POINT LOMA NAZARENE UNIVERSITY

Department of Biology

Bio2010; Cell Biology and Biochemistry 4 units *Spring 2025*

Meeting days/times; MWF 8:30 – 9:25 PM ✪
Meeting location: Latter Hall 101 ✪
Final Exam: Friday, May 9th at 7:30 – 10:00 AM ✪

Instructor title and name:	M.Sc. Bella Cruz; Professor of Biology
Instructor contact information:	Email: jvasquez@pointloma.edu Phone: 619-849-3207
Office location and hours:	Office: Rohr Science 188 Scheduled office hours: M,W 10:30 – 11:45, Tue 11:30 – 12:30pm ***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.***

Required Texts and Resources*

1. Campbell (coauthors: Urry, Cain, Wasserman, Minorsky); Biology in Focus, **3rd** Edition; Copyright 2020. Pearson. ***Note: the eText that comes with Mastering (below) is fine.***
2. Students will also need access to the online learning platform "mastering biology".
    1. Packages purchased through the PLNU bookstore or directly at Pearson
3. Lab Manual; purchased through the campus bookstore or directly through Cognella (orders@cognella.com); ~$27
4. iClicker for class participation (this will be used for many classes; you only need to purchase 1)

Important notes: Biology, Biology-Chemistry, Environmental Science majors (and pre-health students) will use this text for 2 - 3 different courses and should purchase the Mastering biology with eText 24 month access. This is ~$130; ISBN-13: 9780135191804.

- This can also be purchased with the looseleaf text (not required as long as you have the etext) for ~$180 from the bookstore; ISBN 9780135686065

Applied health, dietetics, and Chemistry majors will likely only need this text for one semester and can purchase the 18-week access ~$80. ISBN-13: 9780136781851

The bookstore lists several options for the text. These are just different options for different student/major needs. Purchase the text with mastering that best fits your major, a lab manual, and an iClicker.

BIO 2010 Cell Biology and Biochemistry (GE) (3 Units)

An introduction to the principles of cell biology, molecular biology, and biochemistry. Topics include the chemical basis of life, basic membrane functions and membrane transport, basic metabolic pathways including cellular respiration and photosynthesis, cell division, and expression of the genetic material.

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.

General Education Mission⊛

PLNU provides a foundational course of study in the liberal arts informed by the life, death, and resurrection of Jesus Christ. In keeping with the Wesleyan tradition, the curriculum equips students with a broad range of knowledge and skills within and across disciplines to enrich major study, lifelong learning, and vocational service as Christ-like participants in the world's diverse societies and culture.

Program and Course Learning Outcomes⊛

Learning objectives: *The overarching goal of this course is to prepare students for subsequent in-depth coursework in Biology, Biology-Chemistry, and health sciences.*

1) Understand basic principles of the inner function of cells, including how cells obtain and use energy through cellular respiration and/or photosynthesis, how membranes regulate cellular composition, how cells organize and communicate within a multicellular organism, and how genetic material is copied and converted to phenotypic information. (Program learning outcome #1)
2) Apply content to various scenarios in order to describe how a cell would react under changing environmental conditions, and relate problems associated with malfunctions in various important cellular processes. (Program learning outcome #1)
3) Evaluate current bioethical issues from an understanding of science and our moral responsibilities as Christians. (Program Learning Outcome #3)
4) Utilize skills and techniques critical to experimentation in a cell and molecular biology laboratory setting. (Program learning outcome #1)
5) Design scientific experiments with appropriate controls and analyze scientific data, demonstrating knowledge of the purpose, experimental method, data, and basic statistical interpretation. (Program learning outcome #1)
6) Demonstrate critical thinking skills related to scientific methods, data analysis, and conclusions. (FELO 1d; *Critical Thinking: Students will be able to examine, critique, and synthesize information in order to arrive at reasoned conclusions).*

Foundational Explorations Learning Outcomes⊛

1) Demonstrate critical thinking skills related to scientific methods, data analysis, and conclusions. (FELO 1d; *Critical Thinking: Students will be able to examine, critique, and synthesize information in order to arrive at reasoned*

conclusions; assessed by questions embedded within exams throughout with final assessment included in the final exam).
https://assessment.pointloma.edu/academic-assessment/general-education/assessment-plan/

PLNU Recording Notification⊛
In order to enhance the learning experience, please be advised that this course may be recorded by the professor for educational purposes, and access to these recordings will be limited to enrolled students and authorized personnel. Note that all recordings are subject to copyright protection. Any unauthorized distribution or publication of these recordings without written approval from the University (refer to the Dean) is strictly prohibited.

