South Plains College
Common Course Syllabus: PHYS 2425
Revised 08/23/2021

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 8:30 – 11:00 am, 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: *Matter & Interactions, 4th edition* by R. Chabay and B. Sherwood (John Wiley & Sons, 2015). The e-text through *Perusall.com* is required, paper copy is optional. Textbook errata are at https://matterandinteractions.org/errata/.

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.
13. Solve problems involving the First and Second Laws of Thermodynamics.

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 the comprehensive final exam will assess how well students have met targeted student learning outcomes.

Course Evaluation: Student grades will be based on daily work (class attendance and participation; reading, homework, and lab assignments), four tests, and a comprehensive final exam. Final grades will be assigned based on overall, weighted average using the weighting scheme shown below:

Task	Code	Weight
Daily Work	D	10%
Tests	T	60%
Final Exam	F	30%

Overall Average = 0.10*D + 0.60*T + 0.30*F

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, so that you know at all times what's going on, what are the most important points, etc., and gives you opportunities to ask questions and clear up confusions. Therefore, students are expected to be in attendance for every class session. Attendance and participation in class will contribute to your daily work grade.

Daily Work: Daily work consists of reading assignments in your textbook and both in-class (lab) and outside-of-class (homework) practice with feedback. These activities are meant to be formative assessments and are graded primarily on participation rather than correctness. Their purpose is to help develop understanding of the concepts and principles and to prepare you for the tests.

Daily Work Grade Determination: Your daily work grade will be determined as follows:

Attendance: 10 points if no more than two absences, 0 points otherwise
Reading: Reading score x 20 (but no more than 30 points)
Homework: Fraction attempted and corrected x 37.5 (but no more than 30 points)
Lab: Fraction completed x 37.5 (but no more than 30 points)

Example: You have only 1 absence, a reading score of 1.2, and completed 75% of both the homework and labs. Your daily work grade would be

daily work grade = 10 + 1.2x20 + 0.75x37.5 + 0.75x37.5 = 90.25

Notice to earn a 100 on the daily work grade requires no more than two absences, a reading score of 1.5 (out of a max of 3 possible), and completion of at least 80% of the homework and lab work.

Tests: Four 90-minute tests will be given during the semester as shown on the course calendar. Students are required to take all four tests; however, the lowest test score will be dropped. There will be no make-up tests given, so a test missed due to an excused absence will be the one dropped. A test missed because of an unexcused absence will receive a grade of zero and cannot be dropped. Absences on a test day must be approved before the class in order to be excused. On class days when a test is scheduled, the test will be given during the first 90 minutes of class, followed by a ten-minute break and then lecture for the remainder of the class time. All students will be required to hand in the test at the end of the 90-minute period without exception and the lecture portion of class will begin promptly 10 minutes later.

Final Exam: A comprehensive final exam will be given during the scheduled two-hour final exam time. See the course calendar for the day and time.

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 differences 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, Reese Center (Building 8) 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 Director of Health and Wellness. 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 Director of Health and Wellness at 806-716-2362 or email cgilster@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 get tested 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.

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 2425.001 Fall 2021

Week	Monday		Wednesday	
	Readings	Topics	Readings	Topics
1	08/30	Course Introduction; Math Skills Assessment	09/01 **Chapter 1**	Newton's First Law; Vectors VP Lab – VPython Introduction
2	09/06	Labor Day – No Class	09/08	Position; Velocity; Position Update Equation; Momentum VP Lab – While Loops
3	09/13 **Chapter 2**	Momentum Principle: Iterative and Analytical Prediction of Motion when Net Force is Constant Lab – Uniformly Accelerated Cart on a Track	09/15	Momentum Principle: Iterative Prediction of Motion when Net Force is Varying VP Lab – Projectile Motion
4	09/20 **Chapter 3**	Fundamental Interactions; Reciprocity; Predicting Motion of Gravitationally Interacting Objects VP Lab – Satellite Orbital Motion	09/22	Electric Force; Conservation of Momentum; Simple Collisions **Test 1 – Chapters 1 and 2**
5	09/27 **Chapter 4**	Atomic Model of Contact Interactions: Tension Forces, Normal Forces, Frictional Forces Lab – Measuring Spring Stiffness	09/29	Speed of Sound in a Solid; Simple Harmonic Oscillator; Contact Forces in Fluids VP Lab – Space Voyage from Earth to Moon
6	10/04 **Chapter 5**	Static Equilibrium; Dynamics of Interacting Objects Lab – Mass/Spring Oscillator	10/06	Applying the Momentum Principle to Curving Motion VP Lab – Mass/Spring Oscillator
7	10/11 **Chapter 6**	The Energy Principle applied to a Single Particle Lab – Work and Kinetic Energy	10/13	The Energy Principle applied to Multiparticle Systems; Potential Energy; Energy Graphs **Test 2 – Chapters 3, 4, and 5**
8	10/18	Mass of Multiparticle Systems; Binding Energy; Selecting Initial and Final States VP Lab – Energy Graphs in VPython	10/20 **Chapter 7**	Elastic Potential Energy; Potential Energy of Interacting Neutral Atoms Lab – Ball Toss
9	10/25	Internal Energy; Specific Heat; Microscopic Work (Heat Transfer); Energy Accounting Lab – Measuring Specific Heat	10/27	Energy Dissipation; Resonance Lab – Measuring Heat of Fusion
10	11/01 **Chapter 8**	Energy Quantization – Electronic Energy Levels; Emission and Absorption Spectra VP Lab – Projectile Motion with Air Resistance	11/03	Vibrational and Rotational Energy Levels; Nuclear Energy Levels, Hadronic Energy Levels Lab – Hydrogen and Helium Emission Spectra
11	11/08 **Chapter 9**	The Energy Principle Applied to Rotating Rigid Objects Lab – The Great Ramp Race	11/10	The Energy Principle applied to Deformable Objects **Test 3 – Chapters 6, 7, and 8**
12	11/15 **Chapter 10**	Collisions – Applying both Momentum and Energy Principles Together Lab – Jumping Up	11/17 **Chapter 11**	Angular Momentum and Torque VP Lab – Charged Particle Scattering
13	11/22	The Angular Momentum Principle; Conservation of Angular Momentum Lab – Conservation of Angular Momentum	11/24	Thanksgiving – No Class
14	11/29	The Angular Momentum Principle; Cases with Nonzero Net Torque Lab – Torque and Angular Momentum	12/01 **Chapter 12**	The Fundamental Assumption of Statistical Mechanics; Einstein Model of a Solid **Test 4 – Chapters 9, 10, and 11**
15	12/06	Thermal Equilibrium, Entropy, and Temperature VP Lab – Entropy and Temperature Calculations with VPython	12/08	Predicting the Specific Heat of a Solid VP Lab – Specific Heat Calculations with VPython
16	12/13	**Final Exam – 1:00 to 3:00 pm**	12/15	