

South Plains College
Common Course Syllabus: PHYS 1410
Revised 01/10/2024

Department: Science

Discipline: Physics

Course Number: PHYS 1410

Course Title: Elementary Physics

Available Formats: conventional

Campuses: Levelland

Instructor:

David Hobbs

Office: S67

Office Hours: TT 1:30 – 4:00 pm, F 8:30 – 11:30 am

Phone: 806-716-2639

email: dhobbs@southplainscollege.edu

Course Description: Conceptual level survey of topics in physics intended for liberal arts and other non-science majors.

Prerequisite: There are no prerequisites for this course, however you will be expected both on the homework and in the exams to be able to perform simple mathematical calculations. Examples of the mathematical concepts we will use in this course are scientific notation, multiplying and dividing powers of 10, converting between different metric units, rearranging and solving simple equations. It will be assumed that you are proficient in math at the level of high school algebra.

Credit: 4 **Lecture:** 3 **Lab:** 3

Textbook: We will follow the order of topics in D. Zollman and J. Spears, *The Fascination of Physics*. This book is no longer in print but is available free online at <https://web.phys.ksu.edu/fascination/Contents.htm>.

You will probably want to read every chapter of this book. Additional readings may be selected from other free online resources as well – see the Blackboard course pages for more information.

Supplies: Scientific Calculator

This course partially satisfies a Core Curriculum Requirement:

Life and Physical Sciences Foundational Component Area (030)

Core Curriculum Objectives addressed:

- **Communications skills**—to include effective written, oral and visual communication
- **Critical thinking skills**—to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
- **Empirical and quantitative competency skills**—to manipulate and analyze numerical data or observable facts resulting in informed conclusions
- **Teamwork**—to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

Student Learning Outcomes:

Learning Outcomes - Upon successful completion of this course, students will:

1. Distinguish between displacement, velocity, and acceleration
2. Solve simple problems involving uniform motion, uniformly accelerated motion, or uniform circular motion
3. State Newton's Laws of Motion, explain the meaning of each, and identify applications of each
4. Apply Newton's laws of motion to relate forces to motion for simple physical cases
5. Define momentum and solve simple problems involving conservation of momentum
6. Identify types of energy in a system and solve simple problems involving conservation of energy
7. Describe the basic structure of an atom in terms of protons, neutrons, and electrons
8. Make simple calculations involving changes in temperature as well as phase changes when systems at different temperatures interact
9. Describe and calculate basic properties of waves such as frequency, wavelength, and amplitude
10. Discuss wave interference and the conditions for constructive and destructive interference
11. Describe standing waves and determine the frequencies of the harmonics
12. Discuss electric charge and the role it plays in atomic structure.
13. Calculate electrical forces using Coulomb's law.
14. Describe electric field and discuss electrical interactions in terms of electric field.
15. Discuss simple electrical circuits and make calculations using Ohm's law applied to series and parallel circuits.
16. Describe magnetic field and discuss interactions of magnetic fields with moving charges.
17. Discuss and apply Faraday's law of electromagnetic induction
18. Relate changing magnetic fields to induced electric fields.
19. Describe electromagnetic waves in terms of electric and magnetic fields and electromagnetic induction
20. Discuss the spectrum of electromagnetic waves from radio waves to x-rays.
21. Discuss diffraction and interference and how they arise based on superposition and Huygens' Principle.
22. Make simple calculations related to the photoelectric effect and the Bohr model of the hydrogen atom
23. State the Pauli Exclusion Principle and specify its implications for atomic structure
24. Discuss how quantum mechanics explains the structure of the periodic table
25. Describe the basic structure of a nucleus and explain the meaning of different isotopes
26. Recall the three basic types of radioactivity and describe some properties of each
27. Use radioactive half-life in simple calculations
28. Describe the basic principles of radioactive dating
29. Discuss the use of nuclear fission in electric power generation

Student Learning Outcomes Assessment: Selected questions on tests will assess how well students have met targeted student learning outcomes.

Course Evaluation: Student grades will be based on daily work, homework, and tests. Final grades will be assigned based on the percentages shown below:

Task	Weight
Daily Work	25%
HW & Tests	75%

The letter grades will be based on a fixed scale as follows:

A: 89.5 – 100 B: 79.5 – 89.5 C: 69.5 – 79.5 D: 59.5 – 69.5 F: below 59.5

Borderline cases (within 0.5 of the break) will be decided based on class participation.

Attendance Policy: Attendance and effort are vital to success in this course. Class attendance keeps you well connected to the course and gives you opportunities to ask questions and clear up confusions. Therefore, students are expected to be in attendance for every class session. Students with excessive absences (more than 5) will be administratively dropped from the class. It is the student's responsibility to know how many absences they have accumulated.

