POINT 1902 LOMA
NAZARENE UNIVERSITY

Department of Biology

BIO2010L Sections 1, 2, 3, and 4; Cell Biology and Biochemistry Lab

Fall 2025; Lab (1 unit)

Meeting location: Sator Hall Lab 120

Lab section and time:	**Instructor title and name:**	**Contact information (email):**
Section 1: Wednesday 2:45 – 5:45 (PM)	Professor Jorji Sigmundt	jsiegmun@pointloma.edu
Section 2: Friday 2:45 – 5:45 (PM)	Doctor Saira Justin	sjustin@pointloma.edu
Section 3: Tuesday 8:00 – 11:00 (AM)	Professor Tripp Aversa	taversa@pointloma.edu
Section 4: Tuesday 1:30 – 4:30 (PM)	Professor Tripp Aversa	taversa@pointloma.edu

Course Description
An inquiry-based laboratory that is a co-requisite for BIO2010.

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.

Program and Course Learning Outcomes
The labs are intended to help bring everyone up to the same level so that each person can:

1. Perform various lab techniques that are standard in biology and that will be required to perform many of the labs later in the biology degree.
2. Design experiments based on the scientific method using appropriate controls.
3. Produce written lab reports that effectively convey experimental purposes, methods, results (including data graphs and tables), and conclusions.
4. You will design, analyze and summarize an experiment which will be considered your foundational explorations signature assignment.

Multiple sections of lab:
You must attend the section in which you are registered. Extenuating circumstances requiring individuals to come to a different lab section on any given week will be considered if brought forward to the instructor well in advance.

Approach to lab work in Bio2010: The Bio2010 lab is designed to introduce students to some of the

fundamental principles and methods used in modern biology research. Some lab activities will be completed in one week, while others will span multiple weeks. There will also be some labs where you are required to come in and perform some parts of the lab on your own time outside of the normal laboratory class.

Required Texts

The lab manual is available from the bookstore or from Cognella (https://store.cognella.com).
Everyone must have a reader purchased for their individual use. You will be turning in pages from the reader for grading.

Assessment and Grading

***Assessment*:** The student's grade in lab, which is combined with his lecture grade to create a single overall grade for the course, will be primarily based on the following criteria: (1) lab quizzes, (2) lab reports, (3) lab questions, (4) a lab practical exam, (5) participation and attendance and (6) bioethics assignments. Each is described briefly below.

***Lab quizzes*:** For most weeks students should expect a 5-point quiz at the beginning of lab covering the assigned reading or the previous week's work. Students are expected to read the lab ahead of time and come prepared to perform the lab work in the scheduled time, with a short accountability quiz at the beginning of lab.

***Lab reports*:** For some of the labs, you will be required to turn in a formal written lab report. These reports will include an introduction, detailed materials and methods, results, and a discussion. More information on how to write a lab report can be found in the lab manual, and in the detailed instructions on CANVAS.

***Lab questions*:** Each lab comes with a set of questions. These, along with any supplemental questions or data assigned by the instructor **will be turned in by the end of the lab**. *All late work is deducted 10% per day it is late, up to seven days late.*

***Lab practical exam*:** At the end of the lab course, students will be given a lab practical. Some questions will require hands-on work while others will be thought questions regarding topics discussed and read during the course of the semester in lab. **You are allowed to maintain a lab notebook with protocols, notes, hints, etc. that you will be able to use on the lab practical.** However, you may only use your own notes incorporated into a lab notebook, not your friend's notes or notes taken during studying just prior to the practical, nor will you be able to bring your lab manual itself.

Participation and attendance: ~36 points of your lab grade will be based on participation in the lab. There are a total of ~ 10 labs. As a rule of thumb, you will be awarded ~ 3 pts per lab, which is the culmination of your attendance (1 pt) your punctuality (1 pt) and your participation (1 pt). We want to ensure that everyone is participating and pulling their share of the load during lab activities. If there are any issues, I will discuss this with your lab partners and assign or reduce points as appropriate. You cannot learn in a lab setting without participating to the fullest. You will also do very poorly on the lab practical if you are not immersed in the lab activities each week. Based upon PLNU's attendance policy (see below), if your absences exceed 20% the student may be de-enrolled.

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.

Bioethics: 22 points (~8%) of your lab grade will be based on two bioethics assignments (11 points each). We will discuss bioethical issues which include individual rights versus the public good, falsification of data, and informed consent.

