


POINT¹⁹ LOMA⁰²
 NAZARENE UNIVERSITY
 Department of Biology

Bio3050; Advanced Cell Biology 4 units Fall 2023

Meeting days/times; MWF 12:15 – 1:10 PM ☼

Meeting location: Lecture = Latter 2, Lab = Sator 120 ☼

Final Exam: Monday, December 11th at 10:30 AM – 1:00 PM ☼

Instructor title and name:	Dr. Mike Dorrell; Professor of Biology
Instructor contact information:	Email: mdorrell@pointloma.edu Phone: 619-849-2962
Office location and hours:	Office: Rohr Science 158 Scheduled office hours: M,W 10:30 – 11:45, Thurs 9:00 – 11:00 <i>Email me to set up an appointment. I love meeting with students and am happy to find a time that works for both of us, especially if the scheduled office hours do not work for you. Emailing me to set up an appointment will also ensure that I am not in another meeting at the time.</i>

PLNU Mission☼ To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Course Description:

An in-depth study of the structure and function of eukaryotic cells. Topics include various aspects of subcellular structure, cytoskeleton dynamics and regulation, the mechanism of cell motility and intracellular transport cell adhesion, cellular signal transduction mechanisms, regulation of cell division and cancer. The laboratory provides exposure to important current methodologies. Lecture and lab.

My goal is that by the end of this course, you will be able to understand the mechanistic functions of the cell, which is the smallest and most fundamental unit of life. You will learn how the cell reacts and changes based on its environmental needs, and relate and apply your detailed knowledge of cell function to biological properties and medical issues that arise from problems with these cellular functions. Along the way, I hope that you will grow in your own appreciation of the creative brilliance of our God and Creator at work through evolution.

Learning outcomes; Besides these ultimate objectives, students will also be able to:

- Utilize major cell biology experimental procedures to section and stain tissues, and grow, maintain, differentiate, and stain cells in culture. (PLO #1)
- Understand the major principles of cellular life including the roles of cell membranes, cellular transport, cytoskeleton remodeling, cell signaling, and cell division and apply that knowledge to scenarios by which the cell must respond to its dynamic environment. (PLO #1)
- Comprehend, critically evaluate, and present current research from the primary literature in the topics of cell biology. (PLO #1)
- Utilize self-learning techniques to help yourself and others understand how to obtain, understand, and apply information about cell biology.
- Apply knowledge of cell properties to clinical diseases by describing how alterations in normal cell function can lead to detrimental phenotypes.

REQUIRED TEXTS:

1) ******Alberts et. al., Molecular Biology of the Cell, 7th Ed., (Big pink book). Norton 2022

2) The Immortal Life of Henrietta Lacks; by Rebecca Skloot

***I realize that this is a thick and expensive textbook. However, this textbook is a great resource for Biology in general. I can tell you from experience that it will be a wonderful reference as you prepare for Graduate or Medical school, and while you are studying, or employed in, anything related to biology. Plus, after evaluating many texts, it doesn't cost much more than other text options.*

EVALUATION AND GRADING; Letter grades will be assigned at the end of the course based on your percentage of total possible points, according to the following **approximate** scale:

A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
NC/F	< 60%

As a general rule +/- 3% from the cutoff grades will usually be given +/- grades. For example, 87 – 90 would be a B+ and 90 – 93% would be an A-. Ultimately however, pluses and minuses (e.g., B+/A-) will be determined at the instructor's discretion. A major factor in this decision will be consistent *class participation and preparation*.

Grading scale:

Laboratory grade	20%
Individual homework (worksheets / crosswords / 2 page summaries)	13%
Primary literature presentation	7%
Mixed group problems and contribution	5%
Class participation and group teaching	10%
Midterms	30%
Final exam	15%
<hr/> Total	<hr/> 100%

COURSE FORMAT:

Theory behind the “jigsaw” format and active learning:

The overall format for this class is likely to be different from most other courses that you have taken throughout your educational career. Extensive data has effectively demonstrated that students learn better by taking part in the learning process, a process called ‘active learning’, which provides opportunities for students to meaningfully talk and listen, write, read, and reflect on the content, ideas, issues, and concerns of an academic subject.” (Meyers and Jones, *Promoting active learning; strategies for the college classroom*. San Francisco: Jossey-Bass). In addition, with the technology available today, science is becoming less and less about memorizing certain facts, and more and more about learning to think, analyze, and evaluate information scientifically. To this end, this course will incorporate several active learning techniques, a few of which are referred to as ‘Jigsaw’ and ‘peer teaching’.

