POINT LOMA
NAZARENE UNIVERSITY

BIO2010: Cell Biology and Biochemistry with Lab
Section 2 (3+1 units)
Point Loma Nazarene University
Spring 2020

Blessed are those who have not seen and yet have believed. John 20:29

Instructor:	Dr. Dave Cummings (davidcummings@pointloma.edu, x2642)
Lecture:	M/W/F 1:30-2:35, Latter 2
Lab sections:	All lab sections meet in Sator Hall lab 120 Section 1A: T 1:30-4:30 pm (Woelbern) Section 1B: Th 8-11 am (Woelbern) Section 2A: W 2:45-5:45 pm (Woelbern) Section 2B: W 6-9 pm (Silva)
Weekly reviews:	Th 7-8 pm, location TBD
Lab manual:	See separate instructions (email) for ordering lab manual.
Book options:	(1) Hardcopy of Brooker *Principles of Biology*, 2nd ed. (ISBN: 9781307005332) OR (2) E-Text of Brooker Principles of Biology, 2nd ed. (ISBN: 9781307005448) * Access to Connect/LearnSmart is required.
Office hours:	M 3-5 pm, T 1-3 pm, or by appointment (Rohr Science room 176)

Catalog course description: 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. Lecture and lab. Offered every semester.

Prerequisite(s): Must have a previous course in high school or university-level chemistry.

Course learning outcomes: The facts and concepts presented in BIO2010 are essential building blocks for subsequent courses in the Biology and Biology-Chemistry majors, and provide a firm foundation for the allied health fields. ***Thus, the overarching goal of this course is to prepare students for subsequent in-depth coursework in Biology, Biology-Chemistry, Environmental Science, and allied health sciences.***

Specific learning outcomes: By the end of the semester, students will be able to:

- understand the 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;
- apply content to various scenarios in order to describe how a cell would react under certain conditions, and relate problems associated with malfunctions in various important cellular processes;

- evaluate current bioethical issues from an understanding of science and our moral responsibilities as Christians;
- utilize skills and techniques critical to experimentation in a cell and molecular biology laboratory setting;
- design scientific experiments with appropriate controls and analyze scientific data, demonstrating knowledge of the purpose, experimental method, data, and basic statistical interpretation.

Assessment and grading:
Your grade for this course will be based on six distinct evaluation tools: exams, online homework, peer teaching, laboratory experience, class participation, and bioethics assignments. Each is described in detail below. A total of 750 points are possible in the lecture portion, and another 250 points are available in lab for a total of 1000 possible points.

Exams **(540 points)** – While BIO2010 can be taken as a GE course or to meet requirements for the applied health sciences, it is most commonly one of the first Biology course for students with declared majors in Biology, Biology-Chemistry, or Environmental Science. The content and concepts introduced in this course are foundational to virtually all subsequent courses in the program, thus it is essential that you maximize retention of the content and concepts beyond the exams. There will be 3 midterms (130 points each) and a final exam (150 points). Because of the size of this class, each exam will consist entirely of carefully designed multiple-choice questions.

All of science is cumulative such that scientific knowledge must build and expand upon previous knowledge. The same is true when learning science: you must remember and apply all that you have previously learned in order to completely understand and apply newer material. Thus, although the focus of each midterm will be on recent material, each should be thought of as a cumulative exam. There will be a few specific questions on material covered in previous exams and, more importantly, retention of the previous material will be key to understanding and applying the newer information. The final exam will be 50% cumulative, with half of the points coming from the previous chapters and the rest from the most recent chapters.

If you have a conflict with an exam date/time, you must let the instructor know prior to the week of the exam to arrange for a makeup exam. Makeup exams will be at the discretion of the instructor.

