POINT 1902 LOMA NAZARENE UNIVERSITY	Physics & Engineering & Chemistry Departments Point Loma Nazarene University PSC 1014 - Physical Science for Teachers 4 units
Spring Mini 2021 | January 11 - February 12	

Instructors:

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Office hours:

Dr. Doss

- **MWF: 7:30 AM - 9:30 AM on zoom**
- **or by appointment**
- Zoom Info: Meeting ID: 915 5520 2403 Passcode: DossOffice

Dr. Lingner

- **M-F 9:30-10:30am on Zoom**
- **or by appointment**

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.

Department Mission

The Physics and Engineering Department at PLNU provides strong programs of study in the fields of Physics and Engineering. Our students are well prepared for graduate studies and careers in scientific and engineering fields. We emphasize a collaborative learning environment which allows students to thrive academically, build personal confidence, and develop interpersonal skills. We provide a Christian environment for students to learn values and judgment, and pursue integration of modern scientific knowledge and Christian faith.

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 Co-requisite: MTH 1013Links to an external site. or equivalent.

This course is one of the components of the General Education Program at Point Loma Nazarene University, in support of the general education learning outcome: *Quantitative Reasoning: Students will be able to solve problems that are quantitative in nature*. The purpose of general education is to provide a common educational experience, to develop essential skills, and to provide a broad cultural background for personal and professional growth. PSC 1014 – Physical Science for Teachers is an introductory course appropriate for students with an adequate background in high school mathematics.

FOUNDATIONAL EXPLORATION

This is a PLNU Foundational Explorations course (a general education course).

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 cultures.

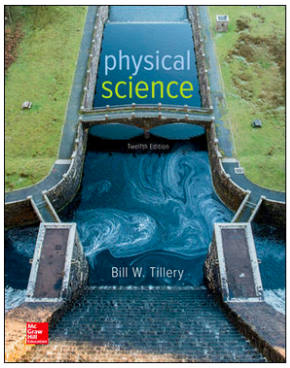
COURSE LEARNING OUTCOMES

In each section there are a number of smaller learning outcomes, which fit into broader course outcomes. Upon completion of this course you should be able to:

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, specifically:
    a) understand the physical properties of solids, liquids, and gases, such as color, mass, density, hardness, and electrical and thermal conductivity,
    b) know that matter can undergo physical changes (e.g., changes in state such as the evaporation and freezing of water),
    c) know that matter can undergo chemical changes (i.e., atoms in reactants rearrange to form products with new physical and chemical properties),
    d) understand conservation laws with respect to matter and energy,
    e) know that matter consists of atoms and molecules in various arrangements,
    f) can give the location and motions of the parts on an atom (protons, neutrons, and electrons),
    g) can describe the constituents of molecules and compounds, naming common elements (e.g., hydrogen, oxygen, iron),
    h) explain how elements are organized on the periodic table on the basis of the characteristics of atoms and their chemical properties,
    i) can describe characteristics of solutions (such as acidic, basic, and neutral solutions),
    j) know examples with different pH levels, such as soft drinks, liquid detergents, and water,
    k) know that mixtures may often be separated based on physical or chemical properties,
    l) describe an object's motion based on position, displacement, speed, velocity, and acceleration,
    m) know that forces (pushes and pulls), such as gravity, magnetism, and friction, act on objects and may change their motion if these forces are not in balance,
    n) know that "like" electrical charges or magnetic poles produce repulsive forces and "unlike" charges or poles produce attractive forces,
    o) describe simple machines in which small forces are exerted over long distances to accomplish simple tasks (e.g., using levers or pulleys to move or lift heavy objects),
    p) identify forms of energy, including solar, wind, chemical, electrical, magnetic, nuclear, sound, light, and electromagnetic,
    q) explain conservation of energy resources in terms of renewable and nonrenewable natural resources and their use in society,
    r) know that total energy in an isolated system is conserved but may be changed from one form to another, as in an electrical motor or generator, and that speed and energy are related,
    s) understand that the difference between heat, thermal energy, and temperature, and understand temperature measurement systems,
    t) know how heat may be transferred by conduction, convection, and radiation (e.g., involving a stove, Earth's mantle, or the Sun),
    u) describe sources of light, including the Sun, lightbulbs, or excited atoms (e.g., neon in neon lights),
    v) interactions of light with matter (e.g., vision, photosynthesis),
    w) describe the properties of waves (e.g., wavelength, amplitude, frequency) and applications and technologies associated with these properties,
    x) know and can apply the optical properties of waves, especially light and sound, including reflection (e.g., by a mirror) or refraction (e.g., bending of light through a prism)