Classroom participation / Jigsaw learning / Peer teaching:

Students will be in charge of learning a portion of each unit on their own and then teaching that portion to the other members of a mixed group of students assigned different portions of the unit content. The group will work together to answer various questions and solve different problems both in and out of class.

Jigsaw / Peer teaching format:

Students will be assigned to one of 5 different groups. For each unit, different groups will be assigned portions of the content (rotating throughout the course)

General timetable within each unit:

Day 1: Introduction

- Exercise designed to initiate interest in, and thoughts about, the topic.
- Background information necessary to understand your assigned portions.

Day 2: Same group discussions and exercises

- Student discussion in groups with others assigned the same topic portion
- Come to class having completed the individual unit worksheet.
 - o Submit to Canvas for grading **PRIOR** to class on that day.
 - o Bring a copy for yourself to use as part of the discussion / teaching
- Discuss the assigned topic with peers who were assigned the same content
 - o Revise misconceptions and clear up confusing aspects
 - o Prepare / practice effective teaching of the key concepts and figures
 - o Use instructor to help clarify any aspect that is unclear.

Prior to mixed group work (prior to Unit day 3):

- o Submit a concise 2-page summary to Canvas **PRIOR** to the next class
- o Come prepared to describe and teach your content in mixed group

Days 3 – 4: Mixed group work.

- Students will assemble in assigned mixed groups
- Students will teach each other their own assigned content (~20 minutes each)
- Throughout the group work, the professor will be helping clear up confusion

Days 5 – 8 (# of days vary slightly): Concept clarification and group problem work

- Instructor led discussions / lectures about different topics within the unit
 - o Further implementation and application of the learned concepts such as how these relate to disease, normal cellular life and function, etc.
 - o Clarifications of commonly misunderstood concepts
- Periodically during discussion, we will introduce a problem from the mixed group questions that you are to work on together in class with your mixed group.
- You should be working as a group some outside of class to complete the other mixed group problems. *Note: I take group participation and evaluations very seriously so you should be sure to be pulling your own weight when questions require some time and effort outside of class to complete.*

See tentative course schedule (latter in the syllabus)

Course Homework and Assessment Descriptions:

Worksheets:

In order to help you focus your thoughts while studying your particular assigned content, you will be given a worksheet to complete. These will be due before you meet in same groups (day 2 of the unit) so that you can bring the completed worksheet to class and use it to confer with students who were assigned the same content. Your individual worksheet is to be submitted to Canvas prior to the same groups class (**NO LATE SUBMISSIONS WILL BE ACCEPTED**). You will then work in “same group” with others assigned the same content, helping to explain important concepts and eliminate misconceptions and confusion. Please use your professor during this time (ASK QUESTIONS OF ME). If one considers the 2-page summaries, the mixed group work and participation, these worksheets really will help contribute to ~30% of your grade (at least indirectly) and thus should be taken very seriously.

2-page summaries:

There is a lot of content in this class. A big part of the success of this format is dependent on each student working hard to understand their assigned content to such a degree that he/she can adequately teach that content to other students and use their knowledge to help with the group answer problem sets. In order to help orient your thoughts into a concise package, you are required to make a 2-page summary of the main ideas and the details of the information contained in your particular content area. The 2-page summary **MUST BE 12-point font (Times New Roman), 1 ½ spaced lines, and less than 2 pages long**. You may find it difficult to adequately describe all of the pertinent information in this small a space, but this is part of the point...to force you to think about, and understand, the content in such depth that this becomes possible, thus making teaching it to others much easier. This will also help you practice to communicate the important concepts without extraneous verbiage. You will print out copies of the summary for each of your mixed group members for use in teaching during mixed group work. The summary can be started at any time and is to be submitted individually, but you should use your ‘same group’ work to help you complete it. Submit via Canvas.

