

**POINT<sup>19</sup> LOMA<sup>02</sup>**  
**NAZARENE UNIVERSITY**  
**Biology Department**

Fall 2026

**Bio 4023: Advanced Human Physiology**  
3 units  
RLC 108: MWF 8:30 a.m.—9:25 a.m.

**Bio 4023L: Advanced Human Physiology lab**  
1 unit  
Sator 117: F 2:45—5:45 p.m.

Final Exam: December 16 (W), 7:30 a.m.—10:00 a.m.

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|----------------------|--------------------------------------------------------------------|
| <b>instructor:</b>   | Dr. Rebecca J. Flietstra                                           |
| <b>office:</b>       | 1 <sup>st</sup> floor Rohr Science in the Biology Department Suite |
| <b>phone:</b>        | x2718                                                              |
| <b>e-mail:</b>       | <a href="mailto:rflietst@pointloma.edu">rflietst@pointloma.edu</a> |
| <b>office hours:</b> | MW: 2:00 p.m.—4:30 p.m. [excluding 9/23, 10/28, 11/18, 12/9]       |

I want you to do well in this course. Towards that goal, I encourage questions during lectures and labs. If you have questions outside of class, feel free to email me. I can email an answer or set up a time to meet. I prefer to meet during drop-in hours, but can meet at other times, depending on my schedule.

### General Course Concerns

If you have a concern related to the content or structure of this course, please bring your concern(s) to me (the instructor) in a timely manner, so that we have the opportunity to discuss your thoughts and work together toward a solution.

### 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:

This course examines how different organ systems work and interact with each other to maintain homeostasis in the human body. The course specifically examines metabolism, the digestive system, the nervous system, the endocrine system, locomotion, respiration, the cardiovascular system, and the urinary system. 3 units

### Co-requisite: Bio 4023L

This advanced human physiology laboratory is a co-requisite for Bio 4023. Students enrolled in Bio 4023 must be enrolled in Bio 4023L, and vice versa. If Bio 4023 is dropped, Bio 4023L must also be dropped. Offered every year. Letter graded. 1 unit

### Prerequisites: Biology 2012 and Chemistry 2094:

According to the university catalog Bio 2012 *Organismal Biology* and Che 2094 *Organic Chemistry I* (or their equivalents) are prerequisites for Advanced Human Physiology.

## Course Learning Outcomes:

1. You will understand and explain the basic physiology of the human body's systems (metabolism, digestive, nervous, endocrine, locomotor, respiratory, cardiovascular, urinary).
2. You will be able to articulate how a disruption in one body system can adversely affect the function of another body system.
3. You will be able to read, analyze and report on papers from the primary literature.
4. You will be able to carry out, analyze and write up laboratory experiments.

## Required Text and Equipment:

Silverthorn, *Human Physiology*, 8<sup>th</sup> ed (Pearson, 2018).

Journal articles for discussion; information about accessing these documents will be posted in Canvas (canvas.pointloma.edu).

Safety glasses required for dissection labs

## LomaBooks Instructions for Students:

This course is part of our course material delivery program, [LomaBooks](#). The bookstore will provide each student with a convenient package containing all required physical materials; all digitally delivered materials will be integrated into Canvas.

You should have received an email from the bookstore confirming the list of materials that will be provided for each of your courses and asking you to select how you would like to receive any printed components (in-store pick up or home delivery). If you have not done so already, please confirm your fulfillment preference so the bookstore can prepare your [LomaBooks](#) materials.

## Studying:

It is highly recommended that you **study at least 2-3 hours for every lecture hour**. Since Bio 4023 + Bio 4023L are worth four credits, **you should be studying 8-12 hours every single week, throughout the week**—and not just the week prior to an exam. While studying includes reading the assigned text, you should concentrate on the lecture material presented in class. Make sure that you both **memorize** the information and **understand** the material. Various study tips will be given in class throughout the semester.

**For this course, not use any study materials from students who have previously taken this class. This includes notes, exams, presentations, essays and laboratory write-ups.**

## Laptop Policy:

On occasion, we will use laptop computers in the lab. In the classroom, however, laptops tend to interfere with your education and can serve as a distraction for your neighbors. Numerous studies (some highlighted here) have confirmed that classroom laptop use can be detrimental to learning. For this reason, **I do not allow the use of laptops or phones in the classroom**. You may use a tablet-style device to take notes, as long as you are using a stylus and not typing.