Point breakdown

Lab quizzes (9 x 5 pts, with lowest score dropped)	40 points
Unit questions and lab reports	125 points
Lab practical (1 x 55 pt) (5 bonus points)	50 points
Lab participation and attitude	30 points
Bioethics	22 points
TOTAL	**267 points possible**

Laboratory attire and safety: Although we will not be working with anything particularly dangerous or sensitive in this course, it is always a good idea to learn and practice strong lab safety procedures. Even the least dangerous chemicals, cells, or other biological/chemical components can cause problems when not used safely or properly. Also, we will be sharing a lab with other classes that do use bacteria and other aspects of biology which cause a more direct safety concern. **Thus, safety procedures and attire for BIO2010 labs will be as follows:**

1) No open toe shoes (such as sandals) in the lab.
2) No food or drink in the lab. Please use the cubicles just inside the lab where you can set your water bottles.

I reserve the right to take off up to 20% from each lab in which you do not follow the above rules regarding attire and food/drink. Other rules and safety requirements such as lab coats, googles, and gloves will be discussed and followed as appropriate for each individual lab.

Laboratory schedule:

Date	Lab activity	Lab section in reader	Purpose of the lab	Due / Notes
Unit 1: Lab Skills. Lab 1 – 3.				
Week 1 (Sep. 2, 3, 5)	Lab introduction; Lab 1a: Common Experimental Techniques-measurements	Lab syllabus Lab reader: "Lab #1a : Common Experimental Techniques"	Learn how to measure volumes and masses accurately.	
Week 2 (Sep. 8, 10, 12)	Lab 1b Activity: Standard curves and analyzing concentrations of unknowns Quiz #1	Lab reader : Lab 1b Activity: Creating a standard curve to estimate the concentration of an unknown	Learn how to make and use a standard curve. Learn to use excel to analyze data with standard curves	Bring laptops Lab 1 (1A and 1B) questions due at the end of lab (15 points)
Week 3 (Sep. 16, 17. 19)	Lab 2: Process of Scientific Inquiry Quiz #2	Lab reader: "Lab #2: Process of Scientific Inquiry"	Learn about experimental replicates and basic statistical analyses	Bring laptops Lab 2 questions due at the end of the lab (15 points)

Week 4 (Sep. 23, 24, 26)	Lab 3: Mini-lab on Microscopy Quiz #3 Review for exam (optional)	Lab reader: "Lab #3_Minilab on Microscopy"	Learn the basics of how to use a microscope	Lab 3 questions due at the end of lab (5 points)
Unit 2: Research Design and Ethics.				
Week 5 (Sep. 30, Oct. 1, 3)	Lab 4: Enzymes and Denaturation (part 1) Quiz #4	Lab reader: "Lab #4: Enzymes and Denaturation"	Learn about enzymes and denaturation, and practice testing for enzyme activity using jello and pineapple	Plan for self-designed experiment due by the end of lab.
Week 6 (Oct. 7, 8, 10)	Lab 4 (cont.): Enzymes and Denaturation (self-designed exp) Quiz #5	Lab reader: "Lab #3: Enzymes and Denaturation"	Implement your self-designed experiment on denaturation. Learn how to plan and implement an exp.	*Lab report: Intro and methods due (peer review)* Bring materials required for your self-designed enzyme denaturation exp.
Week 7 (Oct. 14, 15, 17)	Bioethics 1 (access pre-reading and homework questions on canvas)	"Bioethics Reading and Questions" (must be completed before lab discussion)	Learn about and discuss bioethics in research (based on vaccination scenarios).	Unit 2 packet questions (10 pts) & lab 4 report due (25 pts) (35 pts total) *-bioethics discussion preview Q's due before lab*
Week 8 (Oct. 21, 22, 24)	No lab…. Fall break week			
Unit 3: Research Design and Ethics (cont.).				
Week 9 (Oct. 28, 29, 31)	Lab 5: Metabolism in Plants & Animals (Part 1) Quiz #6	Lab reader: "Lab #4: Metabolism in Plants & Animals"	Learn about cellular respiration and photosynthesis, and how to measure extent of activity by measuring CO2 levels	Plan for self-designed experiment due by the end of lab.

