PSC 1014 – Physical Science for Teachers 4 Units Fall 2019

PLNU Mission Statement
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.

Professor: Dr. Heide Doss
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Office Hours: MWF 12:00-1:00PM, WF 2:45-4:00PM, T 10:00-12:00, or by appointment. NOTE if you really need to see me, I will also be around T (time TBD) and MF from about 10:00AM to 11:00AM but this is also around Chapel time – so you'll have to make up Chapel one evening.

Professor: Dr. Lane Votapka
Office: Rohr Science 322
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Office Hours: MWF 12:30-3:00PM, or by appointment

Regular meeting times Sep 4, 2018 – December 13, 2018
Lecture: MWF 1:30 PM – 2:35 PM (T106)
Final Exam: Friday Dec 20, 1:30-4:00 PM T106

Textbook: Physical Science by Bill Tillery, 12th edition

A scientific calculator (not a phone app) is also needed for the course. It doesn't need to be fancy. For example a TI-30XIIS is good and only runs about $15.

Course Description: (4)
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.

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.

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.

Student 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)

Preclass Assignments: Reading and pre-class questions are due by 9:00 PM the night before class, unless otherwise noted. The pre-class questions are on Canvas. These usually consist of questions and simple problems related to each section of the reading assignment. Pre-class assignments are 5% of the overall grade. Late submissions will not be accepted. These submissions will be graded on the following scale: 2 = demonstrates reading, 1 = room for improvement, 0 = unsatisfactory.

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 and are due at the start of class on the date noted in the syllabus and Canvas. Practicing solving problems is critical to success in this course. Homework will not be accepted late except for acceptable documented emergencies provided.

Late Work: Late work will not be accepted unless there is a documented emergency. Assignments are due as noted on the syllabus and Canvas. Incompletes are only assigned in extremely unusual circumstances.

Activities: Several activities will be carried out through the semester including both hands-on applications of physical science as well as the opportunity to practice aspects of teaching. Activities often take place during the class meeting and cannot be made up, unless arrangements were made with the professor before the lab.

Exams: There will be four in-class exams during the semester comprising 40% of your grade. There is also a final exam (worth 20% of your overall grade) on **Friday Dec 20, 1:30-4:00 PM T106**. Partial credit for non-multiple choice problems will be given for correct reasoning at any step of a problem, but only if it is communicated clearly enough for me to understand. For problems that call for providing your work or explanation, no credit will be given for an answer alone; the method or reasoning must also be shown.

You must take ALL the exams and the final in order to pass the class.

Missed Exam Policy: No make-up exams are allowed except for warranted circumstances. Arrangements must be made with me as soon as possible.

Final Exam: Friday Dec 20, 1:30-4:00 PM: 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. 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. Successful completion of this class requires taking the final examination on its scheduled day, **FINAL EXAM: Friday Dec 20, 1:30-4:00 PM** T106. The final examination schedule is posted on the Class Schedules site. No requests for early examinations or alternative days will be approved. The final exam is worth 20% of your grade.

Final Course Grade: The points you receive during the course are weighted accordingly:

Component	Weight
Pre-Class	5%
Homework	10%
Activities/Projects	10%
Teaching Lessons	15%
Exams (4)	40% (equally weighted)
Final Exam	20%

The grade you earn in this course is based on the following scale:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-
S≥ 91.5	91.5 >S≥ 89.5	89.5 >S≥ 86.5	86.5 >S≥ 82.5	82.5 >S≥ 79.5	79.5 >S≥ 76.5	76.5 >S≥ 72.5	72.5 >S≥ 69.5	69.5 >S≥ 66.5	66.5 >S≥ 62.5	62.5 >S≥ 59.5

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.

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 http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class_Attendance in the Undergraduate Academic Catalog.

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.

Academic Accommodations:
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.

Credit Hour:
In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for any 4 unit class delivered over 15 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Copyright Protected Materials:
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 http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic_Honesty for definitions of kinds of academic dishonesty and for further policy information.

FERPA Policy: In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by distributing grades and papers individually. Also, in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the undergrad academic catalog.

Tentative Course Schedule – subject to updates. Unless otherwise noted: Pre-class assignments are due by 11:59 PM the night before class, HWs are due by 11:59 PM on listed date.
Additional due dates for materials related to the Learning Stations will be provided in class and on canvas

Date	Topics	Assignments due
9/4 W	Intro Ch 1	PC1
9/6 F	Ch 1	PC2
9/9 M	Motion 2.1-2.4	PC3 HW1
9/11 W	Motion 2.5-2.7	PC4
9/13 F	Motion 2.8-2.9	PC 5
9/16 M	Energy 3.1-3.3	PC6 HW2
9/18 W	Energy 3.4-3.5	PC7
9/20 F	Heat 4.1-4.3	PC8 HW3
9/23 M	Heat 4.4-4.5	PC9
9/25 W	Exam 1 – end Part 1	PC10 HW4
9/27 F	Waves & Sound Ch 5.1-5.3	PC11
9/30 M	Waves & Sound Ch 5.4-5.6	PC12
10/2 W	Electricity & Magnetism Ch 6.1-6.2	PC13 HW5
10/4 F	Electricity & Magnetism Ch 6.3-6.4	PC14
10/7 M	Electricity& Magnetism Ch 6.5-6.6	PC15
10/9 W	Light Ch 7.1-7.2	PC16 HW6
10/11 F	Light Ch 7.3-7.5	PC17
10/14 M	Light Ch 7.6	PC18
10/16 W	Exam 2 – end Part 2	PC19 HW 7
10/18 F	Project – Learning Stations Part 1	PC20 Final Lesson Plans for stations part 1
10/21 M	Project – Learning Stations Part 2	PC21 Final Lesson Plans for stations part 2

end physics portion

Tentative Course Schedule – subject to updates. Unless otherwise noted: Pre-class assignments are due by 11:59 PM the night before class except the first day. HWs are due by 11:59 PM on the date listed.

10/23 W		
10/25 F	Oct 19 Fall Break no classes	
10/28 M		
10/30 W		
11/1 F		
11/4 M		
11/6 W		
11/8 F		
11/11 M		
11/13 W		
11/15 F		
11/18 M		
11/20 W		
11/22 F		
11/25 M		
11/27 W	**No Classes 11/27-29 Thanksgiving recess (Happy Thanksgiving!)**	
11/29 F	**No Classes 11/27-29 Thanksgiving recess (Happy Thanksgiving!)**	
11/26 M		
11/28 W		
11/30 F		
12/3 M		
12/5 W		
12/7 F		
12/20 F	**Final Exam Friday Dec 20, 1:30-4:00 PM T106**	Two parts: physics and chemistry
	Grades turned in by Dec 23	