Evaluation and grading:

Point breakdown (tentative; may be altered slightly)

3 midterm exams	39%
1 final exam	17%
Mastering Biology assignments and other homework	17%
peer teaching assignments / Team Activities / participation	7%
Laboratory grade	20%
TOTAL	100%

Approximate grade breakdown

	93-100% = A	90-93% = A-
87-90% = B+	83-87% = B	80-83% = B-
77-80% = C+	73-77% = C	70-73% = C-
67-70% = D+	63-67% = D	60-63% = D-
≤ 59% = F		

Final Examination Policy✪
Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Class Schedules site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

Detailed information

***Exams* (39% for midterms and 17% for final exam)** – There will be 3 midterms (~100 pts each) and a final exam (~160 pts). Each exam will consist of multiple choice and short answer questions and/or calculation problems. All of science is cumulative such that scientific knowledge must build and expand upon previous knowledge. Thus, although the focus of each midterm will be on recent material, each should be thought of as a cumulative exam.

If you have a conflict with an exam date/time, you must let the instructor know well in advance. Makeup exams will be at the discretion of the instructor.
The final exam must be taken at the scheduled place and time.

Homework (17%): – Homework will include mastering biology pre-class and post-chapter assignments. Other assignments will be assigned periodically throughout the semester. Late work will lose 10% per day up to 1 week late (3 classes) at which point a 0 will be given.

Mastering biology

Pre-class assignments **5 pts each** – You will be expected to complete the chapter reading and a short pre-class assignment (~30 minutes) prior to the start of that week's chapter. This will help you be prepared to participate in class and to learn together as we address the more difficult parts of the chapter and work together in class to practice the learning objectives. Many of these contain short videos to view before answering questions. You are strongly encouraged to carefully watch all videos, taking notes along the way.

Chapter review assignments **10 pts each –** After we have completed each chapter together, you will be assigned a more comprehensive set of questions designed to help you practice thinking about and applying what you have learned. These questions more reflect the type of knowledge and questions that you can expect to see on the exams. ~ 1-2 hrs

Canvas Reading guides (extra credit) - The textbook is a very helpful resource for you and we want to encourage you to read prior to coming to class, and to read the textbook in a manner that helps you understand the major content and concepts, be able to explain key figures, and prepare / study for the exams. We encourage you to use and fill out the reading guide when you are reading the text prior to class, and then go back after to revise, expand, and fix any areas. You can think of this as a study guide to be used before and after class. The learning objectives at the back of each reading guide can be considered a pseudo-study guide. ***If you complete all of the reading guides for a given exam and submit (with obvious effort and completeness), you will be awarded 5 extra credit points applied directly to the exam grade.***

EdPuzzle assignments **–** Some weeks there will be a video with questions to answer prior to class. This will help us to cover some of the basic content together prior to class, allowing for more time in class to focus on the higher order learning and practice.

Peer teaching, team activities, and course participation (7%). Actively participating in class is the best way to learn and retain the material, particularly for higher order applications.

Team Based Learning

Peer teaching – Teaching peers is a great way to learn. On some Fridays, for 10-15 minutes at the beginning of class, we will break into peer groups, where one student in the group will teach the others a particular topic, usually describing a key historical experiment that has allowed us to understand current biology related to our course. Topics are listed in the tentative course schedule. **The teaching student will be required to turn in a study guide/outline of the topic (also to be provided to each group member).** Points are awarded according to the degree of preparedness, student evaluations, and the quality of the study guide/outline. **You are allowed to swap weeks with another student in your group, assuming you both agree, but you must inform me of the swap ahead of time.**

Team Activities / quizzing: On some Fridays, we will do Team Activities to practice higher level learning and application. The topic is listed in the schedule. Each student is responsible for reading and preparing any background materials in advance. There may be a short, individual quiz taken on the material prior to the activity to ensure that students are completing the required background work.