Mixed group problems

Groups of 4 or 5, with one person from each content area, will assemble and help teach each other the various content that everyone is ultimately responsible for in each unit. To help you assemble the information from each member of the group, the groups will work on, and turn in, various problem sets. These should be uploaded to Canvas by a single member of each group, with all the group members' names at the top. We will be working on some of the group problems together in class. However, some of the questions will require an effort outside of class. Be sure to work together and pull your own weight. I suggest designing a google document that everyone can add to and revise. You will be grading each other on participation and effort, and I will be taking account of that as well. **Remember that your participation is worth 8% of your grade and I reserve the right to dock points even further from the overall grades! Also, the concepts covered in these problems are very likely to appear on the exams so it is to your benefit to understand the answer to the problems and to learn from other members of your group.**

Crossword puzzle:

I will be generating crossword puzzles using key terms from the chapter. You are to complete these individually. Although I like to focus more on concepts, memorizing and understanding terms is key to Cell biology. Hopefully, this will be a 'fun' activity that will help you study and recognize terms throughout the book. While completing the puzzles, make sure you understand the terms and their importance to the topic. ***You are required to complete the Unit 1 crossword puzzle and 3 of the last 5 units. I suggest you complete them all for your benefit, but you have 2 that you can fail to turn in without penalty.***

Attendance and Group participation / evaluation

As this course is largely designed based on group work, a significant portion of your overall grade (12%) will be based on your preparation, participation, and contribution to class. This includes asynchronous EdPuzzles, Discussion boards on Henrietta Lacks, and group participation in the peer teaching. **There will be opportunities for students to evaluate their fellow group members for preparation, contribution to group problems, and ability to convey their content to the rest of the group.** Remember that your participation is worth 12% of your grade and I reserve the right to dock points even further from the overall grades!

Midterms and Final exam

There will be three scheduled midterms throughout the semester, given during the scheduled laboratory times. Tests will be a combination of multiple choice, short answer / problems, and essay. Each mid-term will mainly cover the recent material. However, you will still be responsible for material covered earlier as comprehension of this material may be key to answering questions on new material. The final exam will be approximately 40% new material and 60% cumulative and **must be taken at the scheduled place and time.**

Primary literature presentation

During each lecture, one of the groups will be assigned to cover a primary literature article on the topic material. Your group will be presenting the article in a 30 – 45 minute, journal club-style presentation during the lab period. As for the other sections, there will be a worksheet that you must complete, meant to guide you through understanding the article. Although **you will not be**

required to write 2-page summary on the content of this article, you should still come to the mixed groups prepared to participate, especially in the mixed group problems. See the guidelines for article presentation for helpful hints, presentation formatting, and the grading rubric on this particular project.

Feedback

As you go through each unit, please let me know what concepts are clear, and which need extra clarification during the concept clarification classes. Also, I have continuously revised this course format to help make it as good as possible. However, I understand that people are different so please give me feedback throughout the course so that I can continue to make this better and optimize your learning experience. I also work very hard to give you feedback on assignments, etc. Use this to your advantage to learn and prepare for the exams.

Laboratory work

See laboratory syllabus for detailed information.

PLNU Attendance and Participation Policy⊕

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an “F” grade.

Spiritual Care*

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith.

If students have questions, a desire to meet with the chaplain or have prayer requests you can contact your professor or the Office of Spiritual Life and Formation.

PLNU Copyright Policy⊕

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

CONTENT WARNING

I acknowledge that each of you comes to PLNU with your own unique life experiences. This contributes to the way you perceive various types of information. In **Bio3050**, all of the class content, including that which may be intellectually or emotionally challenging, has been intentionally curated to achieve the learning goals for this course. The decision to include such material is not taken lightly. These topics include discussions of **human disease, gender, racial and social inequities, the history of biological experimentation including extortion of underrepresented groups**. If you encounter a topic that is intellectually challenging for you, it can manifest in feelings of discomfort and upset. In response, I encourage you to come talk to me or your friends or family about it. Class topics are discussed for the sole purpose of expanding your intellectual engagement in the area of cell biology, and I will support you throughout your learning in this course.