Week 10 (Nov. 4, 5, 7)	Lab 5 (cont.): Metabolism in Plants & Animals (self-designed exp) Quiz #7	Lab reader: "Lab #4: Metabolism in Plants & Animals"	Implement your self-designed experiment to study what affects fish respiration and/or plant photosynthesis.	Lab report: Intro and Methods due Bring materials required for your self-designed cell resp. and photosynthesis lab.
Week 11 (Nov. 11, 12, 14)	Bioethics 2 (access pre-reading and homework questions on canvas)	"Bioethics 2" (must be completed before lab discussion)	Final bioethical discussion focused on falsifying data and conflict of interest.	Unit 3 packet questions due (10 pts) *bioethics discussion preview Q's due before lab*
Unit 4: Microbiology / Genetics Introduction.				
Week 12 (Nov. 18, 19, 21)	Lab 6: Bacterial Conjugations (performing the lab) Quiz #8	Lab reader: "Lab #6: Bacterial Conjugations"	Perform bi-parental mating (bacterial conjugation). Analyze later that week.	Individual lab 5 report due (25 pts)
Week 13 (Nov. 25, 26, 28)	No Lab	Thanksgiving break		
Week 14 (Dec. 2, 4, 5)	Lab 6 (cont.): Bacteria Conjugation (dry-lab concepts) Quiz #9 (take home quiz) turned in	Lab reader: "Lab #6: Bacterial Conjugations"	Focus on bi-parental and tri-parental mating scenarios and how these can be used to study bacterial transfer of plasmids.	Unit 4 Q's and analysis of bacterial conjugation results (lab 6) due by the end of lab (20 pts)
Week 15 (Dec. 9, 10, 12)	Lab Practical (50 points)	Review lab procedures	To assess whether you have learned and practiced the key lab concepts and techniques throughout the semester	

Lab reports:

The following sections should be included and each should be separated by a heading:

I. **Introduction:**
   a. Introduce the context of the lab, including all pertinent background information on the model system, the science behind the experiment, etc.
   b. State the purpose of doing the experiment. Briefly discuss the process or structure that the experiment involves and how it relates to the course content.
   c. Clearly state a hypothesis of the lab.
   d. State why you think that your hypothesis is correct. In other words, give some background information from class or the lab-book, or describe observations that have helped you generate this hypothesis. This should include citations.

II. **Materials and methods:**
   a. Describe how you set up the experiment and collected your data in sufficient detail so that someone else could replicate your study. Include all of the materials /supplies that you used. **This should be written in the <u>past tense</u>, in paragraph form.** *This should not be written like a bulleted protocol or list of reagents.*
   b. Identify the independent, dependent and controlled variables as appropriate.
   c. Describe any key calculations that were done to obtain the results shown in your graphs, etc.

III. **Results:**
   a. Summarize your results **<u>in a paragraph</u>**, but do not draw any conclusions. ***Do not forget that you do need to describe your results briefly in a paragraph that refers to the appropriate figures.***
   b. Provide a <u>table</u> of your results whenever appropriate.
   c. Provide a <u>graph</u> of your results on graph paper when appropriate. Make sure that your graph has a **descriptive title, that the axes are labeled, error bars are included when appropriate, and that the scales are done correctly**.
   d. Include a figure legend to accompany your figure / table.

IV. **Discussion:**
   a. Draw conclusions based on your data.
   b. State whether your hypothesis was supported or rejected by the data and describe why you have come up with that conclusion.
   c. State any problems that you had in your study, as well as what you could have done differently to avoid the problem.
   d. Describe your next set of experiments. What could you do next to expand on the information gained from this experiment
   e. Put the experiment into context with other similar or related experiments. Was this surprising? Did it fit with what others have observed? (requires citations).

Important hint for writing your lab report

You should think of the lab report as a sort of **hourglass of information**. You should start out broad in the introduction by introducing the broad topic and how this particular topic fits into biology as a whole (what is its importance). You should then narrow down and become more specific within the introduction as you start to introduce exactly what you did in this particular experiment and how that fits into the broader topic. Use this space to give some background information that helps the reader know why you did these experiments, and why you thought your particular hypothesis would be correct. Finally, you should finish the introduction with your particular hypothesis (where appropriate) and a

brief sentence summary of what you did and what the results showed. Thus, you go from broad to specific.

The materials and methods and the results are then very specific referring to exactly what you did and what you saw. Finally, the discussion starts out narrow, re-defining what you saw and putting the results into perspective. The discussion should then get broader by relating these results and their interpretation to a broader perspective by discussing how it relates to the more general topic and biology in general. In the discussion, you go back out from specific to broad. What do the results tell you? Was your hypothesis supported or not? Was the data significant? What does this mean in context of the bigger picture? Based on the results, should you modify your hypothesis, do you need more trials, etc.? What are the next steps / future directions?

More information on how to write a lab report can be found in your lab manual, along with an example lab report.

