BIOL 225 A01/A02 (CRN 10337/10338)
Principles of Cell Biology
Fall 2025

Instructors:

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If you send an email, please put "Biology 225" and your lab section number (*e.g.* B03) in the subject line. Due to expected high volumes of email, please expect a 1-2 day delay in email response. If you need a quicker response, I recommend using the Lab Q&A forum on the lab Brightspace page or visiting one of the TAs during daily office hours

Territorial Acknowledgement:

We acknowledge and respect the Lək̓ʷəŋən (Songhees and Xʷsepsəm/Esquimalt) Peoples on whose territory the university stands, and the Lək̓ʷəŋən and W̱SÁNEĆ Peoples whose historical relationships with the land continue to this day.

Inclusivity Statement:

We consider our classroom and office hours to be a place where you will be treated with respect, and we welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability- and other visible and non-visible differences. All members of this class are expected to a respectful, welcoming and inclusive environment for every other member of the class. We will gladly honour your request to address you by an alternate name or gender pronoun. Please advise us of this early in the semester, if applicable to you, so that we may make appropriate changes to our records.

Lecture time and location*:*

A01: TWF 10:30 – 11:20, Bob Wright Centre BWC150
A02: TWF 1:30 – 2:20, David Strong Building DSB C103

Lecture Office Hours and Extra Help*:* Office hours will be held on Wednesdays and Thursdays from 2:30 pm – 3:30 pm in CUN 202C. Outside of these times I can be reached via email at dbriant@uvic.ca

Lecture Delivery*:* the course will be delivered mainly face-to-face, although circumstances may require one or more lectures to be delivered via recording.

Lecture Brightspace site: a Brightspace site will be maintained for this course. Some, but not all, lecture notes will be made available. It contains the following sections:

General Information Including Zoom links: course outline, course timeline, discussion forum, contact information and other course administration material. You will also find the Zoom link for office hours.

Lecture notes: here you will find both PowerPoint and PDF versions of the notes (the two versions have the same content)

Lecture Recordings: audio recordings and transcripts will be available for most lectures.

Textbook Chapter Problems: practice problems from the textbook publisher.

Quizzes and Exams: this will be split into sections for the the Academic Integrity Quiz, Exit Competency Quiz, topic quizzes, midterms and final exam. Online quizzes and midterms will be located here. Midterm and final exam sections will also include practice problems.

Academic Intergrity Quiz: you must score 100% on this quiz before you will be allowed to write any Participation Quizzes or Midterms. This can be found in the Quizzes and Exams section.

Laboratory Materials: these can be found on the laboratory Brightspace site. The lab schedule and learning outcomes can be found on page 6 & 7 of this document.

Note: Laboratory sessions start during the week of September 9th.

Required Lecture Materials

Textbook: Fundamentals of Cell Biology, Dalton and Young. 2024. **Open Text** available for free here: https://open.oregonstate.education/cellbiology/

Topics:

	topic	chapters
1	INTRODUCTION - introduction to cell biology	in lecture material
2	BIOMOLECULES - cell chemistry and biomolecules	In lecture material
3	ORGANELLES - cells and organelles	5
4	MEMBRANE SYSTEMS cytoplasmic membrane systems	4
5	SYNAPTIC SIGNALLING	In lecture material
6	CELL SIGNALLING (non-neuronal)	7
7	CYTOSKELETON	6
8	CANCER	8

Lecture Learning Objectives

Topic 1a – Discovery of Cell, a history

LEARNING OBJECTIVES: early experiments surrounding the discovery of cells are introduced. Students will learn about the basic properties of cells.

Topic 1b – Basic properties and strategies of cells

LEARNING OBJECTIVES: the issues surrounding visualization of cells, which are generally smaller than the naked eye can observe, will be introduced. Students will be taught about various microscopic techniques and they will be able to apply this knowledge to decide which type of microscopy will be best suited to a particular application.

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Topic 1c - Cell Culture

LEARNING OBJECTIVES: students will be introduced to the historical figures and early experiments performed in the development of cell culture techniques. They will have an understanding of challenges surrounding the culturing of animal cells. Students will also learn to recognize the advantages and disadvantages of working with animal cells in culture.

