

**PITTSBURG STATE UNIVERSITY
DEPARTMENT OF PHYSICS**

PHYS 172 PHYSICAL SCIENCE LABORATORY

Your Instructor: Kyla Scarborough

Lab Section: 172-_____ **Course Time:** _____ **Course Day:** _____

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Office Hours: See below. No Canvas messaging

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: 1 credit hour. This course is designed to provide the student with laboratory experiences in mechanics, electricity and magnetism, and Earth and Space science. Concurrent enrollment in PHYS 171 Physical Science required. Closed to students majoring or minoring in Physics or Chemistry.

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. Apply the scientific method.
2. Perform experiments and obtain scientific data.
3. Interpret scientific data to demonstrate basic problem solving.
4. Explain everyday phenomena in terms of basic physical science concepts.

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 laboratory reports, exam(s), and Quizzes, will *describe and explain*, items, principles, and processes related to the student outcomes. (Milestone I)

Instructional Resources:

You will need a folder or notebook, paper, a pencil, and a **calculator (not a smart phone or iPad/AppleWatch/iPod-type calculator)** for this class. **You must wear closed-toe shoes that entirely cover the sides, top, and back of your feet while in the lab. No sandals, clogs, flats, bedroom slippers, or flip-flops are allowed. You will be sent home if you are not wearing appropriate footwear. No food is allowed in the lab. No cell phone texting is allowed in the lab.**

Teaching Strategies:

Generally, an initial brief lecture introduces the laboratory. Careful note taking while performing each lab will be required.

Evaluation:

YOUR GRADE IN THIS CLASS IS DETERMINED BY THE TOTAL NUMBER OF POINTS THAT YOU HAVE.

1. *Attendance & Participation	12 @ 10 points each	120 points
2. 2 Lab Tests	2 @ 30 points each	60 points
3. 2 Quizzes	2 @ 10 points each	20 points
	Total Points	200 points

***You will not be awarded the full amount of attendance points if you do not fully-participate in lab (including doing ALL of your own calculations), if you arrive to lab late, leave lab early, do not have a calculator with you, use your phone during class, do not follow directions, or if you are sent home because you arrived wearing inappropriate footwear.**

GRADING SCALE

180-200 POINTS A
 160-179 POINTS B
 140-159 POINTS C
 120-139 POINTS D
 Below 120 POINTS F

Make-Up Labs:

Missed labs may not be made up. You must attend the lab section in which you are enrolled to earn attendance points. You will never be awarded attendance points for a lab that you do not attend. Regarding labs missed, it is your responsibility to obtain the experimental results from lab partners and to acquire appropriate understanding of the material.

Miscellaneous: It is strongly recommended that you keep your notebook or folder current. **The lab notebook may be used when you take the lab tests.** Please record any apparatus, data, blackboard notes, procedures, etc. in your notebook directly.

Tentative Schedule:

8/28-8/30	Lab 1: Metric System
9/4-9/6	Lab 2: Acceleration of Gravity
9/11-9/13	Lab 3: Work, Power, and Machines, QUIZ 1
9/18-9/20	Lab 4: Simple Circuits/Motors, Generators, Transformers
9/25-9/27	Lab 5: Waves/Speed of Sound

10/2-10/4 TEST 1

NO LABS DURING THE WEEK OF OCTOBER 8TH DUE TO FALL BREAK.

10/16-10/18	Lab 6: Model Motor Construction
10/23-10/25	Lab 7: Chemical Analysis *(Must wear long pants that totally cover your legs.)*
10/30-11/1	Lab 8: Radioactivity
11/6-11/8	Lab 9: Weather
11/13-11/15	Lab 10: Earthquakes & Lab 11: Parallax, QUIZ 2

NO LABS DURING WEEK OF NOVEMBER 19TH DUE TO THANKSGIVING BREAK

11/27-11/29 Lab 12: Rocks and Minerals *(Must wear long pants that **totally** cover your legs.)*

**12/4-12/6 TEST 2 *NOTE THAT THIS IS DURING DEAD WEEK.*
THERE IS NO LAB ACTIVITY DURING FINALS' WEEK—LAB IS OVER.**

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>

Tentative Office Schedule~Kyla Scarborough Fall 2018

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00-9:50	Lunch	Lunch	Lunch	Lunch	Lunch
10:00-10:50	Physical Science	Astro Lab Set-up	Physical Science	Office Hours	Physical Science
11:00-11:50	Office Hours	Office Hours	Office Hours	Office Hours	Office Hours
12:00-12:50	Astro Lab Set-up	PS Lab		PS Lab	Faculty Meeting
1:00-1:50	Descriptive Astronomy	PS Lab	Descriptive Astronomy	PS Lab	Descriptive Astronomy
2:00-2:50	Astro. Lab	Astro. Lab	Astro. Lab	Astro. Lab	PS Lab Set-up
3:00-3:50	Astro. Lab	Astro. Lab	Astro. Lab	Astro. Lab	PS Lab Set-up