

South Plains College
Common Course Syllabus: PHYS 2425
Revised 01/11/2023

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

Phone: 806-716-2639

email: dhobbs@southplainscollege.edu

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 overall point total, using the point values shown below:

Task	Points
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 points 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 who stop attending class will *not* be administratively dropped. *You* must complete the appropriate drop procedure or you may end up receiving a failing grade in the course at the end of the semester.

Daily Work: Daily work consists of reading quizzes and in-class practice with feedback (problem solving sessions 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 and maintaining a lab notebook.

Daily Work Grade Determination: Your daily work grade (up to a maximum of 25 points) will be determined as follows:

Reading Quizzes: 18 quizzes worth $\frac{1}{4}$ point each

Problem Solving Sessions: 19 sessions worth one point each

Lab: 5 labs worth two points each

Homework: Do your homework! There is no substitute. Students who don't put in a good effort often fail the course. Homework will be assigned and graded online with some detailed solutions written and handed in for review. Average of all chapter assignments will be used to determine the homework points (average homework percentage \times 25 points). A better 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 points. 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 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.

Diversity Statement: In this class, the teacher will establish and support an environment that values and nurtures individual and group difference and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be.

Disability Statement: Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Disability Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable documentation of his/her disability to the Disability Services Office. For more information, call or visit the Disability Services Office at Levelland (Student Health & Wellness Office) 806-716-2577, Lubbock Centers (located at the Lubbock Downtown Center) 806-716-4675, or Plainview Center (Main Office) 806-716-4302 or 806-296-9611.

Nondiscrimination Policy: South Plains College does not discriminate on the basis of race, color, national origin, sex, disability or age in its programs and activities. The following person has been designated to handle inquiries regarding the non-discrimination policies: Vice President for Student Affairs, South Plains College, 1401 College Avenue, Box 5, Levelland, TX 79336. Phone number 806-716-2360.

Title IX Pregnancy Accommodations Statement: If you are pregnant, or have given birth within six months, under Title IX you have a right to reasonable accommodations to help continue your education. To activate accommodations, you must submit a Title IX pregnancy accommodations request, along with specific medical documentation, to the Health and Wellness Center. Once approved, notification will be sent to the student and instructors. It is the student's responsibility to work with the instructor to arrange accommodations. Contact the Health and Wellness Center at 806-716-2529 or email dburleson@southplainscollege.edu for assistance.

Covid Statement:

If you are experiencing any of the following symptoms, please do not attend class and either seek medical attention or test for COVID-19.

- Cough, shortness of breath, difficulty breathing
- Fever or chills
- Muscles or body aches
- Vomiting or diarrhea
- New loss of taste and smell

Please also notify DeEtte Edens, BSN, RN, Associate Director of Health & Wellness, at dedens@southplainscollege.edu or 806-716-2376. Proof of a positive test is required. A home test is sufficient but students must submit a photo of the positive result. The date of test must be written on the test result and an ID included in the photo. If tested elsewhere (clinic, pharmacy, etc.), please submit a copy of the doctor's note or email notification. Results may be emailed to DeEtte Edens, BSN, RN at dedens@southplainscollege.edu.

A student is clear to return to class without further assessment from DeEtte Edens, BSN, RN if they have completed the 5-day isolation period, symptoms have improved, and they are without fever for 24 hours without the use of fever-reducing medication.

Students must communicate with DeEtte Edens, BSN, RN prior to their return date if still symptomatic at the end of the 5-day isolation.

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 2023

Week	Tuesday		Thursday	
	Readings	Topics	Readings	Topics
1	01/17	Course Intro – Blackboard, Mastering Physics	01/19 Ch1	Concepts of Motion, MVSR Problem Solving Strategy Problem Solving Session (PS) – Pictorial Representations
2	01/24 Ch2	Kinematics in 1 Dimension PS – 1D Kinematics	01/26 Ch2	Translating between Verbal, Diagrammatic, Pictorial, Graphical, and Mathematical Descriptions of Motion Lab 1 – Graphical Description of 1D Motion
3	01/31 Ch3	Vectors and Coordinate Systems PS – Vectors	02/02 Ch4	Kinematics in 2 Dimensions – Projectile Motion PS – Projectile Motion
4	02/07 Ch4	Kinematics in 2 Dimensions – Uniform and Nonuniform Circular Motion Lab 2 – Projectile Motion	02/09 Ch5	Force and Motion – Newton’s First and Second Laws PS – Identifying Forces and Drawing FBD
5	02/14 Ch6	Dynamics of Motion in a Straight Line PS – 1D Dynamics	02/16 Ch7	Newton’s Third Law; Dynamics of Interacting Objects PS – Dynamics of Interacting Objects
6	02/21	Review of Chapters 1 through 7	02/23	Test 1 9:30am – 11:30am
7	02/28 Ch8	Dynamics of Uniform and Nonuniform Circular Motion PS – Dynamics of Circular Motion	03/02 Ch9	Work and Kinetic Energy; Dissipative Forces and Thermal Energy PS – Using the Work/Kinetic Energy Theorem
8	03/07 Ch10	Interactions and Potential Energy PS – Applying Conservation of Energy	03/09 Ch11	Impulse and Momentum; Collisions and Explosions Lab 3 – Ballistic Pendulum
	03/14	Spring Break – No Class	03/16	Spring Break – No Class
9	03/21 Ch9/10/11	Using Energy and Momentum principles PS – Conservation Laws	03/23 Ch12	Rotational Energy and Moment of Inertia; Rotational dynamics PS – Conservation Laws including Rotational KE
10	03/28 Ch12	Angular Momentum and Torque; Conservation of Angular Momentum PS – Rotational Dynamics	03/30 Ch13	Newton’s Theory of Gravity PS – Energy in Orbital Motion
11	04/04	Review of Chapters 8 through 13	04/06	Test 2 9:30am – 11:30am
12	04/11 Ch15	Oscillations Lab 4 – Simple Harmonic Motion	04/13 Ch18	Pressure, Temperature, Ideal Gas Law PS – Using the Ideal Gas Law
13	04/18 Ch19	Work in Ideal Gas Processes, Thermal Interactions, First Law of Thermodynamics PS – First Law of Thermodynamics	04/20 Ch19	Thermal Properties of Matter, Heat Transfer Mechanisms PS - Calorimetry
14	04/25 Ch20	Kinetic Theory of Gases Lab 5 – Molar Specific Heats of Elemental Metals	04/27 Ch20	Second Law of Thermodynamics PS – Entropy in Thermal Interactions
15	05/02 Ch21	Heat Engines PS – Diesel Engine Cycle	05/04	Review of Chapters 15, 18 through 21
16	05/09	Test 3 10:15am – 12:15pm	05/11	

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