Class participation **-** Class attendance and participation will be based on iClicker participation, attitude, and preparation / contribution in peer teaching and group work. I require **iclickers** and have questions throughout the course that are answered by iclicker. **Generally I am looking for thought and participation, not whether or not you answered the question correctly**. **Everyone must have their own Iclicker and it must be registered with your student ID number.** Bring your iClicker to class each day.
Available in the bookstore or online: http://www.iclicker.com/Products/iclicker2/

Laboratory experience – An essential part of any science curriculum is hands-on experience in the lab. The Bio2010 lab is designed to expose the student to some of the essential tools of the scientist in a safe, controlled environment. Please see the separate lab syllabus for details. ***Lab will meet during the first week of classes.***
***Lab reports will be taught and assessed as part of FELO1a, 1d, and 1e)*

Tips for reading a textbook:

- Keep the big picture in mind. Before reading, look at chapter organization. Read the subheadings and get a feel for the breadth and arrangement of topics covered.
- Go over the figures and special topics sections very closely. Be sure you can explain the "take-home message" and main ideas of each. These are critical to understanding biology and should not be considered "pages to skip".
- Highlight words, phrases, and statements you know you will want to find again.
- Write comments to yourself that will help you study the material later.
- When you've finished a chapter, sometime before the exam, create a study guide that outlines the contents. This can then serve as a checklist for future studying.
- Your book has online materials that are very useful to help you learn; animations, videos, practice tests and quizzes, etc. Use these online resources.

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.

Artificial Intelligence (AI) Policy*

In this course, 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

Week	Date	Topic	Textbook Reference
Week 1	1-13	Syllabus and introduction (part on canvas – videos)	
	1-15	Biology as a Scientific Discipline: Hypotheses vs. predictions; Independent and Dependent variables	Chapter 1
	1-17	Biology as a Scientific Discipline: Statistics	
	Friday peer teaching and Team Activity: Introduction and Instructions		
Week 2	**1-20**	**Day off; MLK Jr. Day**	
	EdPuzzle activity plus Chapter 2 pre-reading and pre-class assignment due Sun. night		
	1-22	Chemical Basis of Life (electro-negativity, hydrophobic/ hydrophilic)	Chapter 2.1 – 2.3
	1-24	***Watch Pre class video (~10 mins)*** Organic Molecules I (Carbon-based chemistry)*)*	Chapter 2.4 – 2.5, Chapter 3.1 – 3.2
Week 3	**Chapter 3 reading and Pre-class assignment due by Sunday night**		
	1-27	Organic Molecules II (lipids / nucleic acids)	Chapter 3.3 – 3.4, 3.6
	1-29	***Watch Pre class video (~10 mins)*** Organic Molecules II (proteins)	Chapter 3.5
	1-31	Organic Molecules III Catch-up	
	Team Activity 1: Review of Ch 2 & 3 (quiz at beginning)		
Week 4	**Chapter 4 reading and pre-class activity due by Sunday night. Organelle matrix due Wednesday night.**		
	2-3	Cells (genomes / proteomes, organelles, etc.)	Chapter 3.7, 4.1 – 4.5
	2-5	Cells (protein transport, extracellular matrix, etc.)	Chapter 4.6 – 4.8
	2-7	Catch up and review	
	Peer teaching (Peers #1): Anfinsen experiment (information and guidelines on canvas)		
Week 5	**Chapter 4 review due Sunday night; Chapter 5 EdPuzzle activity, reading and pre-class activity due by Tuesday at midnight**		
	2-10	**Exam 1**	**Covers Ch. 1 - 4**
	2-12	Cell Membranes I (membrane structure / proteins)	Chapter 5.1 – 5.2
	Team Activity #2: Review of Exam 1		
	2-14	Cell Membranes II (membrane transport)	Chapter 5.3 – 5.5
Week 6	**EdPuzzle activity; Threshold and Ch. 5b pre-class activity due by Sunday @ midnight**		
	2-17	Cell Communication I (threshold and ligands / receptors)	EdPuzzle and Chapter 5.6
	2-19	Cell Communication II (types of cell signaling / signal cascades / response)	Chapter 5.6 and supplementary
	2-21	Catch-up day	

