South Plains College
Common Course Syllabus: PHYS 2425
Revised 05/30/2026

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). Either a physical copy or e-text is fine, just be sure it's the 5th edition. If using an e-text, you *do not* need any of the add-on study aides such as are offered in Pearson+.

Required Supplies: Good scientific calculator (NOT capable of accessing the internet so a calculator app on your smart phone is *not* acceptable, a graphing calculator is fine but not required.)

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 exams will assess how well students have met targeted student learning outcomes.

Course Evaluation: Student grades will be based on pre-class worksheets, end-of-class exit tickets, quizzes, a midterm exam, and a final exam. Final grades will be assigned based on the percentages shown below:

Task	Weight
Pre-class Worksheets	10%
Exit Tickets	10%
Quizzes	30%
Midterm Exam	20%
Final Exam	30%

The lowest 2 worksheet grades and the lowest 3 exit ticket grades will be dropped. This is meant to give you flexibility to deal with normal illnesses, unexpected life events, school-related trips, and so on.

Midterm–Final Improvement Policy

To recognize improvement over the course of the semester, the midterm exam grade may be adjusted based on performance on the final exam.

If your final exam score is higher than your midterm exam score, your midterm grade will be replaced by a weighted combination of the two exams:

Adjusted Midterm = 0.3 × (Midterm Exam Score) + 0.7 × (Final Exam Score)

This adjustment is applied only if it increases your overall course grade. If your final exam score is equal to or lower than your midterm score, your original midterm grade will be used.

This policy is designed to reward sustained learning and improvement while still maintaining the importance of the midterm exam.

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.

General Class Structure: Physics education research has robustly shown that practice-oriented activities are *much* more effective than lectures at teaching both the concepts of physics and physics reasoning skills. We will therefore spend most of class time doing *activities* that give you practice (with instant feedback).

Pre-Class Preparation and Participation

Because this course uses a guided inquiry / active learning format, your first exposure to new material will typically occur before class through assigned readings and short pre-class worksheets. These assignments are designed to help you begin organizing the ideas, identifying questions, and preparing for the collaborative and problem-solving activities that occur during class.

Because class time is centered on conceptual discussion, group work, and application of ideas rather than traditional lecture, completing the pre-class preparation is essential for meaningful participation.

Students are expected to arrive having completed the assigned pre-class work. At the beginning of class, we will immediately begin activities that build directly on the preparation assignment.

If you arrive without completing the pre-class work, you will be asked to complete it in the Student Learning Center area before joining in-class activities. Once the pre-class work is completed, you may immediately return and participate in the remainder of the class session.

The purpose of this policy is not meant to be punitive. Rather, it is intended to ensure that all students have the foundational preparation needed to benefit from the collaborative work we will do together during class. Students who consistently prepare before class and actively engage during class tend to find that they develop a deeper and more durable understanding of the material.

Classroom Routine

Each class session will consist of 3 segments of about 50 minutes with short breaks between. Typical class session flow will be:

- Pre-class preparation: Reading Assignment and short worksheet
- 1st class segment: Worksheet-based collaborative activity followed by concept clarification.
- 2nd class segment: Guided application.
- 3rd class segment: Synthesis / problem solving and exit ticket.

Attendance Policy: 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 or receive an F as the final grade. 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.

Pre-class worksheets: Short (20-30 minute) set of mostly conceptual questions focused on the reading assignment. They will help you be prepared for in-class activities.

End-of-class exit tickets: A very short (3-5 minute) task designed to reinforce the day's core conceptual goal.

Quizzes: Five short quizzes will be given. See the course calendar for quiz days. The lowest quiz grade will be dropped. A missed quiz (due to absence) will be the one dropped. Quizzes serve to check integration of concepts and cumulative understanding but will generally be less demanding than the midterm and final exams.

Midterm and Final Exams: See the course calendar for the dates of the midterm and final exams. An appropriate scientific calculator may be used during the exam. No notes will be allowed. However, a formula sheet with selected information will be provided.

