



**CAMOSUN COLLEGE**  
*School of Arts & Science*  
*Department of Biology*

**BIOL-231-001**  
**Principles of Cell Biology**  
**Fall 2018**

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## **COURSE OUTLINE**

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The course description is online @ <http://camosun.ca/learn/calendar/current/web/biol.html>

Ω Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.

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### **1. Instructor Information**

|                  |   |
|------------------|---|
| (a) Instructor   | Dr. Larry Anthony   |
| (b) Office hours | Mon 11:30 – 12:20; Tue 10:30 – 12:20; Thu 3:00 – 3:50                   |
| (c) Location     | F314A   |
| (d) Phone        | 250-370-3459 <b>Alternative:</b> _____                                  |
| (e) E-mail       | <a href="mailto:anthonyl@camosun.bc.ca">anthonyl@camosun.bc.ca</a>      |
| (f) Website      | <a href="http://online.camosun.ca/">http://online.camosun.ca/</a> (D2L) |

**IMPORTANT NOTE:** I understand that my scheduled drop-in office hour times will not necessarily align with everyone's class schedules. This should not deter you from trying to visit me in my office! My schedule will be posted on my office door and on the course D2L website: I can be available at almost any time that I'm not already in class or lab. Simply arrange an appointment by e-mail and I'll be very pleased to meet with you at a mutually convenient time.

### **2. Intended Learning Outcomes**

(If any changes are made to this part, then the Approved Course Description must also be changed and sent through the approval process.)

Upon completion of this course the student will be able to:

1. Describe the properties of the four groups of macromolecules, including how polymers are synthesized from monomeric units.
2. Describe the structure and functions of the subcellular compartments, organelles and structural molecules.
3. Describe the molecular structure of cellular membranes and explain how membrane structure facilitates membrane function.
4. Explain the molecular mechanisms underlying diffusion, facilitated diffusion and active transport across cytoplasmic membranes.
5. Describe how cells interact with their environment through the extracellular matrix and with other cells through intercellular junctions.
6. Describe the structure and functions of the intracellular membrane systems. Explain the cellular and molecular mechanisms underlying the flow of molecules through the endomembrane system.
7. Explain how secretion, endocytosis and exocytosis facilitate the bulk movement of molecules into and out of the cell.

8. Explain the cellular and molecular mechanisms underlying communication between neurons.
9. Explain the cellular and molecular mechanisms through which cells communicate with one another by chemical messengers.
10. Describe the structures of the cytoskeleton. Explain how the cytoskeletal components are used in movement of intracellular components and in cell motility in the environment.
11. Describe the cellular and molecular mechanisms underlying control of the cell cycle and programmed cell death. Apply these principles in the dysregulated environment of cancer cells.
12. Conduct complex experiments and use a variety of current molecular and analytical techniques to assess various aspects of cellular biology. Critically evaluate data and present written laboratory reports.

### 3. Required Materials

**Text:** Hardin & Bertoni (2016) *Becker's World of the Cell*, 9<sup>th</sup> Edition (Pearson)

**Lab Manual:** Biology 231 lab outlines will be posted on the Biology 231 D2L website several days prior to the lab times. You will be responsible for printing the outline (and any associated worksheet materials) and reading it before the lab session. You will also be responsible for following any pre-lab instructions that may be indicated in the lab. Knowledge of lab procedures and principles prior to the lab may be evaluated through pre-lab quizzes.

**Lab Coat:** Lab coats are required for laboratory work. See below.

**Lecture Outlines:** Lectures will be delivered in a PowerPoint format. PowerPoint slides will be made available on the Biology 231 D2L website. These may be used or printed at the student's discretion to help follow the lectures.

### 4. Course Content and Schedule

(Can include: Class hours, Lab hours, Out of Class Requirements and/or Dates for quizzes, exams, lecture, labs, seminars, practicums, etc.)

|                |     |                |      |
|----------------|-----|----------------|------|
| Lectures:      | Mon | 10:00 – 11:20  | F206 |
|                | Thu | 13:30 – 114:50 | F202 |
| Lab Section A: | Wed | 8:30 – 11:20   | F222 |
| Lab Section B: | Wed | 12:30 – 3:20   | F222 |

**NOTE:** See last page for a weekly breakdown of scheduled lecture and topics.

### 5. Basis of Student Assessment (Weighting)

(Should be directly linked to learning outcomes.)

