

**Faculty of Science Course Syllabus**  
Department of Biology  
BIOL 1010.03  
Principles of Biology Part I  
Fall 2022

Dalhousie University is located in the ancestral, unceded and un-surrendered territory of Mi'kma'ki, the traditional land of the Mi'kmaq peoples. The treaties between Canadian settlers and First Nations are based on peace and friendship and we support all indigenous students in pursuit of their treaty rights.

We also recognize the history, legacy and contributions of the African Nova Scotian people and their communities for which this land has been their home for over 400 years.

We stand in support of BIPOC and LGBTQ2SIA++ communities, Neurodivergent peoples and Persons with Disabilities. We strive to make this course, and the sciences in general, a field of study where all peoples are encouraged to understand and contribute to the pursuit of scientific knowledge.

<b>Instructor</b>	<b>Office</b>	<b>Email</b>	<b>Topic</b>
M. McCarville	LSC 7089	<a href="mailto:mindy.mccarville@dal.ca">mindy.mccarville@dal.ca</a>	Cell Biology
P. Côté	LSC 7124A	<a href="mailto:patrice@dal.ca">patrice@dal.ca</a>	Genetics and Molecular Biology
A. Simpson	LSC 5088	<a href="mailto:alastair.simpson@dal.ca">alastair.simpson@dal.ca</a>	Evolution
T. Bishop	LSC 2089	<a href="mailto:todd.bishop@dal.ca">todd.bishop@dal.ca</a>	Course Coordinator, Lab Instructor
G. Gass	LSC 2116	<a href="mailto:gillian.gass@dal.ca">gillian.gass@dal.ca</a>	Lab Instructor

**Lectures:** Tuesdays and Thursdays 1:05-2:25 p.m. (section 01) or 2:35-3:55 p.m. (section 02) Ondaatje Auditorium, Marion McCain Arts & Social Sciences building. Lecture recordings will be posted on Brightspace. If gathering limits prevent the use of the auditorium, lectures will be canceled, and recordings will be posted on Brightspace. Students will be notified in advance.

**Laboratories:** Eight laboratory sessions, each 1hr & 50min (LSC 2097, 2098, 2100). In the event of Covid restrictions, some labs may be canceled, made optional, or moved online. Students will be notified in advance.

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## **Course Description**

This course, which prepares students for more advanced courses in biology and allied subjects, surveys the fundamental principles of biology with an emphasis on those features common to all organisms. Topics covered include cell and molecular biology, genetics, and evolution.

## **Course Prerequisites**

Knowledge of high school mathematics, chemistry and biology is recommended.

## **Course Objectives/Learning Outcomes**

Learning outcomes are provided to you as a rough guide to the most important concepts in the course. Upon completion of BIOL 1010, students should be able to:

### *Cell Biology*

- 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.

### *Genetics & Molecular Biology*

- Compare and contrast the fundamental features of mitosis and meiosis with emphasis on the movement of homologous chromosomes during these cellular reproductive processes.



- Define Mendel's two laws of heredity that explain the transmission of traits from one generation to the next and provide selected examples of transmission of traits that deviate from these laws.
- Analyze human pedigrees to determine if a trait is dominant or recessive, the gene for the trait is located on an autosome or sex chromosome, and if the trait is likely controlled by a single gene or more than one gene.
- Describe the basic chemical structure of deoxyribonucleic acid (DNA) and how it differs from ribonucleic acid (RNA); what role does each molecule play in the transfer of information from genotype (DNA) to phenotype (protein) and the deciphering of the genetic code.
- Identify the regulatory elements and how they function in the control of gene expression of inducible and repressible operons in prokaryotes.
- Define the classes of physical and chemical mutagens and their effect on the coded amino acids in a polypeptide, and the resulting phenotype.
- Understand the basic principles of DNA technology/Biotechnology, its applications and the ethical and societal implications of this technological revolution.

### *Evolution*

- Describe the basic tenets of 'Darwinian evolution': i) Tree of Life concept; ii) Natural selection, leading to adaptive evolution (including different modes of selection, and sexual selection).
- Articulate the concept of homology, and how biogeography and transitional fossils provide evidence of evolution.
- Use the Hardy-Weinberg principle to calculate expected genotype and allele frequencies (1 Locus, 2 Alleles).
- Define gene flow and genetic drift (and founder effect) and explain how they influence allele frequencies in populations.
- Explain the 'biological species concept', and distinguish between and give examples of i) pre- and post-zygotic reproductive barriers; ii) allopatric and sympatric speciation (e.g. polyploid speciation).
- Interpret the information in simple phylogenetic trees and taxonomies, distinguish between monophyly, paraphyly and polyphyly.
- Demonstrate an understanding of molecular phylogenetics, including the concept of tracing the evolutionary history of genes (e.g. gene duplication, horizontal gene transfer).
- Describe the most general attributes of the fossil record, including mass extinctions (with examples) and adaptive radiations.
- Describe basic concepts that explain evolution of complex features (e.g. Evolution of developmental regulation; concept of Exaptation)
- Describe the most basic similarities and differences between Bacteria, Archaea and Eukaryotes, and the evolutionary relationships between 'protists' and animals, plants and fungi.
- Describe the phenomenon of (primary) endosymbiosis and its role in the origins of mitochondria and plastids (chloroplasts).