Homework **(100 points)** – Homework assignments using McGraw-Hill Connect/ LearnSmart are due frequently throughout the semester for a total of 100 points. LearnSmart points are awarded for completion, not correctness. These assignments are to prepare you for class. Not completing them on time will leave you ill prepared for our time together in class. NOTE: These are the easiest points available to you in BIO2010! In addition to required LearnSmart assignments (labeled LS in the software), a series of practice modules (labeled Practice within the software) have been prepared for you that are not required but strongly recommended. As an incentive for you to use the practice modules, I will award 5 pts extra credit every time you complete a full set before an exam.

Peer teaching **(20 points)** – Teaching is a great way to learn. If you understand a topic well enough to explain it to your peers, then you will be well prepared for exams. Roughly once each week, for fifteen minutes at either the beginning or end of class, you will break into assigned groups of four students, and one student will be responsible for teaching a particular topic to the others in the group. Details will be given one week in advance regarding specifics and expectations of each particular topic. Group "teachers" will rotate each week according

to the course schedule, resulting in each student teaching a total of two topics throughout the course of the semester. The teaching student will be required to turn in a typed study guide/outline of the topic (also to be provided to each group member) via TurnItIn on Canvas. Each peer teaching activity will be graded out of 10 points (20 points total) awarded according to the degree of preparedness and the quality of the study guide/outline. ***Unexcused absences for the teachers will result in a 0 for that week's peer teaching.*** 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. Peer teaching guidelines, assigned groups, and an example of a study guide/outline can all be found on Canvas.

Team-based learning **(40 points)** – Your peer teaching group is also your team-based learning (TBL) group. These days will include a short quiz taken at the beginning of class, and then a group quiz taken together. You will be required to prepare for these days by watching a series of videos and assigned readings. There are four TBLs worth 10 points each (40 points total).

Bioethics assignments **(20 points)** – One of our objectives in the Biology Department is to help students develop a greater appreciation for the complexity of ethical issues in the life sciences. As a case study in bioethics we will be examining some of the controversial issues surrounding vaccinations. More information will be provided in lab.

Class participation **(30 points) –** BIO2010 is taught largely in a lecture / discussion style. Participation is essential to success. Make it your goal to speak up at least once every class period.

Laboratory experience **(250 points)** – 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.

Point breakdown

3 mid-term exams	390
1 final exam	150
Homework assignments	100
Peer teaching assignments/Team-based learning	60
Bioethics assignments	40
Class participation	10
Laboratory activities	250
TOTAL	1000

Grade breakdown

Percentage range	Letter grade earned		
92-100%	A	72-77%	C
90-91%	A-	70-71%	C-
88-89%	B+	68-69%	D+
82-87%	B	62-67%	D
80-81%	B-	60-61%	D-
78-79%	C+	≤ 59%	F

***NOTES:**
1. Final grades will be rounded to the nearest whole number and final letter grades assigned accordingly. Final grades are non-negotiable.
2. A minimum grade of C in this course is required to advance to Genetics. (A grade of C- or lower is not acceptable for advancement to Genetics.)
3. Freshmen earning an F will be offered the opportunity to retake a course once, with the new grade completely replacing the F.

Student conduct:
Attendance of all lectures and lab sessions is required; role will be taken during the first 5 minutes of class; late arrival counts as a half absence (as does early departure). Because lab sessions are 3 hours, missing a lab counts as 2 absences. A total of three *unexcused* absences will be permissible. More than three absences will result in forfeiture of two percentage points per absence from your final grade unless documentation of a valid excuse is provided (see below). **Three weeks of absences (9 lectures or 3 labs) for any reason, excused or unexcused, will result in de-enrollment from the course, according to University policy**. Missed in-class assignments, including iClicker quizzes, cannot be made up without prior instructor approval or documentation of a legitimate excuse.

Excused absences are those that result from situations beyond the control of the student. These include (but are not limited to) personal illness, serious family illness or death, delayed flights, and sanctioned University events (athletics, debate team, etc.). Excused absences require some formal documentation such as a doctor's note, email from a coach, etc. Documentation must be provided directly to the instructor. Work done on a day for which you have an excused absence can be made up in a reasonable amount of time at the instructor's discretion.

