**South Plains College**
**Common Course Syllabus: PHYS 1410**
**Revised 01/07/2020**

**Department:** Science

**Discipline:** Physics

**Course Number:** PHYS 1410

**Course Title:** Elementary Physics

**Available Formats:** conventional

**Campuses:** Levelland

**Instructor:**
David Hobbs
Office: S117D
Office Hours: MW 9:00 – 10:30 am, TT 8:00 – 9:00 am, F 8:00 – 11:00 am
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**Course Description:** Conceptual level survey of topics in physics intended for liberal arts and other non-science majors.

**Prerequisite:** None

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

**Textbook:** Conceptual Physics, 12th Edition by Paul G. Hewitt (Pearson, 2015).

**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:**
Learning Outcomes - Upon successful completion of this course, students will:
1. Distinguish between displacement, velocity, and acceleration
2. Solve simple problems involving uniform motion, uniformly accelerated motion, or uniform circular motion
3. State Newton's Laws of Motion, explain the meaning of each, and identify applications of each
4. Apply Newton’s laws of motion to relate forces to motion for simple physical cases
5. Define momentum and solve simple problems involving conservation of momentum
6. Identify types of energy in a system and solve simple problems involving conservation of energy

7. Describe the basic structure of an atom in terms of protons, neutrons, and electrons
8. Describe the different phases of matter from an atomic perspective
9. Describe how pressure relates to force and determine the pressure at different depths in a fluid
10. Define density and relate it to the buoyant force, applying Archimedes' Principle to solve problems
11. State the first law of thermodynamics and use it to solve simple problems involving energy transfers into or out of a system and changes in the system's internal energy
12. Discuss various means of heat transfer
13. Make simple calculations involving changes in temperature as well as phase changes when systems at different temperatures interact
14. Describe and calculate basic properties of waves such as frequency, wavelength, and amplitude
15. Discuss wave interference and the conditions for constructive and destructive interference
16. Discuss electric charge and the role it plays in atomic structure.
17. Calculate electrical forces using Coulomb's law.
18. Describe electric field and discuss electrical interactions in terms of electric field.
19. Discuss simple electrical circuits and make calculations using Ohm's law applied to series and parallel circuits.
20. Describe magnetic field and discuss interactions of magnetic fields with moving charges.
21. Relate changing magnetic fields to induced electric fields.
22. Discuss the spectrum of electromagnetic waves from radio waves to x-rays.
23. Discuss diffraction and interference and how they arise based on superposition and Huygens' Principle.
24. Make simple calculations related to the photoelectric effect and the Bohr model of the hydrogen atom
25. State the Pauli Exclusion Principle and specify its implications for atomic structure
26. Describe the basic structure of a nucleus and explain the meaning of different isotopes
27. Recall the three basic types of radioactivity and describe some properties of each
28. Use radioactive half-life in simple calculations
29. Describe the basic principles of radioactive dating

**Student Learning Outcomes Assessment:** Three tests and a final exam will be administered to assess how well students have grasped the fundamental principles studied and their ability to apply those principles.

**Course Evaluation:** Student grades will be based on daily work (homework and lab) average, three tests, and a final exam. Final grades will be assigned based on overall, weighted average using the weighting scheme shown below:

| Weighting Scheme | |
|---|---|
| Task | Weight |
| Daily Work | 20% |
| Tests | 60% |
| Final | 20% |

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 (grades within 0.5 points of the break point) will be decided based on class attendance and 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. A student missing any part of the lecture or lab (including arriving late or leaving early) for a given class session may be considered absent. Students absent five times during the semester will be dropped from the class with an X (if passing at the time of the fifth absence) or F (if failing at the time of the fifth absence). It is the student's responsibility to keep track of how many absences they have. In-class work missed can be made up for the student's first two absences if the student can supply documentation showing the absence is excusable. Make-up work must be completed by the end of the week following the week in which the absence occurred. Any make-up work requiring use of the lab must be done on Friday mornings before 11:30 am.

**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.

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.

**Course Overview**

This course offers a broad survey of the fundamental definitions, laws, and principles of physics. We will be taking a first look at what comprises our universe, from the smallest subatomic particles to the largest galaxies, as well as the interactions that can occur between those things. We want to learn to view the world around us through the eyes of physics, seeing how physics principles literally touch our lives moment by moment.

**Approach**

The course will emphasize construction of physics knowledge using a student-centered active learning environment. Class sessions will require students to be responsive, to think, and to perform hands-on tasks. Key concepts of new material will be discussed in short lectures. Lab time will be interspersed with classroom discussion. If you devote a sufficient amount of time each day to studying physics, you will develop a greater appreciation of the world around you and how it functions, based on a clear understanding of the fundamental physical principles that govern the universe.

**Collaborative Work**
This course encourages collaborative teamwork, a skill that is valued by most employers. As you study together, help your partners to get over confusions, ask each other questions, and critique each other's homework write-ups. Teach each other! You can learn a great deal by teaching. But remember that you are responsible for understanding all details of a problem solution.

**Study requirements**
Studying science can be a time intensive activity. You have probably heard the recommendation to study two hours outside of class for every hour of time in class. In physics, this is a reasonable way to estimate the needed study time. It is important to keep up with the class. New concepts introduced in this course build on earlier ones, so mastering key concepts is critical. If you get behind, seek help right away!