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

- Tillery, Bill W., *Physical Science*, 12th edition, McGraw Hill, (2020)
- A scientific calculator
- Laptop or computer access (canvas assignments, zoom meetings, creating presentations, etc)



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 five weeks. Specific details about how the class meets the credit hour requirement can be provided upon request. (Based on 37.5 hours of student engagement per credit hour.)

Distribution of Student Learning Hours	
Category	**Time Expectation in Hours**
Online Participation in Discussions, Groups, etc.	25
Reading Assignments	30
Written Assignments	30
Other Assignments & Learning Activities	55
Exams, Final	10
Total Hours	150

ASSESSMENT AND GRADING
Graded Components

- **Pre-class:** Pre-class Assignments: Reading and pre-class questions are due are on our canvas website. These consist of items based on the reading assignment. Late submissions will not be accepted. Pre-class assignments are 5% of the overall grade. NOTE it is a requirement to read the listed text materials before class.
- **Homework**: Homework assignments, besides the readings and pre-class questions, can be found on Canvas. Homework consists of a set of problems related to chapter material. These chapter problem sets are worth 10% of your overall grade.
- **Projects:** Projects, usually completed in groups, make up 15% of your grade.
- **In Class Activities:** In-Class Activities makes up 10% of your grade.
- **Projects:** In this category are other assignments such as weekly group quizzes given in class, points earned during class for other items, explain it videos, and papers or projects that might come up during the semester. These assignments will comprise 15% of your overall grade. Classwork cannot be made up.
- **Notes and Videos**: Each section will have videos to watch and you should take notes.
- **Examinations and the Final Examination**. Examinations (40% of your overall grade) and the Final Examination (20% of your overall grade) will include problems and questions over material assigned in the text, readings and handouts, as well as material presented in class. No examination shall be missed without prior consent or a well-documented emergency beyond your control. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control.
- **Late work will not be accepted** without prior consent or a well-documented emergency.
- **Final Exam: Date and Time:** 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 th course calendar. No requests for early examinations will be approved. 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 particular student.

Grade Distribution and percentage table	
Grading Distribution	**Percent**
Pre-Class	5% (2.5% physics, 2.5% chemistry)
Homework	10% (5% physics, 5% chemistry)
Projects	15% (7.5% physics, 7.5% chemistry)
In-Class Activities	10% (5% physics, 5% chemistry)
Exams	40% (20% physics, 20% chemistry)
Final Exam	20% (10% physics, 10% chemistry)
Total	100%

Grading Scale

Grades are based on the number of points accumulated throughout the course with the following exception: You must take ALL the exams and the final in order to pass the class. That is, a score of 60% must be achieved in the course and you must take all the Exams, or else the final grade will be an F regardless of all other point totals. Approximate minimal percentages required to obtain a given grade are:

Grade Scale based on Percentages					
Standard Grade Scale Based on Percentages					
	A	**B**	**C**	**D**	**F**
+		87- 89	77-79	67-69	
	92 -100	83-86	73-76	63 -66	0-59
_	90-91	80-82	70-72	60-62	

INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the due date listed on the assignment 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 PoliciesLinks to an external site. 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 (a) prohibits discrimination against students

with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

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

PLNU ATTENDANCE AND PARTICIPATION POLICY

Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day.

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

CLASS ENROLLMENT

It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

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 Links to an external site.

Tentative Course Schedule – subject to updates. Unless otherwise noted: Preclass assignments are due by 11:59 PM the night before the class, and HWs are due by 11:59 PM the night listed. Reading assignments and videos should be completed along with the chapter.

