

*This syllabus is a general representation of the course as previously offered and is subject to change.*

## **BIOL 112 – Biology of the Cell**

General Course Syllabus (as of August 2019)

### **About the Course:**

**Course Description:** The principles of cellular and molecular biology using bacterial and eukaryotic examples.

**Course Format:** Lecture

**Credits:** 3

**Prerequisites:** One of CHEM 12, CHEM 100, CHEM 111 and one of BIOL 11, BIOL 12, BIOL 111. *Note:* students cannot retake a course for a higher grade, meaning that if they have already taken BIOL 112 and passed it, they cannot take it again for credit ([see UBC Academic Regulations](#) for the Faculty of Science).

### **Course Learning Objectives:**

By the end of this course, a successful student should be able to:

- Describe the general cellular machinery and regulation of the processes of replication, transcription, translation, and energy transformation.
- Apply knowledge of the structure-function relationship to the cell's utility of biomolecules (proteins, nucleic acids, lipids, carbohydrates) and organelles.
- Outline general processes and basic thermodynamic underpinning of cell's generation of energy from sugar, and energy + reducing agents from the Calvin cycle.
- Work in small groups to analyze, discuss, and solve problems in the context of cellular and subcellular biology.
- Interpret information on figures and draw conclusions based on descriptive or graphical data in the context of cellular and subcellular biology.
- Communicate evidence-based scientific ideas related to cellular and subcellular biology clearly and succinctly in writing.
- Appreciate the diversity and complexity of the machinery responsible for the biochemical pathways of life.

### **Textbooks and Additional Resources:**

#### **Required Course Materials:**

- **Textbook:** "How Life Works" Custom Third Edition for the University of British Columbia by Morris, Hartl, Knoll, Lue, Michael, Berry, Biewener, Farrell, Holbrook.
  - Available for purchase at the UBC Bookstore.

- **IMPORTANT NOTE:** The UBC Bookstore receipt for the textbook purchase is required to access the online component of the textbook (called LaunchPad; see more information below).
- **LaunchPad:** Will be used to complete pre-class quizzes and homework assignments. Textbook purchase from UBC Bookstore includes LaunchPad access and the complete e-book.
  - Students also have the option to purchase LaunchPad access alone online, if a hard copy of the textbook is not desired.
- **Clicker classroom response system:** Available for purchase at the UBC Bookstore.
- **Access to Canvas Learning Management System (required):** Course resource website where students will find almost everything needed for BIOL 112. Accessible from canvas.ubc.ca via a UBC Campus-Wide-Login (CWL).

**Optional Resources:**

- **Learning Centre:** Open to students to use for individual or group study. The Learning Centre will be staffed with teaching assistants, and the weekly TA schedule will be posted on Canvas.
- **Small Group Sessions/Targeted Tutorials:** Occasionally, small group sessions may be scheduled throughout the term to assist students in various areas of the course. Examples may include special review sessions, viewing midterm exam questions, etc. Details will be announced in class as well as on Canvas.

**Evaluation:**

<b>Assessment</b>	<b>Weight</b>	<b>Alternate*</b>
<b>Examinations:</b>		
● Midterm 1 Exam	15%	IF conditions below* are met, 40% for Mid1+2 +3 weighted
● Midterm 2 Exam	15%	
● Midterm 3 Exam	17%	
● Final Exam	40%	
<b>Learning Activities:</b>		
● Pre-class Quizzes (LaunchPad)	5%	
● In-class Activities (i>Clicker participation and other activities)	8%	

\* Condition for alternate grading scheme: If Final exam % > than Mid1+Mid2 +Midt3 weighted %

**Note:** Students must obtain a total exam score of  $\geq 50\%$  to pass the course. The learning activities scores will be added to a student's total exam score ONLY when the student has met the  $\geq 50\%$  on written exam criteria.