TRIGGER WARNING

I acknowledge that each of you comes to PLNU with your own unique life experiences. This contributes to the way you perceive several types of information. In BIO3045/BIO3045L, we will cover a variety of topics, some of which you may find triggering. These topics include discussions of **human disease, gender, racial and social inequities, the history of biological experimentation including extortion of underrepresented groups**. Much of this work comes within the reading of “The Immortal Life of Henrietta Lacks” and the ensuing discussion boards and in-class discussions. The experience of being triggered versus intellectually challenged are different. The main difference is that an individual must have experienced trauma to experience being triggered, whereas an intellectual challenge has nothing to do with trauma. If you are a trauma survivor and encounter a topic in this class that is triggering for you, you may feel overwhelmed or panicked and find it difficult to concentrate. In response, I encourage you to take the necessary steps for your emotional safety. This may include leaving class while the topic is discussed or talking to a therapist at the Counseling Center. Should you choose to sit out on discussion of a certain topic, know that you are still responsible for the material; but we can discuss if there are other methods for accessing that material, and for assessing your learning on that material. Class topics are discussed for the sole purpose of expanding your intellectual engagement in the area of cell biology, and I will support you throughout your learning in this course.

PLNU Academic Honesty PolicyⓈ

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one’s own when in reality they are the results of another person’s creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

Artificial Intelligence (AI) Policy*

You are allowed to use Artificial Intelligence (AI) tools (e.g, ChatGPT, iA Writer, Marmot, Botowski) to generate ideas, but you are not allowed to submit AI generated work directly as your own (text, video, audio, images). Any work that will end up submitted to be graded for this course must be edited, understood, and ultimately generated by you. If you have any doubts about using AI, please gain permission from the instructor. Any work submitted as your own that is AI generated without substantial input, revisions, understanding, and critical thinking of your own will result in a conversation with the instructor followed by the possibility of lost credit for that work and further university disciplinary action.

TENTATIVE COURSE SCHEDULE:

<u>Week</u>	<u>Unit</u>	<u>Date</u>	<u>Topic</u>	<u>Textbook Reference</u>	<u>Homework due (prior to class)</u>
<i>Week 1</i>	Unit 1	8-28	Course introduction		Course orientation (canvas)
		8-30 (A)	Chapters 1 and 3 (Cell concepts and post-translational modifications)	Ch 1 (optional review), Ch. 3; Pg 159-179 (mandatory)	Review syllabus, course orientation video, and bring Q's
		9-1			
<i>Week 2</i>	Unit 1	9-4	No class: Labor Day		
		9-6	Chapters 8 and 9 (key laboratory techniques)	Ch. 8; Pg 475- 492, Ch.9; Pg 563 - 580	Unit 1 Crossword
		9-8 (in lab)	Unit 2 introduction (pre-class EdPuzzle activity)	Ch.10 – Ch. 11	Unit 1 worksheet.
<i>Week 3</i>	Unit 2	9-11	Group work (same groups)	Ch. 10 – Ch. 11	Unit 2 individual worksheet
		9-13	Cell membranes; mixed groups (teaching)	Ch. 10 – Ch. 11	Unit 2 - 2-pg summary
		9-15			
<i>Week 4</i>	Unit 2	9-18 (A)	Cell membranes; concept clarification	Ch 10 – 11 (cont.)	Henrietta Lacks part 1 discussion due
		9-20			
		9-22			
Exam 1		Thursday 9-28; Lab Period		Exam I (Units 1 – 2; Ch. 1, 3, 8-11)	
<i>Week 5</i>	Unit 2	9-25 (A)	Unit 2 concept clarification	Ch 10 – 11	Unit 2 crossword
	Unit 3	9-27	Intracellular trafficking intro (pre-class video on canvas) <i>Exam 1 (units 1-2; 9-28)</i>	Ch. 12 - 13	Unit 2 mixed group problems and grp eval.
		9-29 (A)	Intracellular trafficking concept clarification-part 1		
<i>Week 6</i>	Unit 3	10-2	Group work (same groups)	Ch. 12 - 13	Unit 3 individual worksheet
		10-4	Intracellular trafficking: Mixed group teaching		Unit 3 - 2-page summary
		10-6			
<i>Week 7</i>	Unit 3	10-9	Intracellular vesicular trafficking; concept clarification	Ch. 12 - 13	
		10-11 (A)			
		10-13(A)	Cell signaling; intro. activity	Ch. 15	
<i>Week 8</i>	Unit 4	10-16	Intracellular trafficking (unit 3) concept clarification #4	Ch. 12 - 13	Henrietta Lacks part 2 discussion due Unit 3 crossword
		10-18	Cell signaling; concept clarification	Ch. 12-13	Unit 3 mixed grp problems and grp eval.
		10-20	No class: Fall break		