### *Laboratory*

- Create scientific questions, propose a written hypothesis as a tentative answer to that question and generate observable predictions consistent with that hypothesis in the context of a particular experiment.
- Collect both quantitative and qualitative data through careful observations, report data using written descriptions, graphs, tables, and sketches, and interpret data to assess hypotheses and generate conclusions.
- Observe diversity of form, as well as key shared structures, across a range of cell and organism types.
- Design a simple experiment and identify the design elements of an existing experiment.
- Use and know when to make use of common biological research tools such as compound microscopes, gel electrophoresis units, pipettors and micropipettors, bioinformatics tools, and enzyme assays.
- Construct a phylogenetic tree using shared characters and parsimony and interpret it as a visual hypothesis about relatedness; use the tree to generate testable predictions.
- Write a properly formatted CSE-style citation for a website, article or book; quote from and/or cite published material as appropriate; read an article from a scientific journal and discuss its content with classmates
- Analyze data using basic statistical techniques (mean, standard deviation, n, chi-square test).

### **Course Materials**

#### *Textbook*

The textbook for this course is *Campbell Biology, 3<sup>rd</sup> Canadian Edition, 2021* by Reece et al. (Pearson Benjamin Cummings, Menlo Park, CA), and is available at the Dalhousie University Bookstore. Second-hand copies of the textbook are also suitable for the class (8<sup>th</sup>, 9<sup>th</sup>, Dalhousie edition of Campbell Biology and the 1<sup>st</sup> and 2<sup>nd</sup> Canadian editions). An e-book option is also available. See the course Brightspace or check with the bookstore for more details. We may also provide page numbers for readings from recent previous editions of the textbook where possible. A few copies of the text are on reserve in the Killam Library. Please plan to make regular use of the textbook. We do not use the Mastering Biology online resource that comes with new copies of the textbook for any class assignments although you are welcome to use it as an additional resource for studying.

#### *BIOL 1010 Brightspace site*

The Brightspace site is accessible at the address [Dal.brightspace.com](http://Dal.brightspace.com) or from a link at the top of the main [Dal.ca](http://Dal.ca) website. Login using the same information that you use to access your Dalhousie e-mail. This site provides lecture information, study aids, Powerpoint presentations from lectures, lecture recordings, online quizzes, marks for labs and exams, and important announcements. You are expected to check Brightspace, as well as your Dalhousie e-mail, multiple times a week.

## Course Assessment

The exams in this course are multiple choice format and they evaluate several skills, including knowledge, comprehension, application, and analysis of information. Success in the course requires that you both remember and understand the class material. Most professors will provide practice questions and, other questions and problems are also available at the end of each chapter in the textbook.

Of the 100 marks available in BIOL 1010, 60 are allotted to the lecture component and 40 to the laboratory as follows:

Midterm exam	October 12, 2022	20% (in-person or online, Covid dependent)
Exam (Christmas Final)	Scheduled by Registrar	40% (in-person or online, Covid dependent)
Laboratory *	Ongoing during term	40%

\* The distribution of laboratory marks is described in the laboratory manual which must be purchased prior to your first laboratory session from the campus bookstore.

You must bring your Student ID card to all FINAL exams. All electronic devices, including calculators, cell phones, and electronic translators, are prohibited at exams. If English is not your first language and you require a dictionary, you may bring with you to exams a paper language-to-language translation dictionary, which must be approved by an instructor prior to use. The midterm exam only covers lecture material from the Cell Biology unit I, while the December exam only covers lecture material from the Genetics/Molecular Biology (II) and Evolution (III) units.

The Registrar's Office has scheduled the final examination period from December 9-19, 2022. The dates, times and locations of the December exam are arranged by the Registrar's Office, and posted well in advance of the end of term. It is very important that you not make arrangements for travel during that time. Dalhousie's policy on alternative final exam times is as follows:

A student requesting an alternative time for a final examination will be granted that request only in exceptional circumstances. Such circumstances include illness or other mitigating circumstances outside the control of the student. Elective arrangements (such as travel plans) are not considered acceptable grounds for granting an alternative examination time. This policy may also be applied at the discretion of the instructor to tests and examinations other than final examinations. (Undergraduate Calendar, 2022-23). Please contact Todd Bishop, the course coordinator, to request alternate arrangements.

