

Faculty of Science Course Syllabus
Department of Biology
BIOL 2020.03 Cell Biology
FALL 2019

Instructors:

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Lectures: MWF 9:35 am – 10:25 am Potter Theatre, Rowe Building

Laboratories: Five, 3-hour labs, biweekly LSC 7012
See "Lab Schedule"

Course Description

Biology 2020.03 introduces you to the eukaryotic cell, the basic organizational unit of most living organisms and hence a critical focus for biological/medical research. The course is at the introductory level, and tends to be "content driven". That is, you are exposed to the language and concepts of cell biology, and it is necessary to both remember and comprehend this information. As the course proceeds, we draw material together and begin to develop an understanding of how structure and function are integrated in cells. The experimental approach for examining cells will be considered and you are required to apply and analyze information obtained in lectures. It is anticipated that Biology 2020 will prepare you for more advanced work in cell/molecular/biochemical areas, while revealing the excitement that characterizes the study of living cells.

Lecture Outline

- Section 1 - History and Context
- Section 2 - Biological macromolecules and membrane structure
- Section 3 - Mitochondria, metabolism and energy production
- Section 4 - Cytoplasmic membrane systems: structure, function and membrane trafficking
- Section 5 - The cytoskeleton and cell motility
- Section 6 - Nucleus structure and function
- Section 7 - Cell signalling and signal transduction: Communication between cells
- Section 8 - Cellular reproduction

Course Materials

Recommended text: This course uses the most recent edition of Becker's World of the Cell (9th ed) by Jeff Hardin and Gregory Paul Bertoni (published by Pearson).

BIOL 2020 Lab manual: Available for free download from the class Brightspace site.

Course Prerequisites

Prerequisite courses: BIOL 1010.03 or BIOL 1020.03 or SCIE 1505 or equivalent (minimum grade of C)

Prerequisite knowledge/skills:

- Describe the process by which carbohydrates, lipids and proteins are assembled from monomers and identify their functional roles in the eukaryotic cell.
- Describe the structure and function of the organelles found in eukaryotic cells, demonstrating an appreciation for the overall architecture of the cell.
- Identify the components of biological membranes, including the various types of membrane proteins.
- Explain the fluid mosaic model and describe how membranes exhibit selective permeability.
- Understand the role of ATP as the energy currency in the cell and appreciate its importance for driving cellular work.
- List the key products and features of glycolysis, the citric acid cycle, and oxidative phosphorylation and understand the flow of energy through the entire process.
- Recall the steps relating to cell division, understanding what cellular processes happen at each step, and describe the control mechanisms for the process.
- Understand the mechanism by which a signal is transmitted into the cell via G protein Coupled Receptors and Tyrosine Kinase Receptors.
- List several examples of second messengers and describe how each is involved in signal transduction pathways.

NOTE: The above is intended as a guide for students to assess their preparation for this course. It is not meant to be a comprehensive or exhaustive list.

Course Goals and Objectives

After taking this course, a student will be able to develop and expand on all the skills listed above, including;

- Describe the chemical structure of proteins, lipids and carbohydrates.
- Explain the composition, structure, and dynamics of the lipid bilayer.
- Outline the mechanisms required for ATP production in the cell.
- Describe endomembrane system components and dynamics, and explain their role in membrane assembly, protein targeting, protein secretion and endocytosis.
- Contrast the structures and functions of the three types of cytoskeletal filaments and their associated proteins.
- Describe DNA storage and other functions of the cell nucleus.
- Describe how cells are attached to each other and function as a tissue.
- Describe the pathways of inter and intracellular communication.
- Describe apoptosis.
- Illustrate how defects in the cell cycle lead to cancer.
- Design an experiment to study cell biology topics.
- Demonstrate proficiency in basic molecular and cell biology techniques.
- Generate appropriate tables and graphs to represent data.
- Write a formal laboratory report.

Course Assessment

Student assessment consists of the components outlined below.

COMPONENT	% OF FINAL GRADE	
Midterm #1	10	Please refer to the "Lab Schedule and Important Dates" document for information regarding dates.
Midterm #2	15	
Top Hat Responses	5	
Laboratory	35	
Final Exam	35	

Midterm #1 held on Monday, October 7^h (9:25-10:25) in the Potter Auditorium
Midterm #2 held on Monday, November 4th (9:25-10:25) in the Potter Auditorium
Lab Test held on Tues December 3rd (9:25-10:25) in the Potter Auditorium

Top Hat Responses

BIOL 2020 will use the Top Hat (www.tophat.com) classroom response system during the lectures. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.

You can register for Top Hat on the course Brightspace page.

Our Course Join Code is **904131**

Should you require assistance with Top Hat at any time, due to the fact that they require specific user information to troubleshoot these issues, please contact their Support Team directly by way of email (support@tophat.com), the in app support button, or by calling 1-888-663-5491.