**Homework**
Weekly homework assignments will be due at the beginning of the first class meeting each week.

**Readings**
A key component of the course is the textbook in which you are introduced to key terms and important concepts. Sections in the text will often end with a "Check Point" question. You should attempt to answer these before reading the answers to check your understanding of the material. You will also find frequent QR codes which can be scanned to take you to a screencast or video providing additional explanation or illustration of the ideas. *Please note that class discussion may not cover all of the assigned material; it is essential that you study the textbook carefully.*
Class sessions will be devoted to *discussion* of ideas, clarifying points of confusion, and activities of various kinds that allow you to practice using the concepts you have read about in the text. The text thus provides the *background* for these activities. *Therefore, it is essential to read the appropriate sections in the textbook BEFORE coming to class.* Your time in class will be largely ineffective if you have not studied the appropriate text sections prior to coming to class.

**Getting help**
You should ask lots of questions in class to clear up any initial confusion you might have about a topic. I also encourage you to avail yourself of my help during office hours. You do not have to wait for my official office hours to get help; anytime I am in my office you are always welcome to come get help. I will do what I can to help you complete the course satisfactorily.

**Tests**
Three tests will be given as shown on the course calendar. The tests will consist of 50 multiple choice questions and the score on the test will be 50 + "number of correct answers" (i.e., if you get 35 of the 50 questions correct, your score would be 50 + 35 = 85). There will be no make-up tests – if you miss a test due to an excused absence, your final exam will count twice (once as the final exam and once in place of the missed test). Tests missed due to an unexcused absence will receive a grade of zero and cannot be replaced by the final exam.

**Final exam**
A comprehensive final exam will cover all of the course material. The final exam will be given during the scheduled final exam time as shown in the schedule of classes and on the course calendar. The format and grading of the final exam will be the same as the tests. If you score higher on the final exam than your lowest test grade, your final exam will count twice (once as the final exam and once in place of the lowest test).

# Calendar

Phys 1410.002 Spring 2020

| Week | Tuesday | | Thursday | |
|---|---|---|---|---|
| | Date | Topics | Date | Topics |
| 1 | 01/14 | Course Introduction | 01/16<br>**1.1 – 1.6** | Our Place in the Cosmos |
| 2 | 01/21<br>**2.1 – 2.8** | Aristotle vs. Galileo – Inertia, Equilibrium | 01/23<br>**3.1 – 3.6** | Describing Motion |
| 3 | 01/28<br>**4.1 – 4.6**<br>**5.1 – 5.5** | Relating Force and Motion; Forces are Interactions | 01/30<br>**6.1 – 6.7** | Conservation of Momentum |
| 4 | 02/04<br>**7.1 – 7.8** | Work, Energy and Conservation of Energy | 02/06 | **Test 1 – 2:30 to 3:45 pm**<br>No Lab |
| 5 | 02/11<br>**9.1 – 9.3**<br>**10.1 – 10.7** | Gravity and Orbital Motion | 02/13<br>**11.1 – 11.9** | Atomic Structure of Matter |
| 6 | 02/18<br>**12.1 – 12.2,**<br>**13.1 – 13.5,**<br>**14.1 – 14.4** | Solids, Liquids, and Gases | 02/20<br>**15.1 – 15.5** | Temperature, Heat, and Thermal Energy |
| 7 | 02/25<br>**16.1 – 16.8** | Heat Transfer; Solar Radiation and Climate Change | 02/27<br>**17.1 – 17.6** | Changes of Phase in Matter |
| 8 | 03/03<br>**18.1 – 18.8** | Thermodynamics, Heat Engines | 03/05 | **Test 2 – 2:30 to 3:45 pm**<br>No Lab |
| 9 | 03/10<br>**Appendix E** | Exponential Growth and Resource Usage | 03/12<br>**19.1 – 19.5** | Vibrations and Waves |
| 10 | 03/17 | Spring Break – No Class | 03/19 | Spring Break – No Class |
| 11 | 03/24<br>**22.1 – 22.9** | Charge, Electric Forces, Electric Field, Electric Potential | 03/26<br>**23.1 – 23.9** | Electric Current; Simple Electric Circuits |
| 12 | 03/31<br>**24.1 – 24.9,**<br>**25.1 – 3, 25.8** | Magnetic Fields, Electromagnetic Induction | 04/02<br>**26.1 – 26.3**<br>**29.1 – 29.3** | Properties of Waves, Electromagnetic Waves, Diffraction and Interference |
| 13 | 04/07<br>**30.1 – 30.9** | Light Emission and Absorption; Spectroscopy | 04/09 | **Test 3 – 2:30 to 3:45 pm**<br>No Lab |
| 14 | 04/14<br>**31.1 – 31.8** | Basics of Quantum Physics | 04/16<br>**32.1 – 32.7** | Atomic Physics |
| 15 | 04/21<br>**33.1 – 33.8** | Nuclear Physics and Radioactivity | 04/23<br>**34.1 – 34.7** | Nuclear Fission and Fusion |
| 16 | 04/28<br>**35.1 – 35.9** | Special Theory of Relativity | 04/30<br>**36.1 – 36.7** | General Theory of Relativity |
| 17 | 05/05 | **Final Exam – 1:00 to 3:00 pm** | 05/07 | |