PSC 1014 - Physical Science for Teachers

(4 credits)
Fall 2024

Meeting days/times	MWF 1:30-2:35p
Meeting location	Ryan Learning Center (RLC) 108
Final Exam	Wednesday, 12/18, 1:30-4:00 pm

	PHYSICS	CHEMISTRY
Instructor	J. David Nichols	Jorji Siegmundt
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Office location and hours	Rohr Science 278 By Appointment or via Zoom	Rohr Science 328 Mon 3-4p, Fri 10:45a-12p

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.

Course Description

An introductory survey of selected principles in physics and chemistry with a discussion of related societal and environmental issues. This course focuses on topics necessary for the California multiple subject teaching credential (K-8). This class is highly interactive and will make use of many hands-on activities. Meets a General Education requirement; does not count toward the Chemistry or Physics major. *Pre or Corequisite: MTH 1013 or equivalent.*

This course is taught jointly by the physics and chemistry departments. The first half of this course will focus on physics and the second half on chemistry.

Program and Course Learning Outcomes

1. Explain observations of the natural world in terms of chemistry and physics,
2. Translate the description of problems into the equations required to solve them using relevant physical principles,
3. Find solutions to problems once appropriate equations or techniques are identified,
4. Create and interpret graphical representations of quantities,
5. Recognize appropriate teaching techniques to convey scientific ideas and practices,
6. Develop content expertise in the "Physical Science Disciplinary Core Ideas" described in the Next Generation Science Standards.

General Education Learning Outcomes

This course is one of the components of General Education program at Point Loma Nazarene University, through which students will acquire knowledge of human cultures and the physical and natural world while developing skills and habits that foster life-long learning. Specifically, this course supports this broader context in developing GELO, Quantitative Reasoning: Students will be able to solve problems that are quantitative in nature.

Required Texts and Recommended Study Resources

Students are responsible for having the required course textbooks prior to the first day of class. All supplemental materials posted on this course site (including articles, book excerpts, or other documents) are provided for your personal academic use. These materials may be protected by copyright law and should not be duplicated or distributed without permission of the copyright owner.

- *Conceptual Physical Science*, 6th Edition, by Hewitt, Suchocki, and Hewitt., https://www.pearson.com/en-us/subject-catalog/p/conceptual-physical-science/P200000006948/9780134857107
- A scientific calculator

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Course Credit Hour Information

In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 4-unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 150 total hours meeting the course learning outcomes. Specific details about how the class meets the credit hour requirements can be provided upon request.

Assessment and Grading

Graded Components

- **Homework:** Hand-written homework is submitted at the beginning of class. Late submissions will not be accepted for credit, however work turned in during business hours after the start of class on the day it is due is eligible for half credit. The lowest homework score will be dropped.
- **Quizzes, in-class assignments:** Quizzes will allow you an opportunity to practice material learned in class. Quizzes cannot be made up; however, the lowest quiz grade will be dropped. Optionally, students can earn back 1/4 of the lost points by submitting properly corrected answers at the beginning of the subsequent class meeting. Participation will be included in this grade.
- **Presentation:** Students will present physical science concepts targeted at K-8 grade levels in groups. One presentation will focus on physics while another will be on chemistry.
- **Midterms and Final Examinations:** Each quad will have a midterm and a final exam. These will include problems and questions over material assigned in the text, readings and handouts, as well as material presented in class. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control. The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that student.

Grading Distribution	Percent of grade
Homework	10
Quizzes and in-class assignments	20
Presentations (1 physics + 1 chemistry)	15
Midterm Exams (1 physics + 1 chemistry)	25
Final Exams (1 physics + 1 chemistry)	30
Total	100

Grades are based on the number of points accumulated throughout the course. Grades will not be rounded automatically. Approximate minimum percentages required to obtain a given grade are as follows:

Grade Scale Based on Percentages

	A	B	C	D	F
+		87.000-89.999	77.000-79.999	67.000-69.999	
	93.000-100	83.000-86.999	73.000-76.999	63.000-66.999	Below 60.000
-	90.000-92.999	80.000-82.999	70.000-72.999	60.000-62.999	

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. Late assignments will not be accepted for credit. However, work turned in after the start of class on the day it is due is eligible for half credit.

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 Traditional Undergraduate Records: Final Exam 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.

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 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

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 talk with the instructor.

Use of Technology

Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work.

Please don't use your laptops during class, unless we are doing a task that explicitly requires them. You may use tablets to take notes or follow along with the slides, but not laptop computers.

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 619-849-2486). 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. The EAC makes accommodations available to professors at the student's request.

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 special 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 a bias incident regarding language, you can find more information on reporting and resources at 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 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.

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: https://plnu.mywconline.com/
- Website: https://www.pointloma.edu/centers-institutes/loma-writing-center
- Email: writingcenter@pointloma.edu

Assignments At-A-Glance

The schedule below is tentative. An up-to-date schedule will be available on Canvas. Each week has its own module where the most up-to-date schedule for that week will be posted. Be sure to check weekly for any updates that may be made following lecture.