The 5% grade will be based on participation. It does not matter if you get an answer right or wrong, just that you responded. To forgive for occasional missed classes or unexpected technical issues, we will count only 80% of your responses. (i.e. if you respond to 80% of the Top Hat questions during lecture, you will get the full 5% for this grade.) It will be calculated in the following manner:

$$\frac{\text{\# questions 'answered'}}{\text{\# questions 'asked' multiplied by 0.8}} \times 5 = \text{Your Top Hat grade out of 5}$$

Assignments:

All assignments are due before the lab the starts. Any late assignment or formal report is subjected to a 10% deduction per day off the total mark. (Same day deduction is 5%.)

You will be required to upload your formal lab report to Brightspace, where it will be assessed with Urkund (Dalhousie's plagiarism detection software).

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale:

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (<50)
A- (80-84)	B- (70-72)	C- (55-59)	

Course Policies

Communication:

Communication between instructors and students shall be conducted via the @dal.ca email system. It is the student's responsibility to frequently check their @dal.ca email account.

Lectures:

Recording of lectures (audio or video) is permitted. However, these recordings are for personal use only.

Mastering Biology:

If you buy a new version of the textbook, it will come with an Access Code for Mastering Biology, the online study tools developed by the textbook publisher. Although we will not be using Mastering Biology for any course assessments, if you have access to it, you are encouraged to use it for practice. You can access Mastering Biology via a link that is on Brightspace.

Personal Protection Equipment in the Lab:

Students will be expected to wear lab coats and closed-toed shoes for all of the labs. You will not be allowed entry to the lab while wearing sandals or flip-flops!

Rules for Examinations:

Students must comply with the *Official Examination Regulations* listed in the Undergraduate Calendar. In particular, rules 3 and 6 will be *strictly enforced* (these are the ones stating that books and notes are not allowed, and that the use of communication/data storage device – for example: cell phone, any sort of digital/smart watch, calculator - is prohibited, and that communication between students by whatever means is forbidden during exams). The only exception is devices required for medical purposes (e.g. hearing aid).

In the case of a missed examination due to a valid excuse, a make-up examination will be scheduled within 7 days of the original date. If the student cannot write the make-up examination on the scheduled date due to a valid excuse, a second opportunity to write the exam will be given within a 7 day period. This will be the final opportunity to complete the examination.

Sharing of Course Content:

All course materials including, but not limited to, lecture slides, lecture recordings, lab-related documents, lab recordings and presentations, pre-lab quizzes, assignment and report feedback, and examinations are solely for your learning and evaluation in BIOL 2020. It is an academic offence to share these materials outside of this course space in such a way that others might gain an unfair advantage, and students who do so may be subject to University discipline.

Missed Course Requirements:

Dalhousie University recognizes that you may experience short-term (3 consecutive days or less) physical or mental health conditions, or other extenuating circumstances that may affect your ability to attend required classes, tests, exams or submit other coursework.

“Short-term absence” refers to absences of 3 consecutive days or fewer due to minor physical or mental health conditions, or other extenuating circumstances such as caregiving duties; immediate family illness, injury or death; involvement in an accident; legal proceedings or being a victim of a crime, domestic or intimate partner violence.

Travel for holidays is not an exceptional circumstance and will not be accommodated.

- ***First absence:*** if you are unable to attend a midterm or the lab test and are experiencing a short-term absence, you must:
 - Notify Mindy McCarville or Katy Garant prior to your absence.
 - Download, complete, and upload a [Student Declaration of Absence \(SDA\) form](#) to the course website on Brightspace.
 - Note: If you knowingly provide “false information and identification” by using the SDA form or by providing other written documentation, you will have committed academic dishonesty and are subject to University discipline (per Section 7 of Dalhousie’s Code of Student Conduct)
- ***Second absence:*** you are only allowed to use the SDA form **ONCE** in BIOL 2020. If you experience a subsequent short-term absence and are unable to attend a midterm, or the lab test, you must notify your instructor and provide appropriate written documentation within 7 days (e.g. a note from a primary care health professional dated for the day of your absence; proof of a family emergency, etc).

See Exceptions below for missed course requirements.

- ***Exceptions – Prelab Quizzes and the Formal Lab Report:*** Since your prelab quiz opens 3 days in advance of your lab session and you have many weeks to complete your formal lab report, only long-term absences are acceptable grounds for quiz or report extensions. In that case, appropriate written documentation is required within 7 days.

“Long-term absence” refers to absences of more than three (3) consecutive days due to major or chronic physical or mental health conditions, or other extenuating circumstances such as caregiving duties; immediate family illness, injury or death; involvement in an accident; legal proceedings; being a victim of a crime, domestic or intimate partner violence.

- ***Exceptions – Accommodations:*** if you have an accessibility plan that already allows for coursework deferrals or deadline extensions, you do not need to submit an SDA form or appropriate documentation. You do need to contact your instructor in advance to initiate your plan.
- ***Exceptions – Final Exam:*** Requests for alternate arrangements for missed University-scheduled **FINAL** exams are handled under a separate University regulation: “[Requests for an Alternative Final Examination Time.](#)”