Unexcused absences are those that are preventable by the student or are recreational in nature. These include (but are not limited to) oversleeping, forgetting to come to class, attending family functions (weddings, family trips, etc.), and personal leave days. Work performed on days for which you have an unexcused absence cannot be made up and points are forfeited. You are allowed no more than 3 unexcused absences before you begin to lose points from your final course grade.

**Please do not come to class if you are currently sick or have had a fever within the last 24 hours.

Respect for one another and for the instructor is essential for an effective classroom environment. You are expected to show respect to your classmates and instructors by:

- listening when others are speaking,
- refraining from discussing non-related issues during class,
- not belittling the opinions of others, even when you disagree.,
- refraining from texting, etc. during class.

Cell phones must be silenced before class begins. Texting is distracting to the instructor and other students. Please wait until after class or lab finishes to text.

Laptop computers are not allowed during class unless you have a documented learning disability that requires it.

Additional information

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 becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

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.

PLNU Academic accommodations policy: While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

Academic honesty: 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.

FERPA policy: In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by distributing graded work individually and posting grades securely in Canvas. Also in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the undergrad academic catalog.

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. No requests for early examinations or alternative days will be approved.

PLNU attendance and participation policy: Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Academic Policies in the Undergraduate Academic Catalog.

Tentative class schedule

Date	Topic	Chapter	Other
T 1/14	Syllabus and introduction		
W 1/15	Biology as a scientific discipline	1	LS1
F 1/17	Chemical review	2	LS2
M 1/20	*MLK Day, no classes*		
W 1/22	Organic molecules	3	PT1-A
F 1/24	Organic molecules	3	LS3
M 1/27	Organic molecules	3	
W 1/29	Cell structures and their functions	4	PT1-B
F 1/31	*NO CLASS*		
M 2/3	Cell structures and their functions	4	LS4, TBL1
W 2/5	Cell structures and their functions	4	
F 2/7	*NO CLASS (Study for exam 1)*		
M 2/10	**Exam 1 (130 points)**	**Chapters 1-4**	
W 2/12	Cell membranes	5	LS5
F 2/14	Cell membranes	5	PT1-C
M 2/17	Energy and enzymes	6	
W 2/19	Energy and enzymes	6	PT1-D
F 2/21	*NO CLASS*		
M 2/24	Cell respiration and fermentation	6	LS6
W 2/26	Cell respiration and fermentation	6	
F 2/28	Cell respiration and fermentation	6	
M 3/2	Cell respiration and fermentation	6	TBL2
W 3/4	Review/catchup day		
F 3/6	**Exam 2 (130 points)**	**Chapters 5-6 (20% cumulative 1-4)**	
M 3/9-F 3/13	*Spring break, no classes*		
M 3/16	Photosynthesis	7	LS7
W 3/18	Photosynthesis	7	
F 3/20	Photosynthesis	7	PT2-A
M 3/23	Cell communication	8	LS8
W 3/25	Cell communication	8	
F 3/27	*NO CLASS*		
M 3/30	Cell communication	8	PT2-B
W 4/1	DNA replication	9	TBL3
F 4/3	DNA replication	9	LS9
M 4/6	DNA replication	9	PT2-C
W 4/8	**Exam 3 (130 points)**	**Chapters 7-9 (20% cumulative 1-6)**	
Th 4/9-M 4/13	*Easter break, no classes*		
W 4/15	Gene expression	10	LS10
F 4/17	Gene expression	10	
M 4/20	Gene expression	10	PT2-D
W 4/22	Mitosis and meiosis	14	
F 4/24	*NO CLASS*		
M 4/27	Mitosis and meiosis	14	LS14
W 4/29	Meiosis and meiosis	14	TBL4
F 5/1	*NO CLASS (Optional Review)*		
F 5/8	**Final exam (1:30-4 pm, 150 points)**	**Chapters 10, 14 (50% cumulative 1-9)**	

LS, LearnSmart (due before 1:30 on their due dates)
PT, peer teaching
TBL, team-based learning