Date	Topics	Assignments due
Week 1	**Chapters 1, 2, 3, and 4**	
1/11/21 M	Skim Ch 1, Read Chapter 2, and view the class video lectures. Zoom Meeting – introductions, Ch 2, Ch 3, NGSS, Projects	Day 1: HW (due tonight) Day 1: PC (due tonight)
1/12/21 T	Read Chapter 3, and view the class video lectures.	Day 2: PC (due tonight) Day 2: HW (due tonight)
1/13/21 W	Read Chapter 4, and view the class video lectures. Zoom Meeting – Ch 3, Ch 4	Day 3: PC Day 3: HW
1/14/21 Th	Catch up and study for exam.	Day 4: PC Day 4: HW
1/15/21 F	Zoom Meeting – Exam 1: Chapters 1, 2, 3, 4	Day 5: Get ahead! Start chapters 5, 6, 7 Day 5: Project
Week 2	**Chapter 5, 6, and 7**	
1/18/21 M	Holiday – No classes	
1/19/21 T	Read Chapter 5, and view the class video lectures.	Day 6: PC (due tonight) Day 6: HW (due tonight)
1/20/21 W	Read Chapter 6, and view the class video lectures. Zoom Meeting – Ch 5, 6	Day 7: PC Day 7: HW
1/21/21 Th	Read Chapter 7, and view the class video lectures.	Day 8: PC Day 8: HW
1/22/21 F	Zoom Meeting – Exam 2: Chapters 5, 6, 7	Get ahead! Day 9: Project
Week 3	**Review, Phyiscs Final, Start Chemistry**	
1/25/21 M	Zoom Meeting –Chapters 1, 2, 3, 4, 5, 6, 7 NGSS	Day 10: PC review Day 10: HW review
1/19/21 T	Study!	Day 11: Study Day 11: Extra Credit Project
1/27/21 W	**Zoom Meeting: Final Exam Physics Portion**	Day 12: relax, get started on chemistry
1/28/21 Th	CHEMISTRY	Day 13:
1/29/21 F	Zoom Meeting –	Day 14:
Week 4		
2/1/21 M		Day 15
2/2/21 T		Day 15
2/3/21 W		Day 17
2/4/21 Th		Day 18
2/5/21 F		Day 19
Week 5		
2/8/21 M		Day 20
2/9/21 T		Day 21
2/10/21 W		Day 22
2/11/21 Th		Day 23
2/12/21 F	**Zoom Meeting: Final Exam Chemistry Portion**	Day 24

Tentative* Chemistry Schedule

Date	Topic/Event/Assignment	Due Date/Time
Thu 1/28	*Office Hours (Optional)*	*8:30-10:30am*
	Video Lectures – Ch 8	To Do 1/28
	Textbook Reading – Ch 8	To Do 1/28
	PCQ – Ch 8	Due 1/28 at 11:59pm
	MDT Discussion Post – Ch 8	Due 1/28 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Fri 1/29	*Office Hours (Optional)*	*9:30-10:30am*
	Synchronous Session – Ch 8 (Required)	**11:00am-12:20pm**
	ICA – Ch 8	Due 1/29 TBD in class.
	Discussion & Examples – Ch 8	To Do in class.
	MDT Response Post – Ch 8	Due 1/29 at 11:59pm
	HW – Ch 8	Due 1/29 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Sat 1/30	**Chem Exam – Ch 8**	**Due 1/30 at 11:59pm**

Date	Topic/Event/Assignment	Due Date/Time
Sun 1/31	Video Lectures – Ch 9	To Do 1/31
	Textbook Reading – Ch 9	To Do 1/31
	PCQ – Ch 9	Due 1/31 at 11:59pm
	MDT Discussion Post – Ch 9	Due 1/31 at 11:59pm
	Connections Project – Topic Selection	Due 1/31 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Mon 2/1	*Office Hours (Optional)*	*9:30-10:30am*
	Synchronous Session – Ch 9 (Required)	**11:00am-12:20pm**
	ICA – Ch 9	Due 2/1 TBD in class.
	Discussion & Examples – Ch 9	To Do in class
	MDT Response Post – Ch 9	Due 2/1 at 11:59pm
	HW – Ch 9	Due 2/1 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Tue 2/2	*Office Hours (Optional)*	*9:30-10:30am*
	Video Lectures – Ch 10	To Do 2/2
	Textbook Reading – Ch 10	To Do 2/2
	PCQ – Ch 10	Due 2/2 at 11:59pm
	MDT Discussion Post – Ch 10	Due 2/2 at 11:59pm
	Chem Exam – Ch 9	**Due 2/2 at 11:59pm**

