

**PITTSBURG STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES
DEPARTMENT OF PHYSICS**

PHYS 171 – PHYSICAL SCIENCE

SUMMER 2019

Date: June 3 – June 28, 2019

Text: The Physical Universe, 16th Edition, Konrad B. Krauskopf, Arthur Beiser

2017 © McGraw-Hill, Inc.

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This course is also intended for partial fulfillment of the Pitt State Pathway Curriculum.

Pitt State Pathway Mission Statement:

The *Pitt State Pathway* curriculum serves as the heart of the university education by fostering interdisciplinary competencies that typify the educated person. It is designed to facilitate the development of key proficiencies including communication and information literacy. The *Pitt State Pathway* curriculum provides a transformational experience that challenges students to think creatively and critically, and to immerse themselves in the productive examination of humans in their global setting. By encouraging the development of skills that promote life-long learning, the *Pitt State Pathway* fosters a sense of personal responsibility, an appreciation of diversity, and an understanding of interconnectedness in our truly global society.

Essential Study to be covered in this course: Natural World within a Global Context

Biological, physical, and chemical systems form the context for life. Students need to understand how these systems work, how these change naturally, and how these can change as a result of human activities. The implications of these changes are essential for long-term decision-making. In this course we will:

Analyze physical and chemical systems;

Evaluate the implications of changes that result from interactions between natural and human systems.

Companion Element to be covered in this course: Scientific Inquiry

The scientific method is the systematic approach to understanding the world around us. Through experimentation and hypothesis testing, students will apply analytical skills and appropriate methods of scientific inquiry (i.e. qualitative and quantitative) to solve a variety of research questions. In this course we will:

Compose appropriate research questions and hypothesis, drawing from experts, reliable sources, or previously collected data.

Collect, synthesize, and analyze data from multiple sources;

Draw logical conclusions, assessing for gaps and weaknesses, and addressing potential consequences and implications

Communicate results using appropriate delivery methods or formats.

The **Learning Outcome** for Natural World in a Global Context is:

Students will explore global systems conscientiously.

The **Learning Outcome** for Scientific Inquiry is:

Students will analyze data logically.

Course Description: The principles of mechanics, electricity and magnetism, atomic science, earth and space science. Three hours of lecture will be accompanied by two hours of hands-on laboratory experiences weekly. Concurrent enrollment required in PHYS 172 Physical Science Laboratory. Closed to students majoring or minoring in the physical sciences or having had PHYS 371 The Physical World.

Course Objectives:

Natural World within the Global Context: Level of Student Learning = Milestone I
Explains physical and chemical processes and human activities that alter them.

Scientific Inquiry: Level of Student Learning = Milestone I
Student will apply the scientific methods to a problem.

You should attain some degree of mastery in the following areas:

1. Explain the scientific method.
2. Discuss the scope of the physical sciences.
3. Interpret scientific data to demonstrate basic problem solving.
4. Explain everyday phenomena in terms of basic physical science concepts.
5. Explain and critique science as presented in the media

The following learning outcomes support the five unit goals listed.

Unit 1 Goal: Understand fundamental relations of kinematics, dynamics, energy equivalence, and universal gravity.

1. Correctly relate displacement, velocity, acceleration, and time by kinematic equations or a graphical representation.
2. Calculate average speed or acceleration from instantaneous values and intervals.
3. Use Newton's 2nd Law of Motion to correctly relate force, mass, and acceleration in dynamic systems.

4. Using proper SI units and the principle of conservation of energy, calculate equivalencies between various forms of energy, including mechanical work, potential, kinetic, and thermal.
5. Using proper SI units, relate energy changes, time intervals, and power for both mechanical and electrical systems.
6. For quantities that obey an inverse square law, correctly calculate the relation between distance and changes in the quantities, including gravitational force, electrostatic force, and intensity of light, sound, radiation, and earthquakes.

Unit 2 Goal: To understand the most basic concepts of electromagnetism and light.

7. Use Ohm's Law to correctly relate current, voltage, and resistance in simple circuits in SI units.
8. Use SI units to correctly relate fundamental electrical quantities.
9. Use the fact that transformers preserve power from input to output with voltage in proportion to the number of turns to calculate unknown voltages, currents, or number of turns, when other quantities are defined.
10. Distinguish images in which the light rays pass through the image (real) and those in which they do not (virtual).
11. From the relation between wavelength, frequency, and speed, calculate a missing quantity if two are specified.
12. Distinguish between the characteristics and origins of continuous, emission, and absorption spectra.

Unit 3 Goal: To understand the most basic concepts of general and organic chemistry.

13. Identify elements and their electronic structure from named groups from the Periodic Table.
14. Distinguish between the types of chemical bonds by the arrangement of electrons and general properties.
15. Describe key characteristics of reactions and recognize elements in their formulas.
16. From a chemical formula, identify the number of atoms of each element in a molecule.

