South Plains College
Common Course Syllabus: PHYS 2425
Revised 12/11/2023

Department: Science

Discipline: Physics

Course Number: PHYS 2425

Course Title: Principles of Physics I

Available Formats: conventional

Campuses: Levelland

Instructor:
David Hobbs
Office: S67
Office Hours: TT 1:30 – 4:00 pm, F 8:30 – 11:30 am
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Course Description: Fundamental principles of physics, using calculus, for science, computer science, and engineering majors; the principles and applications of classical mechanics, including harmonic motion, physical systems and thermodynamics; and emphasis on problem solving. Basic laboratory experiments supporting theoretical principles and applications of classical mechanics, including harmonic motion and physical systems; experimental design, data collection and analysis, and preparation of laboratory reports.

Prerequisite: MATH 2413 Calculus I

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

Textbook: *Physics for Scientists and Engineers, 5th edition* by Randall D. Knight (Pearson, 2022). The textbook and Mastering Physics learning platform will be available through Blackboard.

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:

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

1. Determine the components of linear motion (displacement, velocity, and acceleration), and especially motion under conditions of constant acceleration.
2. Solve problems involving forces and work.
3. Apply Newton's laws to physical problems.
4. Identify the different types of energy.
5. Solve problems using principles of conservation of energy.
6. Define the principles of impulse, momentum, and collisions.
7. Use principles of impulse and momentum to solve problems.
8. Determine the location of the center of mass and center of rotation for rigid bodies in motion.
9. Discuss rotational kinematics and dynamics and the relationship between linear and rotational motion.
10. Solve problems involving rotational and linear motion.
11. Define equilibrium, including the different types of equilibrium.
12. Discuss simple harmonic motion and its application to real-world problems.

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

1. Prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.
2. Conduct basic laboratory experiments involving classical mechanics.
3. Relate physical observations and measurements involving classical mechanics to theoretical principles.
4. Evaluate the accuracy of physical measurements and the potential sources of error in the measurements.
5. Design fundamental experiments involving principles of classical mechanics.
6. Identify appropriate sources of information for conducting laboratory experiments involving classical mechanics.

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 reading quizzes, in-class practice (problem solving sessions with feedback), and lab. 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, to prepare you for the tests, and provide opportunities to practice making experimental observations.

Daily Work Grade Determination: 15% of your daily work grade will come from the reading quizzes, 50% from problem solving sessions, and 35% from lab.

Homework: Do your homework! There is no substitute. Students who don't put in a good effort often struggle in the course. Homework will be assigned and graded online with some detailed solutions written and handed in for review. 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.

Tips for Doing Well

- Read "Preface to the Student" in the textbook. It's written for you!
- Students who have never had a high school physics course must be extra diligent in keeping up with the material. Lots of new concepts are introduced in each chapter. Keep up with the homework and readings to avoid getting overwhelmed.
- Attend classes and ask questions. If you have a question from a previous class, send me a quick email ahead of the next class and I will endeavor to respond, as time permits.
- Read ahead each day. Frame questions from your readings.
- Do the homework. Homework helps you internalize what you are learning and gives practice. Don't skimp! Students who try to get by without doing homework often fail the course. And your homework grade gives "insurance" against a low test grade.
- Time commitment. Learning physics is a time intensive process. Be sure to set aside enough time for both studying the textbook thoroughly and working homework. How much time you need will depend on your prior preparation. It's probably fair to say that most students underestimate the time commitment needed to excel.
- Study together. Explaining your thought process to others is a great way to clarify your thinking. You are encouraged to discuss homework problems with your peers. However, submitted written homework solutions must be your own. You will learn almost nothing by just copying what everyone else is doing.
- Meet individually with me. Don't hesitate to ask me for help. That's my job! To facilitate the most effective help, bring a list of questions you have and any attempted work with you when meeting with me.
- Online resources. There is a plethora of online physics resources. Hyperphysics (http://hyperphysics.phy-astr.gsu.edu/) summarizes many course topics. Video tutorials can be viewed at Khan Academy (https://www.khanacademy.org/science/physics).

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 2425 Spring 2024

Week	Tuesday		Thursday	
	Readings	Topics	Readings	Topics
1	01/16	Course Intro – Blackboard, Mastering Physics, SI Units, Significant Figures	01/18 **Ch1**	Concepts of Motion, MVSR Problem Solving Strategy Problem Solving 1 (PS1) – Pictorial Representations
2	01/23 **Ch2**	Kinematics in 1 Dimension PS2 – Constant Acceleration Model	01/25 **Ch2**	Translating between Verbal, Diagrammatic, Pictorial, Graphical, and Mathematical Descriptions of Motion PS3 – Graphs and Tracks
3	01/30 **Ch3**	Vectors and Coordinate Systems Lab1 – Free Fall	02/01 **Ch4**	Kinematics in 2 Dimensions – Projectile Motion PS4 – Projectile Motion
4	02/06 **Ch4**	Kinematics in 2 Dimensions – Uniform and Nonuniform Circular Motion Lab2 – Projectile Motion	02/08 **Ch5**	Force and Motion – Newton's First and Second Laws PS5 – Identifying Forces and Drawing a FBD
5	02/13 **Ch6**	Dynamics of Motion in a Straight Line PS6 – 1D Dynamics	02/15 **Ch7**	Newton's Third Law; Dynamics of Interacting Objects PS7 – Interacting Objects
6	02/20	Review of Chapters 1 through 7	02/22	**Test 1 Chapters 1 – 7**
7	02/27 **Ch8**	Dynamics of Uniform and Nonuniform Circular Motion PS8 – Circular Motion	02/29 **Ch9**	Work and Kinetic Energy; Dissipative Forces and Thermal Energy PS9 – Work/Kinetic Energy Theorem
8	03/05 **Ch10**	Interactions and Potential Energy PS10 – Conservation of Energy	03/07 **Ch11**	Impulse and Momentum; Collisions and Explosions PS11 – Conservation Laws
	03/12	Spring Break – No Class	03/14	Spring Break – No Class
9	03/19 **Ch9/10/11**	Problem-Solving with Energy and Momentum Principles Lab3 – Ballistic Pendulum	03/21 **Ch12**	Rotational Energy and Moment of Inertia; Rotational Dynamics PS12 – Energy including Rotational KE
10	03/26 **Ch12**	Angular Momentum and Torque; Conservation of Angular Momentum PS13 – Rotational Dynamics	03/28 **Ch13**	Newton's Theory of Gravity PS14 – Energy in Orbital Motion
11	04/02	Review of Chapters 8 through 13	04/04	**Test 2 Chapters 8 – 13**
12	04/09 **Ch15**	Oscillations Lab4 – Simple Harmonic Motion	04/11 **Ch18**	Pressure, Temperature, Ideal Gas Law PS15 – Ideal Gas Law
13	04/16 **Ch19**	Work in Ideal Gas Processes, Thermal Interactions, First Law of Thermodynamics PS16 – Energy in Thermal Interactions	04/18 **Ch19**	Thermal Properties of Matter, Heat Transfer Mechanisms PS17 - Calorimetry
14	04/23 **Ch20**	Kinetic Theory of Gases Lab5 – Molar Specific Heat of Elemental Metals	04/25 **Ch20**	Entropy and Second Law of Thermodynamics PS18 – Calculating Changes in Entropy
15	04/30 **Ch21**	Heat Engines PS19 – Heat Engine Cycle Analysis	05/02	Review of Chapters 15, 18 through 21
16	05/07		05/09	**Test 3 Chapters 15, 18 – 21** **8:00 – 10:00 am**

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