Date	Topic/Event/Assignment	Due Date/Time
Wed 2/3	*Office Hours (Optional)*	*9:30-10:30am*
	Synchronous Session – Ch 10 (Required)	**11:00am-12:20pm**
	ICA – Ch 10	Due 2/3 TBD in class.
	Discussion & Examples – Ch 10	To Do in class.
	MDT Response Post – Ch 10	Due 2/3 at 11:59pm
	HW – Ch 10	Due 2/3 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Thu 2/4	*Office Hours (Optional)*	*9:30-10:30am*
	Video Lectures – Ch 11	To Do 2/4
	Textbook Reading – Ch 11	To Do 2/4
	PCQ – Ch 11	Due 2/4 at 11:59pm
	MDT Discussion Post – Ch 11	Due 2/4 at 11:59pm
	Chem Exam – Ch 10	**Due 2/4 at 11:59pm**

Date	Topic/Event/Assignment	Due Date/Time
Fri 2/5	*Office Hours (Optional)*	*9:30-10:30am*
	Synchronous Session – Ch 11 (Required)	**11:00am-12:20pm**
	ICA – Ch 11	Due 2/5 TBD in class.
	Discussion & Examples – Ch 11	To Do in class.
	MDT Response Post – Ch 11	Due 2/5 at 11:59pm
	HW – Ch 11	Due 2/5 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Sat 2/6	**Chem Exam – Ch 11**	**Due 2/6 at 11:59pm**

Date	Topic/Event/Assignment	Due Date/Time
Sun 2/7	Video Lectures – Ch 12	To Do 2/7
	Textbook Reading – Ch 12	To Do 2/7
	PCQ – Ch 12	Due 2/7 at 11:59pm
	Connections Project - Presentations	Due 2/6 at 11:59pm
	MDT Discussion Post – Ch 12	Due 2/7 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Mon 2/8	*Office Hours (Optional)*	*9:30-10:30am*
	Synchronous Session – Ch 12 (Required)	**11:00am-12:20pm**
	ICA – Ch 12	Due 2/8 TBD in class.
	Discussion & Examples – Ch 2	To Do in class.
	MDT Response Post – Ch 12	Due 2/8 at 11:59pm
	HW – Ch12	Due 2/8 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Tue 2/9	*Office Hours (Optional)*	*9:30-10:30am*
	Video Lectures – Ch 13	To Do 2/9
	Textbook Reading – Ch 13	To Do 2/9
	PCQ – Ch 13	Due 2/9 at 11:59pm
	MDT Discussion Post – Ch 13	Due 2/9 at 11:59pm
	Chem Exam – Ch 12	**Due 2/9 at 11:59pm**

Date	Topic/Event/Assignment	Due Date/Time
Wed 2/10	*Office Hours (Optional)*	*9:30-10:30am*
	Synchronous Session – Ch 13 (Required)	**11:00am-12:20pm**
	ICA – Ch 13	Due 2/10 TBD in class.
	Discussion & Examples – Ch 13	To Do in class.
	MDT Response Post – Ch 13	Due 2/10 at 11:59pm
	HW – Ch 13	Due 2/10 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Thu 2/11	*Office Hours (Optional)*	*9:30-10:30am*
	Chem Exam – Ch 13	**Due 2/11 at 11:59pm**
	Connections Project - Appreciation	Due 2/11 at 11:59pm

Date	Topic/Event/Assignment	Due Date/Time
Fri 2/12	*Office Hours (Optional)*	*9:30-10:30am*
	FINAL EXAM (comprehensive)	**11:00am-12:15pm**