TOPIC 2: Cell Chemistry and Biomolecules

LEARNING OBJECTIVES: in this topic, the building blocks of the cells will be introduced. Students will be expected to how these blocks are assembled into functional macromolecules. This will include analysis of the different types of chemical bonds holding molecules together. Membrane composition and function will be explored, and students will be expected to understand how membranes serve as permeability barriers that demarcate the cell. They will also understand the energetic forces associated with concentration gradients that form across a membrane. Finally, transport of impermeable molecules across a membrane will be discussed, and students will be expected to understand the basic mechanism of these transporters as well as their energetic requirements.

TOPIC 3: Cells and Organelles

LEARNING OBJECTIVES: In this section, students will be introduced to the main functions of the organelles. Students will be expected to know the major functions of each organelle, and understand the adaptations each organelle has gained to maximize their ability to carry out these functions.

TOPIC 4: Membrane Systems

LEARNING OBJECTIVES: movement between organelles, or between organelles and the exterior of the cell, is often mediated by vesicles. The importance and significance of vesicular trafficking, as well as the mechanism, will be described in this section.

TOPIC 5: Signalling 1 – Synaptic Signalling

LEARNING OBJECTIVES: in this section, we will describe how impermeability of the cell membrane to ions allows membrane potential to be established. Students will be expected to know how the various ion channels contribute to an action potential by manipulating the permeability of ions.

TOPIC 6: Signalling II – Non-neuronal Signalling

LEARNING OBJECTIVES: students will be expected to understand the basic eukaryotic signalling pathways. The importance of regulation, and the complexity of combining signalling pathways will be outlined.

TOPIC 7: Cytoskeleton

LEARNING OBJECTIVES: students should understand the structure and importance of the three main cytoskeletal elements. The dynamic nature of the cytoskeleton will be explored and a simple model of motility presented. Finally, the significance of cell-cell and cell-extracellular matrix will be described, and the important signalling pathways underlying these will be introduced.

TOPIC 8: Cancer

LEARNING OBJECTIVES: the epidemiology of cancer was introduced. Students will be expected to form hypotheses about cancer based on this epidemiology. Finally, the underlying causes of cancer will be introduced. Students should be able to correlate the underlying causes with events in the cell cycle of apoptosis.

Evaluation and important dates:

Academic Integrity Quiz:
You must score 100% on this quiz before you can complete any subsequent quizzes. You can make multiple attempts.

Topic Quizzes:
There will be eight topic quizzes, worth 0.5% each. These are participation quizzes, and any learner getting at least one correct answer will receive the full 0.5%. Quizzes are open from Monday to Friday, and are due at 4pm on Fridays. Due dates are as follows:

Quiz 1 – Friday, Sept. 12
Quiz 2 – Friday, Sept. 26
Quiz 3 – Friday, Oct. 03
Quiz 4 – Friday, Oct. 17
Quiz 5 – Friday, Oct. 24
Quiz 6 – Friday, Oct. 31
Quiz 7 – Friday, Nov. 21
Quiz 8 – Friday, Nov. 28

Midterms:
There are two online midterms, each worth 10% of your final grade. They will be held on **Wednesday**, October 08 and **Wednesday**, November 05. Exams can be started between 6:00am – 11:59pm. Once you start you will have 50 minutes to complete the exam. Midterm exams are non-cumulative. There are no deferred exams, and if an exam is missed the weight will be moved to the final exam. You may use materials posted on the course Brightspace site, your textbook and your notes. You may NOT work with other students or use additional resources, including AI or other internet resources.

Lecture Cancelled
There will be NO LECTURE November 07, 2025

Final Exam:
The final will be held in person. It is a cumulative exam. You will be allowed to bring a two-sided templated reference sheet that must be turned in with your exam (template will be provided prior to the exam). The date and time of the exam will be determined by the Registrar.

Final Report Lecture:
Kim Curry will give a special lecture about writing your formal reports on Friday September 26 (during normal lecture time).

