30	Endocytic Pathway and Lysosomes	14
31-33	Mitochondria	13
34-36	Chloroplasts and Peroxisomes	14

*Lecture numbers are approximate and are provided as a guide to the order of materials covered in lectures. Some topics may be discussed over more lecture slots and some less than indicated. Lectures are posted on the M/W/F schedule and can be viewed at any time after they are posted.

Lecture recordings are solely for the use of the F21 MCB*2050 students and may not be

reproduced or transmitted to others without the written consent of the instructors.

5.2 Seminar

Topics: **Tutorial Details and Schedule**

Tutorial Material and Quizzes: There are nine online tutorials held throughout the semester which each include a graded online quiz. The tutorial materials consist of online readings, videos and activities designed to teach the techniques used to study molecular and cellular biology (Learning Outcomes 2,3). This material must be completed independently before writing the associated quiz.

Tutorials 1 - 2 focus on tools and techniques that are widely used in molecular and cellular biology. The associated quizzes (1-2) assess students only on the content covered in these tutorials. Tutorial 1 and 2 content is available on the first day of classes, Sept. 9th.

Tutorials 3 - 9 provide provide a brief review of the current lecture topic AND focus specifically on the techniques used to study this content. The quizzes at the end of each of these tutorials assess students on both the current lecture topic *and* the techniques covered in tutorial. For each of these tutorials (3-9) there is also a virtual seminar focused on applying the techniques covered in tutorial to scientific questions pertaining to the lectures. See below for a detailed description of the virtual seminars.

Students must complete the tutorial material in order to gain access to the Tutorial Quiz. Each Tutorial Quiz is worth 2% of the final grade. The best 8 of 9 quizzes are kept, comprising 16% of the final grade. Quizzes close on Tuesdays at 11:00 am. See the schedule for a complete list of all tutorial quiz due dates.

Tutorial Seminars: Tutorials 3 - 9 are followed by virtual seminars led by graduate Teaching Assistants (TAs) from the department of MCB. Seminars are held via Zoom. All students will require a free basic Zoom account created with their U of G email address in order to participate in the seminars. In these seminars students will work with their classmates to apply the techniques covered in tutorial to the lecture content by completing an application assignment. These assignments are posted the week before each seminar on Courselink, under Content - Tutorials/Seminars. The application assignments consist of 3 - 4 problem solving and data analysis questions and are meant to *challenge* students as they apply their knowledge to molecular problems. For each assignment the first 2-3 questions are completed with the assistance of the TA. The final question is completed during the seminar in 'break-out rooms', without TA assistance, and is graded. Application assignments are due at the end of seminar and should be submitted for grading into Dropbox found in the MCB 2050 Courselink navigation bar.

Students must attend the virtual seminar for which they are registered in order to receive the seminar assignment mark. Each assignment is worth 1.5% of the final mark. The best 6 of 7 grades are kept comprising 9% of the final grade.

All seminars are recorded. Students should conduct themselves in seminar as they would in a face to face lecture. Inappropriate behaviour may result in removal from the seminar. Please see the University policy on Academic Conduct.

NOTE: 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.

Tutorial	Seminar Date	Quiz Close Date (Tues. at 11:00 am)
1: Molecular Tools	No Seminar	Sept. 14th
2: Fundamental Molecular Techniques	No Seminar	Sept. 21st
3: Gene expression	Sept. 28th	Sept. 28th
4: Quantifying RNA	Oct. 5th	Oct. 5th
5: Signal Transduction	Oct. 19th	Oct. 19th
6: Cell cycle and Apoptosis	Oct. 26th	Oct. 26th
7: Nucleus and Nuclear Transport	Nov. 9th	Nov. 9th
8: ER and Golgi compartments	Nov. 16th	Nov 16th
9: Endocytic Pathways and Lysosomes	Nov. 23rd	Nov. 23rd

5.3 Notes

Any dispute regarding your Tutorial Quiz or Seminar Assignment marks has to be raised with the course coordinator within one week after the marks are posted.

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

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6 Assessments

6.1 Assessment Details

Tutorial Quizzes (16%)
Date: Open for one week each
Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Best 8 of 9 (2% each)

Seminar - Application Assignments (9%)
Date: In scheduled tutorials
Learning Outcome: 2, 3, 5, 9, 10
Best 6 out of 7 (1.5% each)

Midterm Examination (35%)
Date: Sat, Oct 30, 10:30 AM - 12:00 PM, Online
Learning Outcome: 1, 2, 3, 4, 5, 6
There will be a midterm examination will be held online, Saturday October 30th, from 10:30 am to 12 pm. The midterm examination is compulsory and accounts for 35% of your final grade. Alternate times will be set for midterm exams only if there is a direct conflict with another course that has been reported to the instructor by Friday Oct. 1st, if there is a Gryphon Varsity event that is confirmed by the team coach, in case of illness or extenuating

circumstance on the day of the scheduled exam.

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 may be required to write a separate final exam with proportionally more content from the midterm.

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 (40%)
Date: Wed, Dec 15, 7:00 PM - , 9:00 PM
Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 9
The final exam will be held online on Wed. Dec. 15th, 7 pm - 9 pm. The final exam is a compulsory examination and will be comprehensive covering content from the entire course.

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.

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7 Course Statements

7.1 Policy for Re-grading of Midterm Exams

Students who wish to have their midterm exam re-graded must submit a request to the instructor within 1 week after writing the midterm exam. The entire midterm exam will be re-graded so the mark may go up, down or remain unchanged.

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

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