|                    |       |
|--------------------|-------|
| Lecture Midterm 1  | 12%   |
| Lecture Midterm 2  | 17%   |
| Lecture Quizzes    | 6%    |
| Lab Exam 1         | 12.5% |
| Lab Exam 2         | 12.5% |
| Lecture Final Exam | 25%   |
| Assignments / Labs | 15%   |

## 6. Grading System

*(If any changes are made to this part, then the Approved Course description must also be changed and sent through the approval process.)*

*(Mark with "X" in box below to show appropriate approved grading system – see last page of this template.)*

Standard Grading System (GPA)

Competency Based Grading System

## 7. Recommended Materials to Assist Students to Succeed Throughout the Course

Larry Anthony has prepared a document intended to provide insight into effective (and ineffective) ways of studying. This document will be posted on the course D2L website.

## 8. College Supports, Services and Policies



### Immediate, Urgent, or Emergency Support

If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @

<http://camosun.ca/about/mental-health/emergency.html> or <http://camosun.ca/services/sexual-violence/get-support.html#urgent>

### College Services

Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at <http://camosun.ca/>

### College Policies

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at <http://camosun.ca/about/policies/>. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

## A. Grading Systems <http://camosun.ca/about/policies/index.html>

The following two grading systems are used at Camosun College:

### 1. Standard Grading System (GPA)

| Percentage | Grade | Description                          | Grade Point Equivalency |
|------------|-------|--------------------------------------|-------------------------|
| 90-100     | A+    |                                      | 9                       |
| 85-89      | A     |                                      | 8                       |
| 80-84      | A-    |                                      | 7                       |
| 77-79      | B+    |                                      | 6                       |
| 73-76      | B     |                                      | 5                       |
| 70-72      | B-    |                                      | 4                       |
| 65-69      | C+    |                                      | 3                       |
| 60-64      | C     |                                      | 2                       |
| 50-59      | D     |                                      | 1                       |
| 0-49       | F     | Minimum level has not been achieved. | 0                       |

### 2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

| Grade | Description   |
|-------|---|
| COM   | The student has met the goals, criteria, or competencies established for this course, practicum or field placement.   |
| DST   | The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement. |
| NC    | The student has not met the goals, criteria or competencies established for this course, practicum or field placement.  |

## B. Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at <http://camosun.ca/about/policies/index.html> for information on conversion to final grades, and for additional information on student record and transcript notations.

| Temporary Grade | Description   |
|-----------------|---|
| I               | <b>Incomplete:</b> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.   |
| IP              | <b>In progress:</b> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.   |
| CW              | <b>Compulsory Withdrawal:</b> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement. |

## PLAGIARISM

Plagiarizing is appropriating the work or parts or passages of another's writing (including the ideas or language) and passing them off as the product of one's own mind or manual skill (see <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.1.pdf>). Plagiarism is a serious offence and is considered to be academic misconduct, and so **will not be tolerated**. Except where work is assigned to a group, all written work, **including lab data processing** and graphs, must be done individually.

## CHEATING

A student caught cheating on an exam will forfeit all credit for that exam and perhaps for the course. Cheating is a serious offence and is considered to be academic misconduct. Cheating includes, but is not limited to:

- (a) using unauthorized materials or resources in a quiz/exam, and
- (b) providing information to another person regarding exam content.

The consequences for cheating and plagiarism are outlined by Camosun College policies (see <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf>) and penalties may be severe.

## ACADEMIC HONESTY AND ACADEMIC MISCONDUCT

In addition to the College Student Conduct Policy (see <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf>), the School of Arts and Science has approved guidelines to help interpret and apply this policy (see <http://camosun.ca/learn/school/arts-science/images/Arts%20and%20Science%20Academic%20Honesty%20Guidelines.pdf>). The guidelines state that the instructor will report all instances of academic dishonesty to the School and they prescribe penalties for infractions. All learners in BIOL-231 are bound by **BOTH** the College policy **AND** the School guidelines, so be sure to familiarize yourself with them.

In BIOL-231, there will be individual assignments and group assignments. If individual assignments **fail in any way** to reflect an entirely individual effort, this will be regarded as an infraction under the guidelines that will be penalized and reported to the School.

