



School of Science  
**BIOL 102**  
**Introduction to Molecular and Cellular Biology**  
Term: Winter  
Number of Credits: 3

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## Course Outline

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**INSTRUCTOR:** Tara Stehelin, BSc, MSc, PhD, Naveen Sorout, MSc. (labs)

**E-MAIL:** [tstehelin@yukonu.ca](mailto:tstehelin@yukonu.ca)

**OFFICE:** A2806

**PHONE:** (867) 456-6957

**TIME/DATES:** T/R 10:30 am – 12:00 (lectures) F 9:00 – 12:00 or 1:00 – 4:00 (labs)

**OFFICE HOURS:** *anytime*, email me, but scheduled office hours are Thurs. 12:00 – 1:30.

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### COURSE DESCRIPTION

An introductory biology course that emphasizes principles applicable to all living organisms, including an introduction to macromolecules in cells, cell structure and function, basic metabolism, processes of cellular reproduction and chromosomal patterns of inheritance, expression of DNA to phenotype, as well as basic principles of plant anatomy and organ systems in vertebrates. This course is part of core introductory science, transferrable to most Canadian universities as one semester of a comprehensive first-year level Biology course. A comparative approach to the unity and diversity of organisms is stressed. Mandatory lab sessions reinforce subject matter presented in lectures.

### COURSE REQUIREMENTS

Prerequisite(s): *One of the following* is required (and more than one is recommended): Biology 11, Biology 12, or Chemistry 11 (or equivalent).

Corequisite(s): Math 12 (or equivalent) is recommended either as a pre-requisite or co-requisite. Students are expected to utilize basic mathematical skills.

### EQUIVALENCY OR TRANSFERABILITY

This course transfers as one semester of first-year biology for Majors at most Canadian institutions, however, please be aware that receiving institutions determine course transferability. Find further information at:

<https://www.yukonu.ca/admissions/transfer-credit>

### LEARNING OUTCOMES

Upon successful completion of the course, a student will be able to:

1. demonstrate understanding of general biochemistry and metabolism in cells,
2. summarize the general structure of the cell and the organelles within cells and structure and function of membranes, and mechanisms of transport at the cellular level,
3. outline with overall process, functions, and stages of cellular reproduction,
4. demonstrate mechanisms patterns of inheritance, molecular patterns of inheritance, DNA structure, replication, transcription and translation,

5. demonstrate understanding of basic plant physiology and animal physiology, including tissue and cell types, organ functioning and some organs systems (as time allows), including digestion, gas exchange, immunity, and homeostatic mechanisms such as excretion.
6. Upon completion of mandatory lab sessions students will be able to safely and ethically perform basic lab skills such as prepare wet mounts of live cells, view and identify cells and tissues using the microscope, identify organelles within cells, perform a detailed vertebrate dissection, collect data from lab exercises, perform basic analyses and communicate results in a full lab report.

## COURSE FORMAT

This course will be delivered with the following breakdown per week: three hours of lecture (in two 1.5-hour blocks), one three-hour lab, and zero hours of tutorial. Although it will vary from individual to individual, students should expect to spend 6 hours on course material outside of the classroom time (per week) on studying or completing assignments.

### Delivery format

This course will be delivered in a face-to-face (in person) format. However, lectures may be attended remotely and recorded to be watched later (upon request). Students will be expected to access the YU online learning platform for additional material (Moodle). Labs can only be conducted in person.

## EVALUATION

Lecture quizzes (5 in total)	45 %
Lab Assignments	21 % (60% of Lab Mark)
Lab Quizzes	14 % (40% of Lab Mark)
Final Exam	20 %
<b>Total</b>	<b>100%</b>

*Please note that there is no midterm for this course. The midterm mark is based on lecture quizzes.*

Lecture quizzes are given during normally scheduled class time and take 30 minutes to complete.

Lab quizzes are given at the start of each lab period (except the first lab) and take 15 minutes to complete. They are based on material covered in the previous lab and some questions on what will be done during that day's lab period. *Students are expected to read lab material before coming into the lab.* There is no final exam for the laboratory portion of the course.

Lab assignments are handed out at the beginning of lab sessions and are to be completed once lab exercises are completed. Some students finish assignments during the lab session, although they are not due until the next weekday at noon. Late assignments may be deducted -5% of marks per day.

Attendance in the laboratory is mandatory. ***Students must pass the lab and lecture portions of the course independently.***

## **COURSE WITHDRAWAL INFORMATION**

The Last date to withdraw without academic penalty is Mar. 11, 2022. Refer to the YukonU website for other important dates. <https://www.yukonu.ca/admissions/important-dates>

## **TEXTBOOKS & LEARNING MATERIALS**

Students can use the same textbook for Biology 101 and 102. Students are expected to purchase a textbook, either a hardcopy (available in the YukonU bookstore) or an online eText from the publisher.

