



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

**BIOL-231-001**  
**Principles of Cell Biology**  
**Winter 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	Wednesdays, 11:00 – 12:20; Thursdays, 2:30- - 4:00
(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 fit into 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:	Tue	11:00 – 12:20	Y316
	Thu	11:00 – 12:20	Y316
Lab Section A:	Mon	9:30 – 12:20	F222
Lab Section B:	Mon	2:30 – 5:20	F222

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

(Should be directly linked to learning outcomes.)

Lecture Midterm 1	15%
Lecture Midterm 2	20%
Lab Exam 1	12.5%
Lab Exam 2	12.5%
Lecture Final Exam	25%
Assignments / Labs / Quizzes	15%

**Please note:** It is understood that life circumstances may negatively affect an individual's performance on an individual exam. Because the final exam is cumulative, if **ONE** midterm lecture exam mark is **less than 60%**, there is an opportunity to re-weight the value of that midterm, transferring some (**but not all**) of its value to the final exam. For this to occur certain strict criteria need to be met:

1. The student must request this adjustment **in writing (by e-mail)**; the instructor **will not** make it automatically. The request must specify which of the two midterms (**not both**) is requested to be re-weighted.
2. The student must be willing to do supplementary questions added to the final exam in order to ensure the topic areas were adequately covered.
3. A minimum of 65% must be obtained on the additional questions or no re-weighting will occur.
4. A minimum of 65% must be obtained **OVERALL** on the final exam or no re-weighting will occur. This is to show that the reason for the poor midterm mark has been overcome.

If the above criteria are met the following strategy will be executed to obtain a final grade:

1. The weight of the unsatisfactory midterm lecture exam mark will be **reduced** by two-thirds (e.g. from 15% to 5% in the case of Midterm 1).
2. The weight of the final exam will be **increased** by the amount reduced on the midterm (e.g. from 25% to 35% if Midterm 1 were re-weighted).

## 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

## 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.

## 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>
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<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 (details to be provided). 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, failure to attend the lab or leaving 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 accommodation 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).

**\* 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.

**Without exception**, the accommodation will be in the form of adjusting the weighting of the final exam to make up the missing marks. In such cases, the final exam will include extra questions to thoroughly examine knowledge of previously untested subject matter. If you are unable to write the final lecture exam, then you may request an exam deferral, in which case an alternate time will be found to write the final exam. Requests for deferral must be supported by documentation indicating the reason for deferral. In some cases, the 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. **Under no circumstances will any make-up lecture exam be administered, either to replace a missed exam or to re-write an exam that has already been written.**

## 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 makeup lab exam will be at the discretion of the instructor. **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 may 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.

Unless otherwise indicated, **all written material** to hand in (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, which includes last-minute handwritten corrections, will not be marked until all formatting is correct. Since correcting formatting requires time, this will likely mean a late penalty will be assessed.

MS Word templates will be provided for assignment purposes by posting on the course D2L website; these templates should 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 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 only 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 – 2018W – 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	8-Jan					Introduction to Principles of Cell Biology
1	Tue	9-Jan	1	Biological Molecules	2/3	1	Micropipetting Technique
1	Thu	11-Jan	1	Biological Molecules	2/3		
2	Mon	15-Jan				2	Microscopy
2	Tue	16-Jan	1	Biological Molecules	2/3		
2	Thu	18-Jan	2	Cellular & Subcellular Structure	4		
3	Mon	22-Jan				3	Histology
3	Tue	23-Jan	3	Membrane Functional Anatomy	7		
3	Thu	25-Jan	3	Membrane Functional Anatomy	7		
4	Mon	29-Jan				4A	Cell Culture (Part 1)
4	Tue	30-Jan	4	Membrane Transport Mechanisms	8		
4	Thu	1-Feb	4	Membrane Transport Mechanisms	8		
5	Mon	5-Feb				5	Leukocyte Isolation
5	Tue	6-Feb	4	Membrane Transport Mechanisms	8		
5	Thu	8-Feb		<b>LECTURE MIDTERM 1</b>			
6	Mon	12-Feb		<b>FAMILY DAY</b>			<b>NO LAB</b>
6	Tue	13-Feb		<b>READING BREAK</b>			
6	Thu	15-Feb		<b>READING BREAK</b>			
7	Mon	19-Feb					<b>LAB EXAM 1</b>
7	Tue	20-Feb	5	Cytoskeleton Structure & Function	13		
7	Thu	22-Feb	5	Cytoskeleton Structure & Function	13		
8	Mon	26-Feb				6	RBC Protein Isolation & Assay
8	Tue	27-Feb	6	Cell Motility	14		
8	Thu	1-Mar	6	Cell Motility	14		
9	Mon	5-Mar				7A	Protein SDS-PAGE Analysis (1)
9	Tue	6-Mar	7	Cell Adhesion, Junctions & ECM	15		
9	Thu	8-Mar	7	Cell Adhesion, Junctions & ECM	15		
10	Mon	12-Mar				8	RTK Signaling
10	Tue	13-Mar	7	Cell Adhesion, Junctions & ECM	15	7B	<i>Protein SDS-PAGE Analysis (2)</i>
10	Thu	15-Mar		<b>LECTURE MIDTERM 2</b>			
11	Mon	19-Mar				4B	Cell Culture (Part 2)
11	Tue	20-Mar	8	Chemical Signal Transduction	23		
11	Thu	22-Mar	8	Chemical Signal Transduction	23		
12	Mon	26-Mar					<b>LAB EXAM 2</b>
12	Tue	27-Mar	9	Cell Cycle, Cell Death & Cancer	24/26		
12	Thu	29-Mar	10	Electrical Signaling in Neurons	22		
13	Mon	2-Apr		<b>EASTER MONDAY</b>			<b>NO LAB</b>
13	Tue	3-Apr	10	Electrical Signaling in Neurons	22		
13	Thu	5-Apr	10	Electrical Signaling in Neurons	22		
14	Mon	9-Apr					<b>TUTORIAL</b>
14	Tue	10-Apr	11	Endomembrane Systems	12		
14	Thu	12-Apr	11	Endomembrane Systems	12		
	Mon	16-Apr		<b>FINAL EXAM PERIOD BEGINS</b>			