## STUDENT SAFETY

**NOTHING** is more important to the instructor than students enjoying a safe class and lab environment. In Principles of Cell Biology we will not be working with organisms capable of causing infection. However, the cell biology labs are within the Camosun Biological Safety Containment Zone (CZ), and so our work in that zone is mandated by federal and provincial legislation and regulations to conform to strict safety standards. These will be outlined fully in the lab, but consider the following issues:

|                              |   |
|------------------------------|---|
| <b>Lab footwear</b>          | <ul style="list-style-type: none"><li>For safety reasons <b>WorkSafeBC</b> mandates, and federal regulations require, that students are <b>required</b> to wear closed shoes in all lab times. Flip flops, sandals or shoes with holes are not acceptable. Other footwear posing an instability risk (e.g. high heels or bicycle shoes) are prohibited.</li></ul>   |
| <b>Lab coats</b>             | <ul style="list-style-type: none"><li>For regulatory, safety and professional reasons, it is <b>mandatory to wear a lab coat</b> during all lab sessions. Because the 231 lab is within the CZ lab coats must remain in the lab for the duration of the semester. Personal lab coats are not permitted; lab coats must be rented for the semester from the Biology Department by purchasing a lab coat rental chit from the Lansdowne Bookstore. Presenting this chit to the instructor will ensure you access to a clean lab coat for your use throughout the semester.</li><li>Failure to wear proper lab attire will result in the <b>inability to enter</b> the lab and the subsequent <b>loss of credit</b> for that lab, including any lab assessment credit.</li><li>While in the lab the lab coat must be completely buttoned.</li><li>The lab coat must <b>NEVER</b> be worn outside of the lab. If you must leave the lab for any reason you must remove your lab coat.</li></ul> |
| <b>Eating &amp; drinking</b> | <ul style="list-style-type: none"><li>Eating or drinking anything in the lab is a violation of federal regulations, so absolutely <b>NOTHING</b> may be ingested while in the lab. Chewing gum and applying makeup or lip balm are similarly prohibited. <b>NO EXCEPTIONS</b> will be made, even for medications.</li><li>If something must be consumed, then it may be taken out of the lab.</li></ul>   |
| <b>Hair</b>                  | <ul style="list-style-type: none"><li>It is recommended that long hair be tied securely to prevent it from being exposed to lab equipment.</li></ul>  |
| <b>Handwashing</b>           | <ul style="list-style-type: none"><li>Hands should be thoroughly washed <b>AFTER</b> removing lab coats and <b>BEFORE</b> leaving the lab. Proper procedure will be demonstrated and practised.</li></ul>   |

## LABORATORY ATTENDANCE

Lab work is critical to the course objectives and much effort has been expended to ensure the lab experience is interesting and educational, both from academic and practical points of view. Therefore, attendance throughout the entire laboratory session is mandatory and will be noted. Labs will start promptly (after a five-minute grace period) because information necessary for performing the laboratory correctly and safely is given at the beginning of the lab. Late attendance may result in inability to attend the lab and subsequent loss of credit for any assignments. Lateness in arriving, unexcused failure to attend the lab or unexcused departure from the lab before its scheduled finish time will result in forfeiting credit for that lab, including any written assignments. If a lab session is missed, another student's data **may not** be used to complete a lab assignment for credit. Exceptions can be made **at the instructor's discretion** in legitimate cases of emergency (e.g. illness); in such cases the instructor must receive **advance notification** and **documented evidence** of the situation (e.g. medical certificate) and grant approval for any accommodation. In cases when a lab is done over two weeks, missing one of the weeks without instructor approval will result in a 50% reduction in the grade for any assignment associated with that lab.

## MISSED LECTURE EXAMS

**Without exception**, all lecture midterm exams must be written at the scheduled times. However, it is understood that emergency circumstances occur (e.g. illness or emergency in the immediate family); for such circumstances one of two options (**NOT BOTH**) may be offered at the discretion of the instructor, provided the student:

- (a) notifies the instructor **in advance** of the exam (not after), and
- (b) provides documented evidence of the circumstance (i.e. medical certificate).

Option 1: **Deferring** the exam, opting to write on a different day.

Option 2: **Re-weighting** the final exam, by transferring the weight of the midterm to the final. This is possible because the final exam is cumulative, covering content from the entire course.

***In considering these options, it should be noted that both options carry risks. BIOL-231 is a content-rich course; time spent studying for a deferred midterm exam will result in the learner falling behind in more current course material. Therefore, deferring midterm exams is NOT in the best interests of learner success. On the other hand, re-weighting a final exam places more pressure to achieve a high mark on the final exam.***

If you elect to defer a midterm and transfer the weight to the final exam, then the final exam will include extra questions to thoroughly examine knowledge of previously untested subject matter. Sufficient time for the extra questions will be provided. The final exam mark will be based upon the total mark for the main exam and the supplemental questions.