1. Laptops and other electronic devices enable more than just note-taking, introducing numerous distractions (web-surfing, homework for other classes, social media, etc.) for you and your neighbors. You may think that you can multitask, but studies show you can't.  
[http://www.slate.com/articles/health\\_and\\_science/science/2013/05/multitasking\\_while\\_studying\\_divided\\_attention\\_and\\_technological\\_gadgets.html](http://www.slate.com/articles/health_and_science/science/2013/05/multitasking_while_studying_divided_attention_and_technological_gadgets.html)
2. Writing is a more effective way of learning material than is typing. With typing, each letter is pretty much the same thing for the brain. Writing, however, uses different muscle groups with each word and encourages the brain to integrate material during the writing process. Typing may be easy and fast, but by making the brain passive, it discourages learning.  
<https://www.npr.org/2016/04/17/474525392/attention-students-put-your-laptops-away>  
<https://www.npr.org/sections/health-shots/2024/05/11/1250529661/handwriting-cursive-typing-schools-learning-brain>

3. As already mentioned, using your laptop in class can be less than neighborly. Your classmates' grades can also suffer due to the distracting pull of the laptop.  
<https://www.sciencedirect.com/science/article/pii/S0360131512002254>
4. Using electronic devices in class also impairs long-term retention, with one study suggesting that cellphone use in class can lower one's grade by half a letter grade.  
<https://www.insidehighered.com/news/2018/07/27/class-cellphone-and-laptop-use-lowers-exam-scores-new-study-shows>

## Journal Articles

As indicated on the schedule, during the semester you will be responsible for reading several assigned journal articles. Specific questions will be assigned with each article. You will be responsible for typing up and submitting the answers via Canvas (canvas.pointloma.edu) to these questions prior to the date of discussion. Credit for this assignment requires (1) typed answers submitted on time, (2) attendance on day of discussion, and (3) timely submission of written feedback.

## Exams:

Exams will be administered during the laboratory times, on the dates indicated in the schedule. If an exam needs to be rescheduled due to an illness or a school-related activity, students must notify me **in advance** of the need to reschedule the exam. **The final exam cannot be rescheduled.**

## 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 Final Exam Schedules site:

<http://www.pointloma.edu/experience/academics/class-schedules>. 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.

## Laboratory Participation:

It is **not** possible to schedule make-up labs. Come prepared for the laboratory exercise by reading the materials supplied ahead of time. Laboratory exercises will be posted to Canvas (canvas.pointloma.edu) at least two days prior to the lab. If possible, save a tree by printing these handouts as double-sided copies.

**No food (including gum) or water in the laboratory.**

**Keep all backpacks and other personal materials either on the lab bench (if there is room) or completely under the lab bench, such that no one could possibly trip over these items.**

**Proper attire is required at all times in Biology lab spaces.** Students who are not wearing proper clothing and shoes will be asked to leave the lab and will miss points covered while they are gone.

Proper lab attire means having as much skin covered as you can from your shoulders to your toes:

**Long hair must be tied back.** Long hanging necklaces and bulky jewelry or other accessories should not be worn in the laboratory.

**Shirts that completely cover the torso without adjustment.** Shirts must cover the shoulders, chest and stomach area completely without having to constantly readjust to maintain coverage.

**Pants or long skirts that reach the ankles.**

**Enclosed shoes with socks.** Open-toed shoes, clogs (such as low-backed UGGs), slippers, backless shoes, or sandals are not permitted. Shoes cannot expose the top of the foot.

**Students must wear safety glasses whenever they are handling dissection material.**

Laboratory assignments will be due as announced in lab.

- **You will not be allowed to hand in a laboratory write-up for a lab you did not attend.** In general, laboratory write-ups will need to be typed.
- Late lab write-ups will not receive full credit.
- Be sure that when you are asked to write up an individual laboratory report that this report reflects your own work, and not someone else's. This means that you can discuss the assignment with your classmates, but that you cannot copy their answers. Students who hand in identical assignments will not be given any credit for that particular assignment.

## Evaluation:

### Based on an expected 605 total points

Your grade for Bio 4023 and Bio 4023L will be calculated together and the same grade applied to both.