EVALUATION	Date
40% laboratory ***	***based on laboratory components. See lab manual for grading details***
4% Topic Quizzes	***0.5% participation mark for each of 8 quizzes (must get at least one answer correct). See due dates and times above.***
10% Midterm 1	***Online via Brightspace, Wed., October 08. Exam. There will be no lecture on this date. See midterm details above.***
10% Midterm 2	***Online via Brightspace, Wed., November 05. There will be no lecture on this date. See midterm details above.***
NO LECTURE NOVEMBER 7!	
36% final exam	***2 hours, in person cumulative exam, date and time TBD by the Registrar***

****** since the course includes lab work, you are required to achieve satisfactory standing in both parts of the course and thus you will not be permitted to write the final exam and will not receive credit for the course if you fail the laboratory component of the course.***

Conversion of marks to final letter grades:

The total mark, calculated from the marks on all the course components including exams, weighted according to the scheme above, will be converted to a percentage and then to a letter grade in the following way:

A+	90 -100	B+	77 - 79	C+	65 - 69	F	<50
A	85 - 89	B	73 - 76	C	60 - 64	N **	<50
A-	80 - 84	B-	70 - 72	D	50 - 59		

** N grades

Students who have completed the following elements will be considered to have completed the course and will be assigned a final grade:

- ***the final exam and the laboratory component must be completed to receive a grade other than "N".***

Failure to complete one or more of these elements will result in a grade of "N" regardless of the cumulative percentage on other elements of the course. An N is a failing grade, and it factors into a student's GPA as 0. The maximum percentage that can accompany an N on a student's transcript is 49

Exam Completion Time Study

Exam completion times and grading outcomes of this course are the subject of a study being conducted by Dr. Mark Laidlaw and Dr. Travis Martin. The purpose of this research is to characterize student exam submission behaviours, and examine how they correlate with student performance. One of the factors that will be tested includes the maximum duration assigned, which may imply status as a student with extended time accommodations. The anticipated benefit of this is to provide guidance data for academic administrators in determining policies on universal design.*

The data on completion times and durations will be kept separate from performance data until after the course has ended and final grades have been submitted. Furthermore, the analysis of the exam completion times and grades for students in this course will be performed using anonymized data, free of student names and student ID numbers, after the completion of the course and submission of final grades. The use of the data, and any collected timing data, will not affect your grade in any way.

Students may opt out of having their data analyzed for this study by sending an email to Dr. Mark Laidlaw or Dr. Travis Martin. Opting out of the analysis will in no way affect performance in the course.

If you have any questions about how your data will be used, or details about the study, you may contact the Data Steward, Dr. Laura Cowen, (sciedean@uvic.ca), or you may contact the researchers, Dr. Travis Martin (travismartin@uvic.ca) and Dr. Mark Laidlaw (laidlaw@uvic.ca). You may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

*Note: Universal Design is a modern pedagogical approach to address accessibility in courses. The approach argues that courses should be designed such that the environment and course policies should be equally usable by all people, regardless of ability or disability, as much as possible. There are many approaches for implementing Universal Design in courses, and these methods vary across disciplines.

LAB INFORMATION

Biology 225 Laboratory Schedule, Fall 2025

Week of	Lab	Topic
Sept 8	**1**	Introduction / Safety / Basic techniques
Sept 15	**2**	Cell structure: light and fluorescence microscopy
Sept 22	**3**	Mitochondria isolation and enzyme assay
Sept 30		***National day for Truth and Reconciliation - no labs***
Oct 6	**4**	Scientific report brainstorming and Excel workshop
Sat. Oct 11		*First part of Scientific report due on course website*
Oct 13		***Thanksgiving break - no labs***
Oct 20	**5**	Cell culturing and sterile techniques – Part I
Oct 27	**5** **6**	Cell culturing and sterile techniques- Part II Red blood cell fractionation by differential centrifugation – Part I
Sat. Nov 1		*Remainder of Scientific report due on course website*
Nov 3	**6**	Blood cell protein quantification and SDS-PAGE prep. – Part II
Nov 10		***Reading break – no labs***
Nov 17	**7**	SDS polyacrylamide gel electrophoresis
Nov 24		Final lab exam

Laboratory Evaluation Summary

In-class assignments:	5 %
Scientific Report:	20 %
Final Laboratory Exam:	15 %
Total:	40%

Intended Lab Learning Outcomes

We have carefully selected lab activities for two purposes: 1) to provide a hands-on opportunity for you to grasp cell biology theories through practice, and 2) to provide opportunities to successively expand on your newly obtained laboratory skills.
Following a lab experiment, special lecture, and interactive lab workshop, you will be able to write a scientific report. You will correctly distinguish the components of precise and clear scientific communication through writing.
Upon completion of the lab course, it is expected that you will be proficient at the timely use of several lab techniques and equipment.