In a situation in which a learner is unable to write the final exam, then the instructor will permit deferring the final exam to another time in the exam period. In very extraordinary cases, a final exam cannot be written in the final exam period. In such cases an 'I' grade (incomplete) will be recorded until the final exam can be completed. Once the final exam has been written, there will be no opportunity to re-write it.

**NOTE: Once an exam is written, requesting a exam deferral or an exam re-write is NOT an option.**

***\* HOLIDAYS OR SCHEDULED FLIGHTS ARE NOT CONSIDERED TO BE EMERGENCIES, AND WILL NOT BE ACCEPTED AS REASONS TO DEFER OR RESCHEDULE EXAMS. \****

Be sure not to make travel plans for the middle or the end of the semester until the lecture and lab exam schedules are posted. **Important:** please ask any friends or family members who might make travel plans on your behalf to consult you before booking non-refundable tickets.

## MISSED LAB EXAMS

Lab exams differ from lecture exams in their formatting and the fact that they cover lab content in a non-cumulative manner. Administering a deferred lab exam will be at the discretion of the instructor and requires advance notice of the reason for deferral and supporting documentation. **Under no circumstances will any make-up lab exam be administered to re-write an exam that has already been written.**

## WRITTEN WORK

Lecture and lab assignments will be assigned at the instructor's discretion. It is the student's responsibility to be informed of any work expected and the dates the work is due. Assignments may be intended to be completed as individuals or as groups. The instructor will make clear which is which. Work intended to be submitted by an individual must be completed independently, keeping in mind student conduct

requirements. Work intended for completion by a group **MUST NOT** be completed by an individual. Each person in a group will receive the same mark on any group work. If a group member does not contribute in an equal manner to a group assignment, then that person's name must NOT be included on the assignment; this is academic dishonesty.

Unless otherwise indicated, **ALL written material** to be submitted to the instructor (including numerical entries in data tables) must be prepared using word processing (typically MS Word) or graphing software (e.g. Excel). **Any exceptions to this rule will be clearly indicated.** Work submitted inappropriately formatted will not be marked and a late penalty will be assessed.

MS Word templates will be posted on the course D2L website for assignment purposes; these templates must not be altered except to complete the blank areas. All written work must be submitted in **hard copy**, not e-mailed or posted to the D2L website. Exceptions to this policy are rare and made only at the discretion of the instructor. This is for purely practical reasons: printing out many assignments is problematic because instructors use shared-access printers, which are not private, and documents or parts of documents can easily go missing. **Always be on the lookout for special instructions.**

### **LATE PENALTIES**

All assignments must be handed in by the **time indicated on the assignment**. If the instructor is not in the office, then slide your work under the office door. Late assignments will be graded but marks equivalent to 15% of the total value of the assignment will be deducted for each day past the deadline (weekends count as one day).

### **SUMMARY OF STUDENT RESPONSIBILITIES**

1. Attending classes and actively engaging in lecture times are optimal for learning and therefore are in the best interests of student success. Should it be necessary to miss a lecture, however, it is the student's responsibility to catch up on anything that may have been missed (e.g. important announcement or assignments).
2. Students must hand in required assignments on time or be subject to penalty.
3. Electronic submissions of assignments (e.g. as e-mail attachments) will **NOT** be accepted.
4. Evaluation of written or oral work will not be given if a student is not present.
5. Students must work independently, except when a group effort is required.
6. Students must know and follow all Safety Rules and Procedures. Students must sign the Safety Contract before participating in any laboratory activity.
7. All safety measures must be followed, with **NO EXCEPTIONS**.
8. The use of cell phones is prohibited in the lab.
9. All laboratories start punctually.



**Biology 231 – 2018F – Course Schedule (Note: Scheduled dates and specific topics are subject to change)**  
**Topics may be added or deleted depending upon time constraints**