Make-up exams will be given only in extreme circumstances. A missed exam can be made up only if the exam was missed due to a serious unavoidable medical issue that is properly documented – see below.

Missing an exam should only be for serious unavoidable medical issues or other serious unavoidable personal reasons and should not be for trivial reasons. Examples of trivial reasons

that are not acceptable include such things as flat tires or other car issues (call someone and get to class, take care of flat tire or car issues after the exam!), doctor or other appointments (reschedule to not conflict with the exam), travel plans (make your travel plans so that they don't interfere with exams), and family events (you may just have to miss your cousin's wedding). You should notify the instructor **before** the missed exam, if at all possible. In any case, you must notify the instructor of the reason for missing the exam within 24 hours of the exam.

Failure to provide this notification means a make-up exam will not be allowed under any circumstances. Proper documentation is required before a make-up exam is scheduled.

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 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 additional problems. The textbook includes answers to the odd-numbered exercises and problems. You are always welcome to come discuss a problem with me during office hours. More practice helps you internalize what you are learning. Don't skimp! Students who try to get by without serious effort often fail the course.
- Time commitment. Learning physics is a time intensive process. Set aside enough time for both studying the textbook thoroughly and working problems. 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 problems with your peers. However, remember you will learn almost nothing by just copying what everyone else is doing.
- Don't hesitate to ask 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/) 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 Fall 2026

Week	Monday		Wednesday	
	Date	Topics	Date	Topics
1	08/24	Course Intro	08/26 1.2-7	Representations of Knowledge and Problem-Solving in Physics; Introduction to Position, Displacement, Velocity, and Acceleration
2	08/31 2.1-7	Kinematics in 1 Dimension; Free Fall	09/02 3.1-4, 4.1-2	Vectors; Kinematics in 2 Dimensions: Projectile Motion
3	09/07	Labor Day – No Class	09/09 4.4-6	Kinematics in 2 Dimensions: Circular Motion **Quiz**
4	09/14 5.1-7	Force and Motion: Newton's 1st and 2nd Laws of Motion	09/16 6.1-4,6	Applying Newton's 2nd Law
5	09/21 7.1-5	Newton's 3rd Law and Systems of Interacting Objects	09/23 8.1-5	Circular Motion Dynamics
6	09/28	Newton's laws – Consolidation and Understanding Check **Quiz**	09/30 9.1-4	Work and the Work-Energy Theorem
7	10/05 9.5-6	Dissipative Forces and Thermal Energy; Power	10/07 10.1-4	Potential Energy and Energy Conservation
8	10/12 10.5-8	Energy Diagrams; Force and Potential Energy	10/14	Energy Principle – Consolidation and Understanding Check **Quiz**
9	10/19	**Midterm Exam**	10/21 11.1-4	Impulse; Momentum; Conservation of Momentum; Collisions and Explosions
10	10/26 4.4-6 12.1	Describing the Motion of a Rotating Rigid Body	10/28 12.2-4	Moment of Inertia; Kinetic Energy of a Rotating Rigid Body
11	11/02 12.5-8	Torque and Rotational Dynamics of Rigid Bodies	11/04 12.9	Conservation of Energy for a Rolling Rigid Body
12	11/09 12.10- 11	Angular Momentum of a Rotating Rigid Body	11/11	Rigid Body Dynamics – Consolidation and Understanding Check **Quiz**
13	11/16 15.1-3	Simple Harmonic Motion	11/18 15.4-6	Dynamics of Simple Harmonic Motion
14	11/23 18.6-7 19.1-2	Ideal Gas Law; Work in Ideal Gas Processes	11/25	Thanksgiving – No Class
15	11/30 19.3-4,7 20.7	Heat Transfers in Gas Processes; 1st Law of Thermodynamics; 2nd Law of Thermodynamics	12/02 21.1-2, 21.5-6	Heat Engines, Refrigerators, and the Limits of Efficiency **Quiz**
16	12/07	**Final Exam – Day 1** **1:00 – 3:00 pm**	12/09	**Final Exam – Day 2** **1:00 – 3:00 pm**

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