<u>Week</u>	<u>Unit</u>	<u>Date</u>	<u>Topic</u>	<u>Textbook Reference</u>	<u>Homework due (prior to class)</u>
Exam 2		10-26; Lab Period		Exam 2 (Units 3 - 4; Ch. 12-13, 15)	
<i>Week 9</i>	Unit 4	10-23	Cell signaling; concept clarification <i>(Exam 2; Units 3-4, 10-26)</i>	Ch. 15	Discussion board - signaling cascade
		10-25 (A)			Unit 4 Mixed group problems and eval. due
		10-27	Cytoskeleton / cell adhesion; intro. activity		Ch. 16 and 19
<i>Week 10</i>	Unit 5	10-30	Cytoskeleton and cell adhesion; (same groups)	Ch. 16 and Ch. 19	Unit 5; individual worksheet
		11-1			Cytoskeleton; mixed group (teaching)
		11-3			
<i>Week 11</i>	Unit 5	11-6	Cytoskeleton / cell adhesion; concept clarification	Ch. 16, Ch. 19	
		11-8 (A)			
		11-10			
Exam 3		11-16; Lab Period		Exam 3 (Units 4-5; Ch. 15, 16, 19)	
<i>Week 12</i>	Unit 5	11-13	Cytoskeleton / cell adhesion; concept clarification	Ch. 16, Ch. 19	Unit 5 crossword
		11-15			Unit 5; Mixed group problems (due Wednesday by midnight)
		11-17 (A)	Cell cycle / apoptosis / cancer introduction		Ch. 17, 18, 20
<i>Week 13</i>	Unit 6	11-20 (A)	Cell cycle / apoptosis / cancer; Concept clarification#1	Ch. 17, 18, 20	
		11-22			No Class; Thanksgiving break
		11-24			
<i>Week 14</i>	Unit 6	11-27	Cell cycle / apoptosis / cancer; same groups	Ch. 17; 1053-67, 1101 – 13 Ch 18,	Unit 6; individual worksheet Henrietta Lacks part 3 discussion due
		11-29	Cell cycle / apoptosis / cancer; mixed group (teaching)	Ch.20; 1205 – 23, 1256 - 64	Unit 6; 2-page summary
		12-1			
<i>Week 15</i>	Unit 6	12-4	Cell cycle / apoptosis / cancer; Concept clarification #2 - 4	Ch. 17; 1053-67, 1101 – 13 Ch 18, Ch.20; 1205 – 23, 1256 - 64	
		12-6			Unit 6 crossword
		12-8 (A)			Unit 6; mixed group problems (<i>due 12-10</i>)
Final exam Monday, 12-11 (10:30 – 1:00)		10:30 – 1:00; Final exam (~1/3rd covers Unit 6; ~2/3^{rds} cumulative)			

State Authorization⊕

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

PLNU Academic Accommodations Policy⊕

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

Language and Belonging*

Point Loma Nazarene University faculty are committed to helping create a safe and hospitable learning environment for all students. As Christian scholars we are keenly aware of the power of language and believe in treating others with dignity. As such, it is important that our language be equitable, inclusive, and prejudice free. Inclusive/Bias-free language is the standard outlined by all major academic style guides, including MLA, APA, and Chicago, and it is the expected norm in university-level work. Good writing and speaking do not use unsubstantiated or irrelevant generalizations about personal qualities such as age, disability, economic class, ethnicity, marital status, parentage, political or religious beliefs, race, gender, sex, or sexual orientation. Inclusive language also avoids using stereotypes or terminology that demeans persons or groups based on age, disability, class, ethnicity, gender, race, language, or national origin. Respectful use of language is particularly important when referring to those outside of the religious and lifestyle commitments of those in the PLNU community. By working toward precision and clarity of language, we mark ourselves as serious and respectful scholars, and we model the Christ-like quality of hospitality.

You may report an incident(s) using the [Bias Incident Reporting Form](#).

Sexual Misconduct and Discrimination*

In support of a safe learning environment, if you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that accommodations and resources are available through the Title IX Office at pointloma.edu/Title-IX. Please be aware that under Title IX of the Education Amendments of 1972, faculty and staff are required to disclose information about such misconduct to the Title IX Office. If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at pointloma.edu/title-ix.