*Campbell Biology, 3<sup>rd</sup> Canadian Edition (2020).*

Authors: Reece, J. B., L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky, R. B. Jackson, F. E. Rawle, D. G. Durnford, C. D. Moyes, K. Scott, and S. J. Walde. Publisher: Pearson

Lab materials (e.g., lab manuals) are provided in the form of three-hole punched pages in the first lab.

Laboratory coats are mandatory and students can purchase these from the YukonU bookstore for \$20. Because of COVID-19 precautions, masks must be worn at all times and should be brought along for labs and lectures.

## **ACADEMIC INTEGRITY**

Students are expected to contribute toward a positive and supportive environment and are required to conduct themselves in a responsible manner. Academic misconduct includes all forms of academic dishonesty such as cheating, plagiarism, fabrication, fraud, deceit, using the work of others without their permission, aiding other students in committing academic offences, misrepresenting academic assignments prepared by others as one's own, or any other forms of academic dishonesty including falsification of any information on any Yukon University document.

Please refer to Academic Regulations & Procedures for further details about academic standing and student rights and responsibilities. <https://www.yukonu.ca/policies/academic-regulations>

## **ACADEMIC ACCOMMODATION**

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon University Academic Regulations (available on the Yukon University website). It is the student's responsibility to seek these accommodations by contacting the Learning Assistance Centre (LAC): [LearningAssistanceCentre@yukonu.ca](mailto:LearningAssistanceCentre@yukonu.ca).

## TOPIC OUTLINE

General topic	Chapter	Topics	# Lectures, quiz dates
1. <b>Cell Structure and Function</b>	CH 6	Organelles, functions of each Membrane Structure, the extra-cellular matrix	2
	CH 7		<b>Quiz 1 Jan 20*</b>
2. <b>Metabolism of Cells</b>	CH 8, 9	Glycolysis and Cellular Respiration	1
	CH 10	Photosynthesis	1 <b>Quiz 2 Feb. 3</b>
3. <b>The Cell Cycle</b>	CH 12	The Cell Cycle, controls, Cell Division	2
	CH 13	Meiosis and Sexual Life Cycles	1 <b>Quiz 3 Feb. 17</b>
4. <b>Genetics</b>	CH 14	Mendelian Inheritance	2
	CH 15	Chromosomal Basis of Inheritance	1
	CH 16	Molecular Basis of Inheritance	1
	CH 17	Structure of DNA, Genetic Engineering, From Gene to Protein	1 <b>Quiz 4 Mar. 10</b>
5. <b>Animal and Plant Physiology</b>	CH 36, 37	Resource transport and gas exchange in plants Soil and plant nutrition	2
	CH 40	Animal Form and Function ( <i>self-study and covered in labs</i> )	
Nutrition	CH 41	Animal Nutrition, Animal Digestion	3
Gas Exchange	CH 42	Circulation and Gas Exchange in Animals	<b>Quiz 5 Mar. 24</b>
Immunity	CH 43	Immune systems of animals	
Homeostasis	CH 44, 45	Osmoregulation, excretion Hormones and the Endocrine System	1
	CH 48, 49	Neurons and the brain (as we have time)	1
	Review		<b>Final Exam (April 13 – 23)</b>
		<b>Last class April 12</b>	

\*Please note that quiz dates are “set” but exact quiz topics may change depending on how fast we move through material!\*

**Lab Schedule and List of Topics – Labs typically start in the SECOND WEEK of CLASSES**

Lab 1	The Cell – Cell structure and function, Membranes
Lab 2	Metabolism: glycolysis, cellular respiration and photosynthesis
Lab 3	Cellular Reproduction – mitosis and meiosis
Lab 4	<b>Genetics I</b> , Mendelian patterns of inheritance using <i>Drosophila</i> , introduction to a basic statistical test, the <i>chi-square</i>
Lab 5	<b>Genetics II</b> , Mendelian patterns of inheritance using <i>Drosophila</i> , <i>sex-linked inheritance</i>
Lab 6	Animal Form and Function - Cell types, tissues, organs Vertebrate Dissection ( <i>start</i> )
<b>Reading Week Feb. 21 – 24, no labs</b>	
Lab 7	Digestive Systems - & Introduction to full lab report Vertebrate Dissection ( <i>cont.</i> )
Lab 8	Gas Exchange and Circulation
Lab 9	Immunity and Introduction to Homeostasis
Lab 10	Homeostasis: osmoregulation and excretion
Lab 11	Nervous and Muscular Systems, the brain