## DETAILS ON ASSESSMENTS:

### **Examinations:** BIOL 112 Exams:

- Consist of multiple choice questions (MCQs) and short answer questions (called Open Response Questions or ORQs).
- Are Two-stage exams: Stage 1 is an individual exam and stage 2 is a group exam. Stage 1 (individual exam) is weighted as 90% of the exam grade and Stage 2 (Group exam) is weighted as 10% of the exam grade. Details will be provided in class.
- Are restricted open book. Students will be permitted to bring in one 21.6 cm x 27.9 cm (8.5" x 11") original review sheet, containing whatever notes they believe would be helpful to them. Both sides may be used
- Midterm exams are held in-class with their registered section.
- The Final Exam will be held during the term-end exam period as scheduled by the Registrars' Office. Instructors have no control over the final exam dates and students should not make airline reservations until they know their exam schedule.

### **In-class Activities**

Each section and Instructor may allocate in-class activities and marks as appropriate for their classroom. Some activities based on 80% participation over the term. In-class activities that are recorded for participation and not correctness require students to show their best effort.

**Learning Path:** Biology 112 is divided into three units, and uses a weekly Learning Path approach. In a typical week, students are expected to:

- Complete pre-class readings and quizzes prior to lecture.
- Attend lectures and participate in in-class activities and assignments.
- Practice and keep up with material with post-class practice questions, assignments, and other study strategies.

## Schedule of Topics:

Below is a sample schedule from 2018W2 (subject to change):

### **Unit 1:**

#### **Introduction to biological macromolecules, cellular structure and function**

<b>Week</b>	<b>Topics</b>
1	- Course introduction and policies - Cell Theory, General properties and types of cells
2	- Eukaryotes and Prokaryotes - Introduction to macromolecules in cells - Chemistry for biology - bonds in biology
3	- Lipids - Phospholipid structure, membrane self-assembly - Lipids - Membrane selective permeability, transport, diffusion, osmosis
4	- Proteins - Structure and self-assembly, Enzymes
5	- <b>Midterm 1 (Stage 1 &amp; 2)</b>

### **Unit 2:**

#### **Biological information flow – from genes to proteins**

5	- Nucleic Acids - Structure, DNA assembly and organization
6	- Nucleic Acids - Genomes - Biological Information Flow and Gene Structure
7	- Transcription
8	- Translation - <b>Midterm 2 (Stage 1 &amp; 2)</b>
9	- Regulating gene expression [lac and mal Operons] - DNA mutations and their consequences
10	- DNA replication in vitro - polymerase chain reaction - DNA replication in vivo

### **Unit 3:**

#### **Metabolism**

<b>Week</b>	<b>Targeted Reading Topics</b>
11	- <b>Midterm 3 (Stage 1 &amp; 2)</b> - Metabolism overview - Energy and chemical reactions - Bacterial cell growth
12	- Cellular respiration overview and Redox reactions: - Glycolysis - Acetyl coA synthesis and citric acid cycle - Electron transport chain and oxidative phosphorylation - Fermentation
13	- Photosynthesis – Photophosphorylation - Photosynthesis - Calvin Cycle

## Course Policies:

- **Lectures and activities** may not be recorded (and/or posted) by audio, video or photographic devices without the explicit permission from the instructor.
- **Final Exam:** Students must write all midterm exams to be eligible to write the final examination. Exceptions may apply in extenuating circumstances.
- **Missed Midterm Exams:** To be eligible to write a make-up exam, students must inform the instructor and the course coordinator within 24 hours of the missed exam with the reason for missing the exam. Without timely notification of an absence or valid documentation, a grade of "0" will be given for the exam.
- **Missed Final Exams:** Students must report their absence to the course coordinator AND their faculty advising office. In the Faculty of Science, students will be expected to fill out a "Request for Academic Concession" and may need to provide documentation for the missed exam (<http://science.ubc.ca/students/advising/exams>). Note: Students who do not fulfill the course requirements during the term and miss the final exam may not be eligible for a deferred examination.
- **Classroom Civility:** Students are expected to conduct themselves at all times in the classroom in a manner that does not disrupt teaching or learning.
- **Centre for Accessibility:** Students who registered with the Centre for Accessibility are asked to provide this information to the Instructor and course coordinator at least 1 week prior to the first exam.
- **SSC (student service centre):** Students should monitor their "Message Centre" to make sure they have received all course e-mails. A plea of ignorance will not be received if they miss some important e-mail information that negatively impacts their course grade.

## University Policies:

*UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence.*

*UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom.*

*UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances.*

*UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.*

*Details of the policies and how to access support are available on [the UBC Senate website](#).*