Lab techniques – cell culturing, cell plating, enzyme assays, standard curves, protein electrophoresis, fluorescence microscopy sample prep, isolation of cellular components

Lab equipment – such as micropipettes, centrifuges, light and fluorescent microscopes, spectrophotometers, hemocytometers

Lab safety

You are expected to wear closed-toe shoes, a lab coat, and lab safety glasses and follow all lab safety protocols.

Lab schedule

You must enrol in and attend a lab section in this course.
Labs will begin September 8. Labs are in Cunningham 132 or 136. Check that you attend the correct laboratory section.

Lab Policies

Detailed lab policies are outlined in detail on the lab Brightspace page

COURSE INFORMATION AND POLICIES

1. The Department of Biology upholds and enforces the University's policies on academic integrity. These policies are described in the current University Calendar. All students are advised to read this section. Here is a link to the policy: https://www.uvic.ca/students/academics/academic-integrity/index.php

2. Cell phones, computers, and other electronic devices must be turned off at all times during live class sessions unless being used for the purpose of connecting and engaging with the class.

3. No recordings of live lectures are permitted without permission of the instructor. However, many courses will be recorded by the instructor for accessibility for students unable to attend. If you do not wish to be recorded, contact your instructor to determine if alternative arrangements can be made. Attendance and engagement in the classroom are integral parts of the learning process and cannot be substituted with recordings. It is at the instructor's sole discretion whether they provide a recording or give permission to students to record a lecture. There is no obligation to do so nor is there any expectations about the quality of the recordings. Nor should students assume a lecture will be recorded as instructors may withdraw access to recordings or permission to record. It is the responsibility of students who miss lectures to catch up on the material through extra readings, and obtaining notes from

fellow students. Students who miss several lectures due to illness should contact their instructors to discuss options.

4. Students and instructors are expected to assess their health daily and avoid campus if they are ill.

5. Course materials, such as notes, problem sheets, quizzes, examinations, example sheets, or review sheets, may not be redistributed without the explicit written permission of the instructor.

6. Students are expected to be available for all midterm exams. If you are unable to write a midterm, the grade weight will be automatically shifted on to the final exam. Information about deferral of the final exam is listed below in section 8.

7. The Department of Biology considers it a breach of academic integrity for a student taking a deferred examination to discuss the exam with classmates. Similarly, students who reveal the contents of an examination to students taking an examination are considered to be in violation of the University of Victoria policy on academic integrity (see current University Calendar). Students must abide by UVic academic regulations and observe standards of scholarly integrity (no plagiarism or cheating). Online exams must be taken individually and not with a friend, classmate, or group, nor can you access notes, course materials, the internet, or other resources without the permission of the instructor. You are prohibited from sharing any information about the exam with others. Use of unauthorized electronic devices and accessing the internet and class material during exams is prohibited unless permission is granted by the instructor. Instructors may use Browser Lockdown Software to block access during classes and exams.

8. Deferral of a final exam must be requested with an Academic Concession form and submitted directly to Undergraduate Records. Deferred final exams for fall term courses will be arranged by the instructor. Deferred final exams or spring term courses will be arranged through Undergraduate Records and must be written before the end of the summer term as stipulated in the University Calendar.

9. Requests for review/remark of a midterm exam must be made within one week of the exam being returned.

10. The instructor reserves the right to use plagiarism detection software or other platforms to assess the integrity of student work.

11. Supplemental exams or assignments will not be offered to students wishing to upgrade their final mark.

12. Anonymous participation in online classes is not permitted without permission of the instructor.

Centre for Accessible Learning

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a accessibility considerations that may require accommodations, approach the Centre for Accessible Learning (CAL) as soon as possible in order to assess your specific needs. https://www.uvic.ca/services/cal/index.php

Course Experience Survey (CES)
We value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to us regarding the course and our teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to your CES dashboard. You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. We will remind you nearer the time but please be thinking about this important activity.