



COURSE OUTLINE

BIOL 102

Introduction to Molecular and Cellular Biology

3 CREDITS

PREPARED BY: Tara Stehelin, Biology Instructor

DATE: April 23, 2020

APPROVED BY: Joel Cubley, Chair, School of Science

DATE: November 6, 2020



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BIOLOGY 102, Introduction to Molecular and Cellular Biology

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OFFICE LOCATION: A2806**E-MAIL:** tstehelin@yukonu.ca**TELEPHONE:** (867) 456-6957**OFFICE HOURS:** Thurs 12:00 – 1:30

or by appointment

CLASSROOM: online or labs in A2805**TIME:** Lectures: Tuesday 10:30 – 12:00

(online, synchronous))

Labs: F 9:00 –12:00 or 1:00 – 4:00

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.

PREREQUISITES

One of the following is required (and more than one is recommended): Biology 11,12, or Chemistry 11 (or equivalent). Math 12 (MATH 060, or equivalent) is recommended as a prerequisite. Students are expected to use basic mathematical skills.

EQUIVALENCY OR TRANSFERABILITY

When taken with Biology 101, these two courses transfer as two semesters of first-year biology to most universities in British Columbia.

Please see the University Website for more information on transferability:
<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

Material will be presented in two 1.5 hr lectures and one 3 hr lab session per week.

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

Because of unusual circumstances of the **SARS Cov-2 pandemic** of 2019 and 2020, lectures will be delivered online. Students are greatly encouraged to attend lectures when they are delivered synchronously (during the lecture time) although lectures will be recorded and can be watched later. Labs will be delivered in face-to-face format, but with some added precautionary measures in place in the lab. Please follow all directions carefully. Students are expected to have access to a computer for best viewing of online lectures and activities. If this is not possible, please contact the university to make other arrangements.

ASSESSMENTS

Attendance

Attendance is mandatory in labs and greatly encouraged in lectures.

Absence from labs results in a zero assigned for assignments and quizzes relevant to the missed lab. If the instructor is notified in advance of potential problems with attendance for medical travel or other unavoidable circumstances, alternate work may be assigned.

Students must attend the laboratory session assigned to them upon registration, once per week.

Students are expected to participate actively in laboratory exercises, including taking part in classroom discussions of results of lab activities and experiments.

Lab

Assignments are given during laboratory sessions that are due by 12:00 noon the next weekday. A lab quiz covering material from the previous lab as well as some material from that week's lab will be given each during each scheduled lab (except the first lab) to assess progress. *Students are expected to read the material for that day's lab before coming into lab.*

Lecture

Five quizzes will be given on lecture material and are worth 45% of the total mark. The final examination with 20% of the final mark will be held at the end of the term and will cover material from the entire course, although it will focus mostly on the last portion of material.

EVALUATION

Lecture Quizzes	45%
Lab Assignments	21% (60% of lab mark)
Lab Quizzes	14% (40% of lab mark)
Final Exam	20%
Total	100%

REQUIRED TEXTBOOKS AND MATERIALS

Students can use the same textbook for Biology 101 and 102.

Campbell Biology, 3rd 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

Purchase eText access through Pearson or order a copy from other sources. Textbooks will not be sold in the bookstore this year.

Lab Manuals will be handed out in lab in the form of three-hole punched pages.

ACADEMIC AND STUDENT CONDUCT

Information on academic standing and student rights and responsibilities can be found in the current Academic Regulations that are posted on the Student Services/ Admissions & Registration web page. (section 4.0 on Academic conduct)

[https://www.yukonu.ca/sites/default/files/policies/Academic%20Regulations Effective%20Jul%202019%20to%20Dec%202020.pdf](https://www.yukonu.ca/sites/default/files/policies/Academic%20Regulations%20Effective%20Jul%202019%20to%20Dec%202020.pdf)

PLAGIARISM

Plagiarism is a serious academic offence. Plagiarism occurs when a student submits work for credit that includes the words, ideas, or data of others, without citing the source from which the material is taken. Plagiarism can be the deliberate use of a whole piece of work, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Students may use sources which are public domain or licensed under Creative Commons; however, academic documentation standards must still be followed. Except with explicit permission of the instructor, resubmitting work which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the University.

YUKON FIRST NATIONS CORE COMPETENCY

Yukon University recognizes that a greater understanding and awareness of Yukon First Nations history, culture and journey towards self-determination will help to build positive relationships among all Yukon citizens. As a result, to graduate from ANY Yukon University program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see www.yukonu.ca/yfnccr.

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. It is the student's responsibility to seek these accommodations. If a student requires an academic accommodation, they should contact the Learning Assistance Centre (LAC): lac@yukonu.ca.

TOPIC OUTLINE (weeks)	Chapter
Metabolism of cells	
1 Glycolysis and Cellular Respiration	8, 9
2 Photosynthesis	10
<i>Quiz 1 Jan 21</i>	
Cell Structure and Function	
3 Organelles, functions of each	6
Membrane structure, the extra-cellular matrix	7
<i>Quiz 2 Feb 4</i>	
4 The Cell Cycle, Cell division	12
5 Meiosis and Sexual Life Cycles	13
<i>Quiz 3 Feb 18</i>	
6 Mendelian inheritance	14
7 The chromosomal basis of inheritance	15
8 The molecular basis of inheritance	16
Structure of DNA, Genetic Engineering	
From gene to protein	17
<i>Quiz 4 Mar 11</i>	
Animal and Plant Anatomy and Physiology	
9 Resource transport and gas exchange in plants	36
Soil and plant nutrition	37
Basic principles of Animal Form and Function (self-study and covered in labs)	40
10 Animal Nutrition	41
12 Circulation and Gas Exchange in animals	42
12 Immune systems of plants and animals	Plants pgs. 905-907
Animals	CH 43
<i>Quiz 5 March 25</i>	
Homeostasis of body fluids, liver, kidney function	
13 Osmoregulation and excretion	44
Hormones and the endocrine system	45
Sex hormones	Pages 1078 - 1084
14 Neurons, nervous systems, the brain (as there is time)	48, 49
Last class April 12th	<i>Final Exam (April 14 - 28)</i>

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

Lab TOPICS AND SCHEDULE

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	Genetics I, Mendelian patterns of inheritance using <i>Drosophila</i> , introduction to a basic statistical test, the <i>chi-square</i>
Lab 5	Genetics II, Mendelian patterns of inheritance using <i>Drosophila</i> , <i>sex-linked inheritance</i>
Lab 6	Animal Form and Function - Cell types, tissues, organs,
Lab 7	Digestive Systems - & <i>Introduction to full lab report</i> <i>Vertebrate Dissection (start)</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