Week	Date	Topic	Textbook Reference
Week 7	**EdPuzzle on Thermodynamics… chapter 6 pre-class activity due by Sunday @ midnight**		
	2-24	Thermodynamics, endergonic vs. exergonic rxns	Chapter 6.1 – 6.3
	2-26	Enzymes	Chapter 6.4 – 6.5
	2-28	Catch-up day	Chapter 6.4 – 6.5
Week 8	**Chapter 7 pre-class activity due by Sunday @ midnight**		
	3-3	***Watch pre-class videos (~6 mins)*** Cell Respiration I (glycolysis / Citric acid cycle)	Chapter 7.1 – 7.3
	3-5	**Exam II.**	**Through chapter 6**
	3-7	***Watch pre-class video (~15 mins total)*** Cell Respiration II (OP, fermentation)	Chapter 7.4 – 7.6
March 10 → 14	**Spring break (enjoy)**		
Week 9	**Chapter 8 pre-class activity due by Tuesday @ midnight**		
	3-17	Cell Respiration II (OP, fermentation) - continued	Chapter 7.4 – 7.6
	3-19	***Watch pre-class video (~ 9 mins)*** (Photosynthesis I (photosystems 1 & 2)	Chapter 8.1 – 8.2
	3-21	Photosynthesis II (Calvin cycle)	Chapter 8.3 – 8.4
	Peer teaching (peers #2); Yoshida experiment (Information and guidelines on canvas) Team Activity #3: Cell respiration and photosynthesis		
Week 10	**Chapter 13 reading and pre-class activity due by Sunday @ midnight**		
	3-24	***Watch pre-class video (~6 minutes)*** DNA Structure/Replication I	Chapter 13.1 – 13.2
	3-26	***Watch pre-class video (~6 minutes)*** DNA Structure/Replication II	Chapter 13.1 – 13.2
	3-28	DNA Structure/Replication III / Chromatin and DNA engineering)	Chapter 13.3 – 13.4
Week 11	**ID of DNA as the genetic material – homework activity (no new chapter reading)**		
	3-31	Catch up day	
	4-2	**Exam III**	**Ch. 7, 8, 13**
	4-4	**In class activity on Intro to Molecular biology**	
Week 12	**Chapter 14 reading and pre-class due by Sunday at midnight**		
	4-7	Gene Expression I (overview and transcription)	Chapter 14.1 – 14.2
	4-9	***Pre-class EdPuzzle; mRNA processing (~15 mins)*** Gene Expression II (RNA processing & Translation)	Chapter 14.3 - 14.4
	4-11	Gene Expression III (Translation and mutations)	Chapter 14.5

		Peer teaching (peers #3): Nirenberg exp. (Info and guidelines on canvas)	
Week	**Date**	**Topic**	**Textbook Reference**
Week 13	**4-14**	Gene Expression III (Translation and mutations)	Chapter 14.5
	4-16	Chromosomes / cell cycle	Chapter 9.1 and 9.3
	4-18	No class: Good Friday	
Week 14	**EdPuzzle Activity and Chapters 9 and 10 reading and pre-class activity due by Tuesday**		
	4-21	No class: Easter Monday	
	4-23	Mitosis,	Chapter 9.2
	4-25	***Watch a pre-class video (~3 min) and complete homework "Creating a need for meiosis" (~20 min). Homework link and information on canvas*** Meiosis	Chapter 10.1 – 10.4
	Peer teaching (peers #4): Ledenbergs experiment (Information and guidelines on canvas) Team Activity #5: Review of Concepts from Chapters 10 and 14		
Week 15	**EdPuzzle activity and Chapter 11 reading and pre-class activity due by Sunday**		
	4-28	Mendelian inheritance I	Chapter 11.1 – 11.3
	4-30	Mendelian inheritance II	Chapter 11.4 and 12.2
	5-2	Catch-up day / review session	
Final exam = FRIDAY May 9th 7:30 – 10:00 am.			

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 ***Bio2010*** 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 **evolution, creation care, gender, genetic inheritance, and human health and disease**. 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 biochemistry, 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 Bio2010, we will cover a variety of topics, some of which you may find triggering. These topics include discussions of **evolution, creation care, gender, genetic inheritance, and human health and disease**. 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. Class topics are discussed for the purpose of expanding your intellectual engagement, and I will support you throughout your learning in this course.

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 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.

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.