| Wk | Day | Date   | Unit | Lecture Topic                            | Chap  | Lab | Lab Activity                         |
|----|-----|--------|------|--|-------|-----|--------------------------------------|
| 1  | Mon | 3-Sep  |      | <b>LABOUR DAY</b>                        |       |     |                                      |
| 1  | Wed | 5-Sep  |      |  |       | 1   | Course Introduction & Lab Safety     |
| 1  | Thu | 6-Sep  | 1    | Inflammation: Cell Biology in a Nutshell |       |     |                                      |
| 2  | Mon | 10-Sep | 2    | Cellular & Subcellular Structure         | 2/3   |     |                                      |
| 2  | Wed | 12-Sep |      |  |       | 2   | Microscopy                           |
| 2  | Thu | 13-Sep | 3    | Biological Molecules                     | 2/3   |     |                                      |
| 3  | Mon | 17-Sep | 3    | Biological Molecules                     | 4     |     |                                      |
| 3  | Wed | 19-Sep |      |  |       | 3   | Histology                            |
| 3  | Thu | 20-Sep | 4    | Membrane Functional Anatomy              | 7     |     |                                      |
| 4  | Mon | 24-Sep | 4    | Membrane Functional Anatomy              | 7     |     |                                      |
| 4  | Wed | 26-Sep |      |  |       | 4   | Quantifying Diffusion                |
| 4  | Thu | 27-Sep | 5    | Membrane Transport Mechanisms            | 8     |     |                                      |
| 5  | Mon | 1-Oct  | 5    | Membrane Transport Mechanisms            | 8     |     |                                      |
| 5  | Wed | 3-Oct  |      |  |       | 5A  | Cell Culture (Part 1)                |
| 5  | Thu | 4-Oct  | 5    | Membrane Transport Mechanisms            | 8     |     |                                      |
| 6  | Mon | 8-Oct  |      | <b>THANKSGIVING DAY</b>                  |       |     |                                      |
| 6  | Wed | 10-Oct |      |  |       | 6   | Leukocyte Isolation                  |
| 6  | Thu | 11-Oct |      | <b>LECTURE MIDTERM 1</b>                 |       |     |                                      |
| 7  | Mon | 15-Oct | 6    | Cytoskeleton Structure & Function        | 13    |     |                                      |
| 7  | Wed | 17-Oct |      |  |       |     | <b>LAB EXAM 1</b>                    |
| 7  | Thu | 18-Oct | 6    | Cytoskeleton Structure & Function        | 13    |     | <i>ShakeOut BC</i>                   |
| 8  | Mon | 22-Oct | 7    | Cell Motility                            | 14    |     |                                      |
| 8  | Wed | 24-Oct |      |  |       | 7   | RBC Protein Isolation & Assay        |
| 8  | Thu | 25-Oct | 7    | Cell Motility                            | 14    |     |                                      |
| 9  | Mon | 29-Oct | 8    | Cell Adhesion, Junctions & ECM           | 15    |     |                                      |
| 9  | Wed | 31-Oct |      |  |       | 8A  | Protein SDS-PAGE Analysis (1)        |
| 9  | Thu | 1-Nov  | 8    | Cell Adhesion, Junctions & ECM           | 15    |     |                                      |
| 10 | Mon | 5-Nov  | 8    | Cell Adhesion, Junctions & ECM           | 15    |     |                                      |
| 10 | Wed | 7-Nov  |      |  |       | 9   | RTK Signaling                        |
| 10 | Thu | 8-Nov  | 9    | Chemical Signal Transduction             | 23    | 8B  | <i>Protein SDS-PAGE Analysis (2)</i> |
| 11 | Mon | 12-Nov |      | <b>COLLEGE CLOSED</b>                    |       |     |                                      |
| 11 | Wed | 14-Nov |      |  |       | 5B  | Cell Culture (Part 2)                |
| 11 | Thu | 15-Nov |      | <b>LECTURE MIDTERM 2</b>                 |       |     |                                      |
| 12 | Mon | 19-Nov | 9    | Chemical Signal Transduction             | 23    |     |                                      |
| 12 | Wed | 21-Nov |      |  |       | 10  | Phagocytosis                         |
| 12 | Thu | 22-Nov | 10   | Cell Cycle, Cell Death & Cancer          | 24/26 |     |                                      |
| 13 | Mon | 26-Nov | 11   | Electrical Signaling in Neurons          | 22    |     |                                      |
| 13 | Wed | 28-Nov |      |  |       |     | <b>LAB EXAM 2</b>                    |
| 13 | Thu | 29-Nov | 11   | Electrical Signaling in Neurons          | 22    |     |                                      |
| 14 | Mon | 3-Dec  | 11   | Electrical Signaling in Neurons          | 22    |     |                                      |
| 14 | Wed | 5-Dec  |      |  |       |     | <b>TUTORIAL</b>                      |
| 14 | Thu | 6-Dec  | 12   | Endomembrane Systems                     | 12    |     |                                      |
|    | Mon | 10-Dec |      | <b>FINAL EXAM PERIOD BEGINS</b>          |       |     |                                      |