

Biology 4070: Neuroscience
3 units
Point Loma Nazarene University
Spring 2021

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lecture time/location:	Rohr Hall 111 MWF: 8:30—9:25 am PT
office hours:	MWF: 1:00—2:30 pm PT

Purple Tier: When San Diego County is under Purple Tier restrictions, all lectures will be live/synchronous over Zoom. Exams will be on Canvas through Honorlock.

Red Tier: When San Diego County is under Red Tier restrictions, all lectures will be in the classroom. We have a smaller class this semester, and thus the entire class will be able to meet while maintaining social distancing. I will expect all students to be present unless they have officially applied to PLNU for remote learning. Exams will be held in the classroom.

At all times, a face mask (not a gaiter or loose cloth; face mask cannot have a valve or vent) must be worn properly when attending class face-to-face. Your face mask should completely **cover your nose and mouth** at all times. You should have several face masks in your possession, since you may wish to switch to a fresh mask once or twice a day. You will also want to have a good supply of cloth masks so they can be washed frequently.

If you have any questions about the material in this course, feel free to email me or to attend the Zoom office hours.

Course Description:

A study of the nervous system at the molecular, cellular and intercellular levels with the goal of understanding the generation and control of thoughts and behavior. The relationship of brain and mind are examined in discussions of nervous system development, intelligence, memory, pathophysiology, sexuality and gender identity, and religious faith and ethics. Lecture and lab. 3 units

Prerequisites: Biology 1040, Biology 2012, Biology 4023 or Psychology 3001:

The university catalog specifically states that the prerequisites for this course are Biology 1040 *Human Anatomy and Physiology 2*, Biology 2012 *Organismal Biology*, Biology 4023 *Advanced Human Physiology* or Psychology 3001 *Physiological and Neuropsychology*. If you are in doubt about whether you meet this requirement, please talk to me.

Student Learning Outcomes:

1. Students will learn the molecular biology, cellular biology, and electrophysiology of neuron function. Students will understand how actions of individual neurons contribute to the activity of the entire central nervous system.
2. Students will be able to describe the development and function of different regions of the brain.
3. Students will understand how consciousness, emotion, language, sexuality, memory and intelligence are encoded by normal brain function; and will be able to describe how pathologies can selectively affect these functions.

Required Text:

For each lecture there is an assigned reading. It is recommended that you read through these pages both prior to and following the related lecture. We may also have additional handouts that will be distributed throughout the semester.

Purves D, et. al.; *Neuroscience*, 6th ed. (Sinauer, 2017).
Konyndyk DeYoung, R, *Glittering Vices*, 2nd ed. (Brazos Press, 2020)

Studying:

It is highly recommended that you **study at least 2-3 hours for every lecture hour**. Since Bio 4073 is a three-credit course, **you should be studying 6-9 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.

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

Exams:

Exams will be administered 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.**

Grades are tentatively based on the following:

650 expected points

- 300 pt—3 non-cumulative exams (100 pt/exam)
 - 100 pt—final cumulative exam
 - 60 pt—primary literature summaries
 - 70 pt—primary literature presentation
 - 120 pt—virtues and vices assignments
- Additional points may come from in-class assignments or other homework

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

Your final grade will be calculated from your cumulative percent score as follows:

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

Other Academic Issues:

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.

INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Incompletes will only be assigned in extremely unusual circumstances.

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 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

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 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

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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.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all **synchronous** class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions (virtual or face-to-face), 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 drop date or, after that date, receive the appropriate grade for their work and participation. In some courses, a portion of the credit hour content will be delivered **asynchronously** and attendance will be determined by submitting the assignments by the posted due dates. See [Academic Policies](#) in the Undergraduate Academic Catalog. If absences exceed these limits but are due to university excused health issues, an exception will be granted. **Asynchronous Attendance/Participation Definition**
A day of attendance in asynchronous content is determined as contributing a substantive note, assignment, discussion, or submission by the posted due date. Failure to meet these standards will result in an absence for that day. Instructors will determine how many asynchronous attendance days are required each week.

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](#)

USE OF TECHNOLOGY

In order to be successful in the online environment, you'll need to meet the minimum technology and system requirements; please refer to the [Technology and System Requirements](#) information. Additionally, students are required to have headphone speakers compatible with their computer available to use. If a student is in need of technological resources please contact student-tech-request@pointloma.edu.
Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work.

Tentative Lecture and Laboratory Schedule:

Handouts for each lecture are posted on Canvas.

date	topic	reading
Mar 1 (M)	Studying the Nervous System	Purves, chp. 1
Mar 3 (W)	Survey of Anatomy	Purves, Appendix
Mar 5 (F)	Virtues and Vices	handouts
Mar 8 (M)	Electrical signals of nerve cells	Purves, chp. 2
Mar 10 (W)	Voltage-dependent membrane permeability	Purves, chp. 3
Mar 12 (F)	Ion channels and transporters	Purves, chp. 4
Mar 15 (M)	Synaptic transmission	Purves, chp. 5
Mar 17 (W)	Neurotransmitters and their receptors	Purves, chp. 6
	Molecular signaling within neurons	Purves, chp. 7
Mar 19 (F)	Synaptic Plasticity	Purves, chp. 8
Mar 22 (M)	Early brain development	Purves, chp. 22
Mar 24 (W)	Construction of neural circuits	Purves, chp. 23
Mar 26 (F)	Presentation 1	
Mar 29 (M)	EXAM PREPARATION—NO CLASS	
Mar 31 (W)	MENTAL HEALTH WEDNESDAY—NO CLASS	
Apr 2 (F)	Exam 1	
Apr 5 (M)	Modification of neural circuits... experience	Purves, chp. 24
Apr 7 (W)	Repair and regeneration in the nervous system	Purves, chp. 25
Apr 9 (F)	The somatic sensory system: touch and proprioception	Purves, chp. 9
Apr 12 (M)	Pain	Purves, chp. 10
Apr 14 (W)	Vision: the eye	Purves, chp. 11
Apr 16 (F)	Presentation 2	
Apr 19 (M)	Vision: the eye	Purves, chp. 11
Apr 21 (W)	Central visual pathways	Purves, chp. 12
Apr 23 (F)	The auditory system	Purves, chp. 13
Apr 26 (M)	The vestibular system	Purves, chp. 14
Apr 28 (W)	EXAM PREPARATION—NO CLASS	
Apr 30 (F)	Exam 2	
May 3 (M)	The chemical senses	Purves, chp. 15
May 5 (W)	MENTAL HEALTH WEDNESDAY—NO CLASS	
May 7 (F)	Presentation 3	
May 10 (M)	Lower motor neuron circuits and motor control	Purves, chp. 16
May 12 (W)	Upper motor neuron control of the brainstem & spinal cord	Purves, chp. 17
May 14 (F)	Modulation of movement by the basal ganglia	Purves, chp. 18
	Modulation of movement by the cerebellum	Purves, chp. 19
May 17 (M)	The Visceral Motor System	Purves, chp. 21
May 19 (W)	Cognitive Functions & the Organization of the Cerebral Cortex	Purves, chp. 27
May 21 (F)	Presentation 4	

May 24 (M)	Cortical States	Purves, chp. 28
May 26 (W)	EXAM PREPARATION—NO CLASS	
May 28 (F)	Exam 3	

May 31 (M)	Attention & Memory	Purves, chp. 29, 30
June 2 (W)	Emotion	Purves, chp. 31
June 4 (F)	Language	Purves, chp. 33

June 9 (W)	Final exam, 7:30—10:00 a.m. PT	
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