

South Plains College
Common Course Syllabus: PHYS 2425
Revised 12/09/2024

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: MW 1:00 – 2:00 pm, TT 1:30 – 3:30 pm, F 1:00 – 3:00 pm

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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, 4 tests, and a comprehensive final exam. Final grades will be assigned based on the percentages shown below:

Task	Weight
Daily Work	25%
Tests	60%
Final Exam	15%

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.

Late Work: Late work will not be accepted.

Extra Credit: This course will not include any extra credit opportunities.

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.

Dropping a Course: Students may drop courses through Texan Connect, the Admissions and Records Office, or Advising and Testing Center through the late registration period.

After late registration has closed, a student must complete the online [Student Initiated Drop Request](#) to drop a course.

Students may also drop courses in person at any campus location by completing a Student Initiated Drop Form. Complete a [Student Initiated Drop Form](#) and return the signed form to the Levelland Admissions and Records Office, the Student Support Center at the Lubbock Downtown Center, the Lubbock Career and Technical Center, or Plainview Center. You must have a picture ID to complete the drop.

A mark of "W" will be given for student-initiated drops that occur prior to and through the last day to drop as indicated in the online Academic Calendar found here:

<https://www.southplainscollege.edu/academiccalendar/index.php>.

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. 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.

Tests: Four tests will be given during the semester as shown on the course calendar. Each test will be worth 15% of the course grade.

Make-up tests will be given only in extreme circumstances. The first missed test will be replaced by your semester average homework score. A second missed test can be made up only if both missed tests were due to serious unavoidable medical issues that were both properly documented – see below.

Missing a test should only be for serious unavoidable medical issues and should not be for trivial reasons. You should notify the instructor **before** the missed test, if at all possible. In any case, you must notify the instructor of the reason for missing the test within 24 hours of the test date.

Failure to make this notification means making up the test will not be allowed under any circumstances. Proper documentation must be provided before a make-up test will be scheduled.

Final Exam: The final exam will be a comprehensive exam. It will be given during the scheduled final exam time as shown on the course calendar.

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, homework solutions should 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 free online physics resources. [Hyperphysics](http://hyperphysics.phy-astr.gsu.edu/) (<http://hyperphysics.phy-astr.gsu.edu/>) summarizes many course topics. Video tutorials can be viewed at Khan Academy (<https://www.khanacademy.org/science/physics>).

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.

Syllabus Statements: For information about Artificial Intelligence, Disabilities, Non-Discrimination, Intellectual Exchange, Title IX Pregnancy Accommodations, CARE (Campus Assessment, Response, and Evaluation) Team, Campus Concealed Carry, and COVID-19, please use this link: <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 2025

Week	Tuesday		Thursday	
	Readings	Topics	Readings	Topics
1	01/14	Course Intro – Blackboard, Mastering Physics, SI Units, Significant Figures Lab1 – Measurement and Uncertainty	01/16 Ch1	Concepts of Motion, MVSr Problem Solving Strategy Problem Solving 1 (PS1) – Pictorial Representations
2	01/21 Ch2	Kinematics in 1 Dimension PS2 – Constant Acceleration Model	01/23 Ch2	Translating between Verbal, Diagrammatic, Pictorial, Graphical, and Mathematical Descriptions of Motion Lab2 – Graphical Analysis of Data
3	01/28 Ch3	Vectors and Coordinate Systems Lab3 – Free Fall	01/30 Ch4	Kinematics in 2 Dimensions – Projectile Motion PS3 – Projectile Motion
4	02/04 Ch4	Kinematics in 2 Dimensions – Uniform and Nonuniform Circular Motion Lab4 – Projectile Motion	02/06 Ch5	Force and Motion – Newton’s First and Second Laws PS4 – Identifying Forces and Drawing a FBD
5	02/11	Test 1 Chapters 1 – 4	02/13 Ch6	Dynamics of Motion in a Straight Line PS5 – 1D Dynamics
6	02/18 Ch7	Newton’s Third Law; Dynamics of Interacting Objects PS6 – Interacting Objects	02/20 Ch8	Dynamics in Two Dimensions, Dynamics of Uniform Circular Motion PS7 – Dynamics of Uniform Circular Motion
7	02/25 Ch8	Dynamics of Nonuniform Circular Motion PS8 – Dynamics of Nonuniform Circular Motion	02/27 Ch9	Work and Kinetic Energy; Dissipative Forces and Thermal Energy PS9 – Work/Kinetic Energy Theorem
8	03/04	Test 2 Chapters 5 – 8	03/06 Ch10	Interactions and Potential Energy PS10 – Conservation of Energy
9	03/11 Ch11	Impulse and Momentum; Collisions and Explosions Lab5 – Ballistic Pendulum	03/13 Ch12	Rotational Energy and Moment of Inertia; Rotational Dynamics PS11 – Energy including Rotational KE
	03/18	Spring Break – No Class	03/20	Spring Break – No Class
10	03/25 Ch12	Angular Momentum and Torque; Conservation of Angular Momentum PS12 – Rotational Dynamics	03/27 Ch13	Newton’s Theory of Gravity PS13 – Energy in Orbital Motion
11	04/01	Test 3 Chapters 9 – 12	04/03 Ch15	Oscillations Lab6 – Simple Harmonic Motion
12	04/08 Ch18	Pressure, Temperature, Ideal Gas Law PS14 – Ideal Gas Law	04/10 Ch19	Work in Ideal Gas Processes, Thermal Interactions, First Law of Thermodynamics PS15 – Energy in Thermal Interactions
13	04/15 Ch19	Thermal Properties of Matter, Heat Transfer Mechanisms PS16 - Calorimetry	04/17 Ch20	Kinetic Theory of Gases Lab7 – Molar Specific Heat of Elemental Metals
14	04/22	Test 4 Chapters 13, 15, 18 – 19	04/24 Ch20	Entropy and Second Law of Thermodynamics PS17 – Calculating Changes in Entropy
15	04/29 Ch21	Heat Engines and Refrigerators PS18 – Energy-Transfer Diagram and Efficiency	05/01 Ch21	Analyzing a Heat Engine Cycle PS19 – The Diesel Cycle
16	05/06		05/08	Comprehensive Final Exam 8:00 – 10:00 am

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