	Day	Date	TOPICS	Subtopics	Readings (Complete before class)	HW DUE	QUIZ
1	M	9/2/24	**NO CLASS - LABOR DAY**	**NO CLASS**			
	T	9/3/24					
	W	9/4/24	Intro/Units/Plotting				
	R	9/5/24					
	F	9/6/24	Patterns of Motion		§1		
	Sa	9/7/24					
	Su	9/8/24					
2	M	9/9/24					
	T	9/10/24					
	W	9/11/24	Newton's Laws		§2		
	R	9/12/24					
	F	9/13/24					
	Sa	9/14/24					
	Su	9/15/24					
3	M	9/16/24	Momentum and Energy		§3		
	T	9/17/24					
	W	9/18/24					
	R	9/19/24					
	F	9/20/24	Gravity, Projectiles and Satellites		§4		
	Sa	9/21/24					
	Su	9/22/24					
4	M	9/23/24	Fluid Mechanics		§5		
	T	9/24/24					
	W	9/25/24	Exam #1		§1-5		
	R	9/26/24					
	F	9/27/24	Thermal Energy and Thermodynamics		§6		
	Sa	9/28/24					
	Su	9/29/24					
5	M	9/30/24					
	T	10/1/24					
	W	10/2/24	Heat Transfer and Phase Changes		§7		
	R	10/3/24					

	Day	Date	TOPICS	Subtopics	Readings (Complete before class)	HW DUE	QUIZ
	F	10/4/24	Static and Current Electricity		§8		
	Sa	10/5/24					
	Su	10/6/24					
6	M	10/7/24	Magnetism and Electromagnetic Induction		§9		
	T	10/8/24					
	W	10/9/24	Waves and Sound		§10		
	R	10/10/24					
	F	10/11/24					
	Sa	10/12/24					
	Su	10/13/24					
7	M	10/14/24	Light		§11		
	T	10/15/24					
	W	10/16/24	**PHYSICS FINAL**		§1-11		
	R	10/17/24					
	F	10/18/24	**PHYSICS PRESENTATIONS**				
	Sa	10/19/24					
	Su	10/20/24					
8	M	10/21/24	**PHYSICS PRESENTATIONS**				
	T	10/22/24					
8	W	10/23/24	Introduction	Hist of atoms Elements Protons & Neutrons	12.1-3	Chem HW 1	
	R	10/24/24					
	F	10/25/24	**NO CLASS - FALL BREAK**	**NO CLASS**			
	Sa	10/26/24					
	Su	10/27/24					
9	M	10/28/24	Atoms and the Periodic Table	Periodic table Physical & conceptual models Spectroscopy	12.4-6		Chem Quiz 1
	T	10/29/24					
	W	10/30/24	Atoms and the Periodic Table	Quantum chem e- waves Shell model	12.7-9	Chem HW 2	
	R	10/31/24					

	Day	Date	TOPICS	Subtopics	Readings (Complete before class)	HW DUE	QUIZ
	F	11/1/24	Elements of Chemistry	Molecules Phys. & Chemical properties	14.1-4		
	Sa	11/2/24					
	Su	11/3/24					
	M	11/4/24	Elements of Chemistry	Compounds	14.5-14.7		Chem Quiz 2
	T	11/5/24					
	W	11/6/24	Chemical Bonds	e- dots ions ionic bonds	15.1-3	Chem HW 3	
10	R	11/7/24					
	F	11/8/24	Chemical Bonds	Metallic bonds Covalent Bonds Polar covalent bonds	15.4-15.6		
	Sa	11/9/24					
	Su	11/10/24					
	M	11/11/24	Mixtures	Matter Types of mixtures Solutions Solubility	16.1-16.4		Chem Quiz 3
	T	11/12/24					
	W	11/13/24	Chemical Reactions	Chemical equations Molar mass	17.1-17.2	Chem HW 4	
11	R	11/14/24					
	F	11/15/24	Chemical Reactions	Reaction rates Catalysts Energy in reactions	17.3-17.5		
	Sa	11/16/24					
	Su	11/17/24					
	M	11/18/24	Midterm review & Final presentation discussion				
12	T	11/19/24					
	W	11/20/24	**CHEMISTRY MIDTERM**				
	R	11/21/24					

	Day	Date	TOPICS	Subtopics	Readings (Complete before class)	HW DUE	QUIZ
	F	11/22/24	Organic Chemistry	Hydrocarbons Functional groups Brief overview of each functional group	19.1-19.3		
	Sa	11/23/24					
	Su	11/24/24					
	M	11/25/24	Organic Chemistry	continued		Chem HW 5	
	T	11/26/24					
	W	11/27/24	**NO CLASS - THANKSGIVING BREAK**	**NO CLASS**			
13	R	11/28/24					
	F	11/29/24	**NO CLASS - THANKSGIVING BREAK**	**NO CLASS**			
	Sa	11/30/24					
	Su	12/1/24					
	M	12/2/24	Nuclear Chemistry	Radioactivity Radiation			Chem Quiz 4
	T	12/3/24					
	W	12/4/24	Nuclear Chemistry	Radiometric dating Half-life		Chem HW 6	
14	R	12/5/24					
	F	12/6/24	Work on group presentations				
	Sa	12/7/24					
	Su	12/8/24					
	M	12/9/24	**CHEMISTRY PRESENTATIONS**				
	T	12/10/24					
	W	12/11/24	**CHEMISTRY PRESENTATIONS**				
15	R	12/12/24					
	F	12/13/24	Final Exam review				
	Sa	12/14/24					
	Su	12/15/24					
	M	12/16/24					
	T	12/17/24					
16	W	12/18/24	**FINAL EXAM 1:30-4p**				
	R	12/19/24					
	F	12/20/24					

	Day	Date	TOPICS	Subtopics	Readings (Complete before class)	HW DUE	QUIZ
	Sa	12/21/24					
	Su	12/22/24					