

MCB*2050
Molecular Biology of the Cell
Winter 2016

Department of Molecular and Cellular Biology
College of Biological Science
University of Guelph

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, genomics, 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)

COURSE PERSONNEL

INSTRUCTORS

Dr. Richard Mosser (Lectures 1-18)
Office: SSC 3463
Ext: 58059
Email: rmosser@uoguelph.ca

Dr. John Vessey (Lectures 19-35)
Office: SSC 3455
Ext: 56997
Email: jvessey@uoguelph.ca

COURSE COORDINATOR

Dr. Reynald Tremblay
Office: SSC 4443
Email: reynaldt@uoguelph.ca

TEACHING ASSISTANTS

The tutorial instructors are graduate students, many of them in 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.

REQUIRED TEXTBOOKS

Principles of Genetics by P. Snustad and M.J. Simmons, 6th Edition, 2011. John Wiley and Sons, Inc. New York, NY.

Cell and Molecular Biology: Concepts and Experiments by Gerald Karp, 7th Edition, 2013. John Wiley and Sons, Inc. New York, NY.

The textbooks are available on a 2 hour reserve in the library.

COURSE WEB PAGE

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.

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 complaints 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.

LECTURES

Section 1: Monday, Wednesday, Friday at 10:30 am – 11:20 am in Rozanski Hall, Room 104.

Section 2: Monday, Wednesday, Friday at 12:30 pm– 1:20 pm in Rozanski Hall, Room 103.

Lectures representing the basic course material are further clarified and amplified by text material and tutorial assignments. Students are responsible for all material given in lectures and tutorials.

LEARNING OUTCOMES

By the end of this course, successful students 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.

TENTATIVE LECTURE SCHEDULE

Lectures*	Topic	Text Chapter
1-4	Techniques of Molecular Biology	14 (Snustad)
5-7	Genomics	15 (Snustad)
8-10	Applications of Molecular Genetics	16 (Snustad)
11-14	Regulation of Gene Expression in Eukaryotes	19 (Snustad)
15-17	Genetic Basis of Cancer and Cell Cycle Control	21 (Snustad)
Midterm Exam (covers lectures up to and including February 26) Saturday March 5 at 11:00 am - 12:30 pm Location to be announced		
18-20	Nucleus and Nuclear Transport	12 (Karp)
21-23	Endomembrane System	8 (Karp)
24-26	Vesicular Trafficking – ER to Golgi	8 (Karp)
27-29	Lysosome and Endocytic Pathway	8 (Karp)
30-32	Mitochondria	5 (Karp)
33-35	Chloroplasts and Peroxisomes	5,6,8 (Karp)

*Lecture numbers are approximate and are provided as a guide to the order of material covered. Some topics may be discussed over more lecture slots and some less than indicated.

******* FINAL EXAM: Monday April 11 at 11:30 am to 1:30 pm *******

Location to be announced

The final exam will cover the entire course.

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).

TUTORIALS

Weekly tutorial sessions provide help in improving your understanding of the course material by working through assignments posted on the CourseLink web page, which are based on the lectures and assigned reading materials. The tutorials will provide you the opportunity to develop self-learning skills and independent investigation. The details of assignments, the timing of the handing in of assignments and its grading will be discussed in class. Briefly, each assignment consists of two components. The first component (Part A) consists of 10 short answer questions. The answers to these questions can be found entirely in the lecture notes and textbook readings. Part A must be completed individually before the start of the tutorial session. The second component (Part B) will be completed during the tutorial session. The questions for Part B will be problem solving in nature and will be worked through with the assistance of the teaching assistant. You must bring to your tutorial the entire tutorial document (Parts A and B) with Part A completed. You will hand in the complete, **stapled** assignment at the end of the tutorial. BOTH components

are needed for a full grade for each tutorial. There are seven tutorial assignments and you are required to complete six of them satisfactorily for 15% of your final grade (or up to 2.5% each). With acceptable documentation, the weight of missed tutorial assignments will be transferred to the final exam. Details regarding the assignments, times and locations of tutorials will be available on CourseLink. **Any dispute regarding your tutorial marks has to be raised within one week after the marks are posted.** The tutorials will also provide opportunity for group discussion in addressing questions and solving problems.

TUTORIAL SCHEDULE

Tutorial	Topic	Assignment Number
Jan. 11 - 15	No tutorial scheduled	
Jan. 18 – 22	No tutorial scheduled	
Jan. 25 - 29	Techniques of Molecular Biology	1
Feb. 1 - 5	Genomics	2
Feb. 8 – 12	Applications of Molecular Genetics	3
Feb. 15 - 19	Study Break – No tutorial scheduled	
Feb. 22 - 26	Regulation of Gene Expression in Eukaryotes	4
Feb. 29 – Mar. 4	No tutorial scheduled	
Mar. 7 - 11	No tutorial scheduled	
Mar. 14 - 18	Nucleus and Nuclear Transport	5
Mar. 21 - 25	ER and Golgi compartments	6
Mar. 28 – Apr. 1	Secretory and Endocytic Pathways	7
Apr. 4 - 8	No tutorial scheduled	

COURSE EVALUATION

There will be a midterm examination on **Saturday, March 5 at 11:00 am - 12:30 pm**. The midterm examination is compulsory and accounts for 35% of your final grade. Alternate times may be set for midterm exams only if there is a direct conflict with another course that has been reported to the instructor by January 29, or with a Gryphon Varsity event that is confirmed by the team coach. No other reasons will be accepted, including medical and compassionate reasons.

The final exam is scheduled on **Monday April 11 at 11:30 am to 1:30 pm**. The final exam is a compulsory examination and will be comprehensive, including the entire course.

Grade Assessment

Assessment	Value (% of final grade)	Date	Learning Outcomes
Tutorial Assignments	15% (Best 6 out of 7)	In scheduled tutorials	1-10
Midterm Exam	35%	Saturday, March 5	1-6
Final Exam	50%	Monday, April 11	1-9

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.

UNDERGRADUATE DEGREE REGULATIONS AND PROCEDURES

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](#)

E-mail Communication

As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students. When using email to communicate with instructors and teaching assistants use appropriate email etiquette with appropriate salutations with complete sentences, punctuation and capital letters as needed. Also include MCB*2050 in the Subject Line. In some cases it might be better to arrange a time to meet with the instructor directly instead of using lengthy email communications.

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 in writing via email with your name, and ID#. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Drop Date

The last date to drop one-semester courses, without academic penalty, is Friday, March 11, 2016. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

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.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services as soon as possible. For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: [Student Accessibility Services](#)

Academic Misconduct

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 discourages misconduct. 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.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
[Academic Misconduct](#)