Unit 4 Goal: To understand basic concepts of Earth science, plate tectonics, and weather.

17. Recognize constituent gases of the atmosphere and their proportions in the named layers, particularly trace gases that affect global warming.
18. Recognize key identifying properties and origins for rocks and minerals.
19. Recognize evidence supporting the theory of plate tectonics, and select the one that finally convinced the geological community.
20. Identify prevailing wind directions from latitude, pressure differences, and interaction with Earth's rotation.

Unit 5 Goal: To understand basic concepts of space science, planetary astronomy, and cosmology.

21. Using Kepler's Laws of planetary motion as a guide, characterize orbits of objects in the solar system.
22. Identify key properties of planets in the Solar System.
23. Identify key characteristics of the universe according to recent cosmological data.
24. Describe the life cycle of stars of various sizes in comparison to our own Sun, and producing exotic objects, such as neutron stars and black holes.

Methods of Assessment:

Students, on homework, exams, and Quizzes, will *describe and explain*, items, principles, and processes related to the student outcomes. (Milestone I)

Website:

PSU – Canvas

We will use Canvas as our Learning Management System (LMS). Please gain access and be familiar with Canvas functions. Here are links to get familiar with Canvas:

<https://pittstate.instructure.com/courses/151308>

<https://www.pittstate.edu/it/information-technology-services/canvas.html#undefined4>

Course & Grading:

It is absolutely important that you read/study the appropriate section/sections in the textbook **before** taking any quizzes or exams. As you read the material I suggest you take notes on key concept, laws, equations, assumptions, approximations, conditions, restrictions and list any question that you might have or things that are not clear to you. Students take responsibility for their knowledge. This includes studying the text, lecture notes and completing the assignments and exams on time.

The course grade will be determined by Assignments (15% of the course grade), three unit exams (40%), quizzes (25%) and a comprehensive final exam (20%). Your overall percent grade will determine the course letter grade according to:

A (100-90), B (89-80), C (79-70), D (69-60), F (59-0).

Assignments

There will be assignments needed to be done after you read the appropriate section/chapter. The assignments check your level of knowledge as you progress into it. Reading the section/chapter is absolutely essential to answer the assignment questions correctly. The Assignments will be contributing 15% to your overall grade.

Quizzes

Quizzes will be assigned for each chapter. These will test your qualitative and quantitative understanding of the chapters. It is important that you work on the assigned quizzes before the due date. Late quizzes will not be accepted. Quizzes will contribute 25% to your final grade.

Unit Exams:

There will be three **closed-book**, unit exams. The duration of the each exam will be restricted to one hour. They will contribute 40% to your overall grade. You will need a calculator for the exams. No smart phones or communication with a class-mate is allowed during exams. Honesty is the best practice, you are all here to learn and cheating is the worst thing you could do to yourself in your college career. Plagiarism and cheating policy is given below. Please click on the link, read and understand it.

Final Exam:

There will be one comprehensive final exam, which will cover all chapters we studied. Final exam will contribute 20% to your overall grade. The duration of the final exam will be two hours. You will need a calculator for the final exam. No smart phones or communication with a class-mate is allowed during exams. Honesty is the best practice, you are all here to learn and cheating is the worst thing you could do to yourself in your college career. Plagiarism and cheating policy is given below. Please click on the link, read and understand it.

Disabilities:

Any student who, because of a disabling condition, may require some special arrangements in order to meet course requirements should contact me as soon as possible to make necessary accommodations.

Plagiarism and Cheating:

Plagiarism and cheating are serious offenses and may be punished by failure on the exam, paper or project, failure in the course, and/or expulsion from the University.

For more information refer to the PSU Code of Student Rights and Responsibilities:

Article 30, Academic Misconduct at

http://catalog.pittstate.edu/contentm/blueprints/blueprint_display.php?bp_listing_id=162&blueprint_id=124&sid=1&menu_id=7980

Please review the following syllabus supplement:

https://www.pittstate.edu/registrar/_files/documents/syllabus-supplement-spring-2019-updated-1-3-19-.pdf

Minimum Technology Requirement:

Canvas is required. Please click the link to a Canvas help page:

<https://www.pittstate.edu/it/information-technology-services/canvas.html>

Any technical difficulties, please contact Gorilla Geeks at

<https://www.pittstate.edu/it/gorilla-geeks.html>

EXAM SCHEDULE

Exam 1	Tentative date: June 7, 2019
Exam 2	Tentative date: June 14, 2019
Exam 3	Tentative date: June 21, 2019

Final Exam

June 28, 2019

The schedule is tentative and subject to change. You will receive an announcement in lecture if there is any change in the syllabus throughout the semester.