## Other course requirements

Laboratories are usually held each week; please check the schedule in your lab manual. There are 30 students in each laboratory with one Learning Assistant (LA) who answers questions and instructs students on how to conduct laboratory exercises; as well an Instructor is supervising three lab rooms at any one time. You must attend the laboratory in your scheduled room and time slot. There are online quizzes and assignments to be completed throughout the term. Assignments must be handed in at the end of the laboratory period. If you find it difficult to finish laboratories in the allotted time, please speak to a lab instructor. Students requiring accommodations are encouraged to speak to their TA or supervising lab instructor so that we can help you get the most out of your lab sessions.

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

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

Please note: a grade of C (60%) or better in BIOL 1010 is required for entry into several second year biology classes (BIOL 2020, 2030, 2040 & 2004). Please note that this has changed from the previous requirement of C+ (65%).

### **Course Policies**

#### *Make-up Examinations*

Make-up exams will take place after the scheduled exam, with time and location of make-up exams announced on the course Brightspace site. Make-up exams are intended for students who miss a scheduled exam **because of illness or some other legitimate reason**. They are not available to students who achieve less than their expectations on the regular examination and want to improve their mark. Students must provide appropriate documentation to the Course Coordinator within one week of the scheduled exam in order to write the make-up exam. Students who miss the make-up final exam due to ongoing illness may write a make-up during the first week of winter term.

#### *Absences*

It is the responsibility of students who are absent from lectures and laboratories to ascertain what was missed, including announcements of tests and other information. If you miss one or more lectures for medical reasons, contact the course coordinator to discuss options for catching up on missed lecture material. Absence from a lab at which a quiz or assignment is due requires that you contact Todd or Isabelle within 48 hours of your absence to avoid losing marks.

While going to class and studying tend to be the main focus for most students, they may also want to forge relationships with members of communities they identify with. The following is a small list of communities that exist on campus to support students in their academic journeys.

#### 2SLGBTQ+

<https://daloutside.wixsite.com/dalout>

#### Black student advising centre and other related societies and groups:

[https://www.dal.ca/campus\\_life/communities/black-student-advising/societies-and-groups.html](https://www.dal.ca/campus_life/communities/black-student-advising/societies-and-groups.html)

#### Indigenous students:

[https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

There is also a main page that provides opportunities to find other groups and get involved in campus life:

[https://www.dal.ca/campus\\_life/get-involved.html](https://www.dal.ca/campus_life/get-involved.html)



**Biology 1010 Outline of Lectures Fall 2022**

Unit	Date	Topic	Textbook readings	Lecturer
	Sept 6	Welcome!	Ch. 1 ( <i>Not testable, but a great intro to BIOL 1010</i> )	Bishop/ Gass
<b>CELL BIOLOGY</b>	Sept. 8	Biological Molecules	Please refer to the detailed "Recommended Reading" document on Brightspace!	McCarville
	Sept. 13	Membranes		
	Sept. 15	Endomembrane System		
	Sept. 20	Mitochondria and Cytoskeleton		
	Sept. 22	Energy and Metabolism		
	Sept. 27	Cell Signalling		
	Sept. 29	Cell Cycle		
	Oct. 4	Cancer		
<b>Cell Biology Midterm Exam – Wednesday, October 12, 2022. Details to be announced.</b>				
<b>GENETICS &amp; MOLECULAR BIOLOGY</b>	Oct. 6	Mitosis and Meiosis	Please refer to the detailed "Recommended Reading" document on Brightspace!	Côté
	Oct. 11	Patterns of Inheritance		
	Oct. 13	Human Genetics		
	Oct. 18	DNA: The Genetic Material		
	Oct. 20	Genes and How They Work		
	Oct. 25	Regulation of Gene Expression; Mutation		
	Oct. 27	Gene Technology		
<b>EVOLUTION</b>	Nov. 1	History of Biological Evolution	Ch. 1, 22	Simpson
	Nov. 3	Evidence of Evolution; More on selection	Ch. 22, 23	
	Nov. 7-11	<b>Fall Study Break – No Classes</b>		
	Nov. 15	Evolution of Populations I	Ch. 23	
	Nov. 17	Evolution of Populations II	Ch. 23	
	Nov. 22	Origin of Species	Ch. 24	
	Nov. 24	Phylogenetics and Systematics	Ch. 26	
	Nov. 29	Macroevolution	Ch. 25	
	Dec. 1	Tree of Life & Microbial Diversity	Ch. 25, 27, 28	

## ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation because of barriers related to learning difference, disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here:

[http://www.dal.ca/dept/university\\_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html](http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html)

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Student Accessibility Centre** prior to or at the outset of the regular academic year. More information is available at [www.dal.ca/access](http://www.dal.ca/access).

## ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie's **Statement on Intellectual Honesty** and **Faculty Discipline Procedures** is available here:

[http://www.dal.ca/dept/university\\_secretariat/academic-integrity/academic-policies.html](http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html)

## STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

“The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non – academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members.”

The full text of the code can be found here:

[http://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)



## **FREQUENTLY ASKED QUESTIONS**

### **1. I am having trouble accessing the Brightspace site. How do I get help?**

Contact Information Technology Services (ITS): <https://www.dal.ca/dept/its/help.html>  
902-494-HELP (902-494-4357) or toll free 1-800-869-3931. Or e-mail [support@dal.ca](mailto:support@dal.ca)

### **2. I have ADHD and/or other Learning Differences (eg. Dyslexia, etc.) that might impact my ability to learn and keep up with the course. What should I do?**

You should contact Todd as soon as possible to ensure you are set up as best you can to complete the course. Additionally, you should ensure you are registered with the Accessibility Centre to ensure you can receive accommodations for the exams. [https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.html)

### **2. I missed my laboratory. What should I do?**

You should talk to either Todd or Gillian as soon as possible to explain your absence in order to avoid losing marks.

### **3. I missed an exam because I was sick. What should I do about writing the make-up exam? Do I need a doctor's note?**

You should contact Todd concerning permission to write the make-up exam.

### **4. My team is playing a game out of town the day of the midterm exam. What should I do about writing the make-up exam?**

You should contact Todd for permission to write the make-up exam. You will need a signed note from your coach to verify the reason for your absence.

### **5. I have questions about the lecture material. How do I get help?**

You should contact the person giving the lectures for that unit.

### **6. I'm not sure what material will be on the lecture exam. How do I get this information?**

You should contact the person giving the lectures for that unit.

### **7. I have trouble with multiple choice exams. What should I do?**

You may wish to attend a Study Skills Workshop on "Writing Multiple Choice Exams" offered through the Studying for Success program ([www.dal.ca/sfs](http://www.dal.ca/sfs)). Students sometimes find certain types of multiple choice questions more difficult than others. By reviewing your BIOL 1010 midterm exam, you can determine whether you tend to get a particular type of question wrong more often than other types. If so, then you should make an effort to get as much practice as possible with that form of question (e.g. do questions at the end of text chapters, talk to the professor teaching the unit regarding sample exam questions, work with friends and create practice questions).

### **8. May I make an audio recording of the lectures?**

This is unnecessary as all lectures are automatically recorded and will be posted to the class website on Brightspace as soon as possible after the lecture.

### **9. I'm not satisfied with my grade in the course. Can I do an extra assignment to get more marks?**

No. The labs, quizzes and exams are the only graded material in the course, so treat all coursework as important during the term.

### SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

<b>Service</b>	<b>Support Provided</b>	<b>Location</b>	<b>Contact</b>
<b>General Academic Advising</b>	Help with <ul style="list-style-type: none"> <li>- understanding degree requirements and academic regulations</li> <li>- choosing your major</li> <li>- achieving your educational or career goals</li> <li>- dealing with academic or other difficulties</li> </ul>	<i>Bissett Student Success Centre</i> Room 426, Student Union Building 6136 <u>University Avenue</u>	<a href="https://www.dal.ca/campus_life/academic-support/student-success-centre.html">https://www.dal.ca/campus_life/academic-support/student-success-centre.html</a>
<b>Dalhousie Libraries</b>	Help to find books and articles for assignments  Help with citing sources in the text of your paper and preparation of bibliography	<b>Killam Library Ground floor</b>	<a href="https://libraries.dal.ca">https://libraries.dal.ca</a>
<b>Studying for Success (SFS)</b>	Help to develop essential study skills through small group workshops or one-on-one coaching sessions  Match to a tutor for help in course-specific content (for a reasonable fee)	Killam Library, Room G28 (main floor) - call 494-3077 or - email the Coordinator at: sfs@dal.ca	<a href="https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html">https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html</a>
<b>Writing Centre</b>	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) <ul style="list-style-type: none"> <li>- Learn to integrate source material into your own work appropriately</li> <li>- Learn about disciplinary writing from a peer or staff member in your field</li> </ul>	<b>Killam Library Ground floor</b> Learning Commons & Rm G25	<a href="https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html">https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html</a>