Rubric for grading lab reports (write-up portion)

Neatness	Many typos and Sections are unlabeled 0 pt.	Several writing errors throughout 2.5 pt.	Typed and clean with few or no errors 3 pts.	_____pts.
Introduction	Poor intro No hypothesis stated. Lab is not put into context of the course content. No background is given. 0 pts.	Minimal intro, Hypothesis is stated, but unclear. Some background, but minimal context for the lab. 2 pts.	Good intro that puts the lab into context of the class or particular biological topic being studied, states a hypothesis that is being tested, and gives background information regarding that hypothesis. 5 pts.	_____pts.
Materials and methods	Unclear procedure, steps unclear or missing No variables identified 0 pt.	Clear procedure, but missing key steps, Variables incorrectly identified 2 pts.	Clear procedure with all necessary steps for a scientist to repeat the experiment, written in the past tense ("20 mL was added") Variables correctly identified 4 pts.	_____pts.
Results	Figures and tables legends and labels are incomplete No table of results Graph poorly done or missing Discussion of results hard to read, missing or unclear, inaccurate No statistical analysis of the data. 0 pts.	Table and graph are both present, but are not labeled clearly or the graph is confusing Explanation of graph, table and results is OK, but limited. Very little or no explanation of the results referring to appropriate figures / tables Graph does not include correct error bars 3 pts.	Figures and tables well labeled Good table of results Includes a graph of the average values of the trials with error bars representing standard deviation (as appropriate) Includes a t-test measurement to determine if there is a difference between control and test group(s) Explanation of results is clear, accurate, and complete 7 pts.	_____pts.
Conclusion	Poor conclusion, no discussion of problems or future study 0 pt.	Statement of conclusion is minimal, no discussion of problems or future study 2 pts.	Clear statement of conclusions, putting the data and results into context of the broader biological topic. Problems and/or future study ideas are discussed 4 pts.	_____pts.
Bibliography	No bibliography or citations 0 pt	Bibliography at the end, but no citations throughout the report, or bibliography is not in correct APA or MLA formatting 1 pt	Complete and correctly formatted bibliography with works cited throughout the report, including research for introduction (background) and conclusion (context) 2 pts	_____pts

Total = 25 points for write-up

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 [class name], 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 [list topics]. 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 [subject/major], 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 [class name], we will cover a variety of topics, some of which you may find triggering. These topics include [list topics]. Each time this topic appears in a reading or unit, it is marked on the syllabus. 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 [subject/major], and I will support you throughout your learning in this course.

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 you 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.

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 distance education outside California.

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 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.

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. For all student appeals, faculty and students should follow the procedures outlined 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, Gemini Pro 1.5, GrammarlyGo, Perplexity, etc) to generate ideas, but you are not allowed to use AI tools to generate content (text, video, audio, images) that will end up in any work submitted to be graded for this course. If you have any doubts about using AI, please gain permission from the instructor.

PLNU Academic Accommodations Policy✪

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities in accordance with the Americans with Disabilities Act (ADA). 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 619-849-2533). Once a student's eligibility for an accommodation has been determined, the EAC will work with the student to create an Accommodation Plan (AP) that outlines allowed accommodations. Professors are able to view a student's approved accommodations through Accommodate.
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. Accommodations are not retroactive so clarifying with the professor at the outset is one of the best ways to promote positive academic outcomes. 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. Students cannot assume that because they had accommodations in the past, their eligibility at PLNU is automatic. All determinations at PLNU must go through the EAC process. This is to protect the privacy of students with disabilities who may not want to disclose this information and are not asking for any accommodations.

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.
If you (or someone you know) have experienced other forms of discrimination, you can find more information on reporting and resources at www.pointloma.edu/nondiscrimination.

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.
If you (or someone you know) have experienced other forms of discrimination or bias, you can find more information on reporting and resources at www.pointloma.edu/bias

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.
Note: The information below must be included under the "PLNU Attendance and Participation Policy" Section if you are teaching an Online or Hybrid course.

Loma Writing Center

The Loma Writing Center exists to help all members of the PLNU community cultivate transferable writing skills to engage their academic, professional, personal, and spiritual communities. We work toward this goal by conducting one-on-one consultation sessions, supporting writing education across the PLNU community, and participating in ongoing writing center research.

Getting feedback from the Loma Writing Center while you're in the process of working on an assignment is a great way to improve the quality of your writing and develop as a writer. You are encouraged to talk with a trained writing consultant about getting started on an assignment, organizing your ideas, finding and citing sources, revising, editing for grammar and polishing final drafts, and more. For information about how to make in-person or online appointments, see Loma Writing Center webpage or visit the Loma Writer Center on the first floor of the Ryan Library, room 221.

- Appointment Calendar
- Website
- Email: writingcenter@pointloma.edu