300 points—3 exams (100 points/exam)

100 points—final, cumulative exam

135 points—journal articles (4 articles)

60 points—reading and answering questions (15 points/article)

10 points—evaluating presentations

65 points—group presentation

70 points for laboratory participation and write-ups

other assignments may be given in class as deemed appropriate

### Your letter grade will be determined from your cumulative percent score as follows:

| A         |            | B         |            | C         |            | D         |            | F        |         |
|-----------|------------|-----------|------------|-----------|------------|-----------|------------|----------|---------|
|           |            | <b>B+</b> | 87.0—89.99 | <b>C+</b> | 77.0—79.99 | <b>D+</b> | 67.0—69.99 | <b>F</b> | ≤ 59.99 |
| <b>A</b>  | 93.0—100   | <b>B</b>  | 83.0—86.99 | <b>C</b>  | 73.0—76.99 | <b>D</b>  | 63.0—66.99 |          |         |
| <b>A-</b> | 90.0—92.99 | <b>B-</b> | 80.0—82.99 | <b>C-</b> | 70.0—72.99 | <b>D-</b> | 60.0—62.99 |          |         |

## Other Academic Issues:

### 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 Bio 4023 all 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 several diseases which may have affected you, family members or friends. 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 Advanced Human Physiology 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 students have questions, a desire to meet with the chaplain or have prayer requests you can contact the [Office of Spiritual Development](#).

### 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 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**

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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**

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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 BEHAVIOR POLICY**

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Both faculty and students at Point Loma Nazarene University have the right to expect a safe and ordered environment for learning. Students are expected to take the initiative to learn and conduct themselves in a mature and civil manner in the classroom environment. Any student behavior that is disruptive or threatening is a serious affront to Point Loma Nazarene University as a learning community. Students who fail to adhere to these behavioral standards may be subject to disciplinary action, including removal from class or further university sanctions. For a full definition of disruptive behavior, response procedures, and the appeal process, please consult the [Academic Behavior Policy](#) in the [University Catalog](#).

## **ARTIFICIAL INTELLIGENCE (AI) POLICY**

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The use of Artificial Intelligence (AI) tools (e.g., ChatGPT, Gemini Pro, GrammarlyGo, Perplexity, etc.) is prohibited in this course for any aspect of your work, including idea generation, drafting, editing, or final submissions. This course is designed to assess your independent critical thinking, writing, and research skills without the assistance of AI technologies. Any reliance on AI tools in this course is subject to an academic honesty violation.

## **PLNU ACADEMIC ACCOMMODATIONS POLICY**

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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, [by email](#) or phone at 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 approved 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 approved accommodations in that particular course. Accommodations are not retroactive; as such, 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-related need should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. In accordance with ADA, accommodations cannot constitute a fundamental alteration to course outcomes; therefore, planning ahead is vital in establishing appropriate accommodations for equal access to this course. 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 eligibility 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**

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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 a bias incident regarding language, you can find more information on reporting and resources at [www.pointloma.edu/bias](http://www.pointloma.edu/bias).

## 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](#). 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](#) or [consult the list of campus pastors](#).

If you (or someone you know) has experienced other forms of discrimination or bias, you can find more information on reporting and resources via the [Nondiscrimination and Antiharassment Policy](#).

## 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.

| Tentative Lecture and Lab Schedule |                                                           |                    |
|------------------------------------|-----------------------------------------------------------|--------------------|
| <b>Aug 31 (M)</b>                  | Introduction to Physiology                                | chp. 1             |
| <b>Sep 2 (W)</b>                   | Animal Research                                           |                    |
| <b>Sep 4(F)</b>                    | Molecular Interactions                                    | chp. 2             |
| <i>Sep 4 (F)</i>                   | <i>Lab: Individual Meetings</i>                           |                    |
| <b>Sep 7 (M)</b>                   | <b>LABOR DAY</b>                                          |                    |
| <b>Sep 9 (W)</b>                   | Membrane Dynamics                                         | chp. 5 pp. 123-136 |
| <b>Sep 11 (F)</b>                  | Metabolism and Energy Balance                             | chp. 22            |
| <i>Sep 11 (F)</i>                  | <i>Lab: Metabolism and Temperature in Rats</i>            |                    |
| <b>Sep 14 (M)</b>                  | Energy Production                                         | chp. 4 & 22        |
| <b>Sep 16 (W)</b>                  | Muscle Contraction                                        | chp. 12            |
| <b>Sep 18 (F)</b>                  | Muscle Forces                                             | chp. 12            |
| <i>Sep 19 (F)</i>                  | <i>Lab: Effects of Castration on Juvenile Male Rats—1</i> |                    |
| <b>Sep 21 (M)</b>                  | Muscle Metabolism                                         | chp. 4 & 22        |
| <b>Sep 23 (W)</b>                  | Communication, Integration, and Homeostasis               | chp. 6             |
| <b>Sep 25 (F)</b>                  | <b>NO LECTURE</b>                                         |                    |
| <i>Sep 25 (F)</i>                  | <i>Lab: Exam 1</i>                                        |                    |
| <b>Sep 28 (M)</b>                  | Endocrinology Basics                                      | chp. 7             |
| <b>Sep 30 (W)</b>                  | Endocrine Glands                                          | chp. 7             |
| <b>Oct 2 (F)</b>                   | Sexual Differentiation                                    | chp. 25            |
| <i>Oct 2 (F)</i>                   | <i>Lab: Journal Article #1</i>                            |                    |