Daily Work: Daily work consists of quizzes and in-class (lab) practice with feedback. These activities are meant to be formative exercises and are graded primarily on participation. Their purpose is to help develop understanding of the concepts and principles and to prepare you for the tests.

Daily Work Grade Determination: 50% of your daily work grade will come from the quizzes and 50% from the in-class practice.

Homework: Do your homework! There is no substitute. Students who don't put in a good effort often struggle in the course. A better semester average homework grade will replace your lowest test score.

Tests: Three tests will be given during the semester as shown on the course calendar. Each test will be worth 25% of the course grade. There will be no make-up tests given, so a test missed counts as zero. However, your lowest test grade will be replaced automatically by a greater semester average homework score at the end of the semester. Thus, in addition to demonstrating your grasp of the subject and helping you to prepare for tests, a good homework grade provides "insurance" against a low or missing test grade.

Plagiarism and Cheating: Students are expected to do their own work on all projects, quizzes, assignments, examinations, and papers. Failure to comply with this policy will result in an F (grade of zero) for the assignment and can result in an F for the course if circumstances warrant.

Plagiarism violations include, but are not limited to, the following:

1. Turning in a paper that has been purchased, borrowed, or downloaded from another student, an online term paper site, or a mail order term paper mill;
2. Cutting and pasting together information from books, articles, other papers, or online sites without providing proper documentation;
3. Using direct quotations (three or more words) from a source without showing them to be direct quotations and citing them; or
4. Missing in-text citations.

Cheating violations include, but are not limited to, the following:

1. Obtaining an examination by stealing or collusion;
2. Discovering the content of an examination before it is given;
3. Using an unauthorized source of information (notes, textbook, text messaging, internet, apps) during an examination, quiz, or homework assignment;
4. Entering an office or building to obtain unfair advantage;
5. Taking an examination for another;
6. Altering grade records;
7. Copying another's work during an examination or on a homework assignment;
8. Rewriting another student's work in Peer Editing so that the writing is no longer the original student's;
9. Taking pictures of a test, test answers, or someone else's paper.

Student Code of Conduct Policy: Any successful learning experience requires mutual respect on the part of the student and the instructor. Neither instructor nor student should be subject to others' behavior that is rude, disruptive, intimidating, aggressive, or demeaning. Student conduct that disrupts the learning process or is deemed disrespectful or threatening shall not be tolerated and may lead to disciplinary action and/or removal from class.

For information regarding official South Plains College statements about intellectual exchange, disabilities, non-discrimination, Title IX Pregnancy Accommodations, CARE Team, and Campus Concealed Carry, please visit

<https://www.southplainscollege.edu/syllabusstatements/>.

Note: The instructor reserves the right to modify the course syllabus and policies, as well as notify students of any changes, at any point during the semester.

Calendar

Phys 1410

Spring 2024

Week	Monday		Wednesday	
	Readings	Topics	Readings	Topics
1	01/15	Martin Luther King Day – No Class	01/17	Course Intro – Blackboard Overview, Scientific Notation, SI Units
Unit 1: Space and Time				
2	01/22	Position, Distance, and Displacement	01/24	Describing Motion
3	01/29	Relative Motion at Low Speeds	01/31	Special Theory of Relativity
Unit 2: Interactions and Forces				
4	02/05	Interaction and Momentum	02/07	Interaction and Force
5	02/12	Newton's Three Laws	02/14	The Fundamental Interactions
6	02/19	Review for Test 1	02/21	Test 1 9:30am – 11:30am
Unit 3: Energy				
7	02/26	Energy	02/28	Thermal Energy in Matter
8	03/04	How Thermal Energy is Transferred	03/06	Thermodynamics
	03/11	Spring Break – No Class	03/13	Spring Break – No Class
Unit 4: Waves and Particles				
9	03/18	Atoms, Molecules, and Thermal Energy	03/20	Making Waves
10	03/25	Waves: Sound and Electromagnetic	03/27	Interference and Diffraction
11	04/01	Wave-Particle Duality	04/03	Light Quanta and Atoms
12	04/08	NO CLASS – ECLIPSE	04/10	Review for Test 2
Unit 5: From Electricity to the Nucleus				
13	04/15	Test 2 9:30am – 11:30am	04/17	Turning on the Lights
14	04/22	Electromagnetism	04/24	Radioactivity
15	04/29	Nuclear Energy	05/01	Review for Test 3
16	05/06		05/08	Test 3 8:00 – 10:00 am

This schedule may be subject to change. Any necessary changes will be announced in class and through Blackboard.