|                   |                                                             |                                |
|-------------------|-------------------------------------------------------------|--------------------------------|
| <b>Oct 5 (M)</b>  | Male Reproductive System                                    | chp. 25                        |
| <b>Oct 7 (W)</b>  | Female Reproductive System: menstrual cycle                 | chp. 25                        |
| <b>Oct 9 (F)</b>  | Female Reproductive System: pregnancy and lactation         | chp. 25                        |
| <i>Oct 9 (F)</i>  | <i>Lab: Effects of Testosterone on Juvenile Male Rats—2</i> |                                |
| <b>Oct 12 (M)</b> | Cells of the Nervous System                                 | chp. 8                         |
| <b>Oct 14 (W)</b> | Electrophysiology                                           | chp. 8                         |
| <b>Oct 16 (F)</b> | Synapses                                                    | chp. 8                         |
| <i>Oct 16 (F)</i> | <i>Lab: Journal Article #2</i>                              |                                |
| <b>Oct 19 (M)</b> | The Central Nervous System                                  | chp. 9                         |
| <b>Oct 21 (W)</b> | Sensory Physiology: Background [touch, chemical senses]     | chp. 10                        |
| <b>Oct 23 (F)</b> | <b>HOLIDAY: FALL BREAK</b>                                  |                                |
| <i>Oct 24 (F)</i> | <i>Lab: Fall Break</i>                                      |                                |
| <b>Oct 26 (M)</b> | Sensory Physiology [inner ear: balance and hearing]         | chp. 10                        |
| <b>Oct 28 (W)</b> | Sensory Processes [vision]                                  | chp. 10                        |
| <b>Oct 30 (F)</b> | <b>NO LECTURE</b>                                           |                                |
| <i>Oct 30 (F)</i> | <i>Lab: Exam 2</i>                                          |                                |
| <b>Nov 2 (M)</b>  | Autonomic Nervous System                                    | chp. 11                        |
| <b>Nov 4 (W)</b>  | Cardiovascular Physiology                                   | chp. 14                        |
| <b>Nov 6 (F)</b>  | Cardiovascular Physiology                                   | chp. 14                        |
| <i>Nov 6 (F)</i>  | <i>Lab: Sheep Brain and Sheep Heart dissections</i>         |                                |
| <b>Nov 9 (M)</b>  | Blood Flow and Blood Pressure                               | chp. 15                        |
| <b>Nov 11 (W)</b> | Blood                                                       | chp. 16                        |
| <b>Nov 13 (F)</b> | Mechanics of Breathing                                      | chp. 17                        |
| <i>Nov 13 (F)</i> | <i>Lab: Journal Article #3</i>                              |                                |
| <b>Nov 16 (M)</b> | Gas Exchange and Transport                                  | chp. 18                        |
| <b>Nov 18 (W)</b> | The Kidneys                                                 | chp. 19                        |
| <b>Nov 20 (F)</b> | <b>NO LECTURE</b>                                           |                                |
| <i>Nov 20 (F)</i> | <i>Lab: Exam 3</i>                                          |                                |
| <b>Nov 23 (M)</b> | The Kidneys                                                 | chp. 19                        |
| <b>Nov 25-27</b>  | <b>HOLIDAY: THANKSGIVING BREAK</b>                          |                                |
| <b>Nov 30 (M)</b> | Fluid and Electrolyte Balance                               | chp. 20                        |
| <b>Dec 2 (W)</b>  | Diabetes Mellitus                                           |                                |
| <b>Dec 4 (F)</b>  | Digestive System                                            | chp. 21                        |
| <i>Dec 4 (F)</i>  | <i>Lab: Journal Article #4</i>                              |                                |
| <b>Dec 7 (M)</b>  | Digestive System                                            | chp. 21                        |
| <b>Dec 9 (W)</b>  | Immune System: Lymph and Innate Immunity                    | chp. 24; chp. 15 (pp. 499-500) |
| <b>Dec 11 (F)</b> | Immune System: Adaptive Immunity                            | chp. 24                        |
| <i>Dec 11 (F)</i> | <i>Lab: No Lab</i>                                          |                                |
| <b>Dec 16 (W)</b> | <b>FINAL EXAM, 7:30—10:00a.m.</b>                           |                                |