

South Plains College
Common Course Syllabus: PHYS 2426
Revised 01/06/2021

Department: Science

Discipline: Physics

Course Number: PHYS 2426

Course Title: Principles of Physics II

Available Formats: conventional

Campuses: Levelland

Instructor:

David Hobbs

Office: S118

Office Hours: MW 1:00 – 2:00 pm, TT 2:00 – 3:30 pm, F 8:00 – 11:00 am

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Course Description: Principles of physics for science, computer science, and engineering majors, using calculus, involving the principles of electricity and magnetism, including circuits, electromagnetism, waves, sound, light, and optics. Laboratory experiments supporting theoretical principles of electricity and magnetism, including circuits, electromagnetism, waves, sound, light, and optics; experimental design, data collection and analysis, and preparation of laboratory reports.

Prerequisite: PHYS 2425 Principles of Physics I and MATH 2414 Calculus II

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 <http://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. Articulate the fundamental concepts of electricity and electromagnetism, including electrostatic potential energy, electrostatic potential, potential difference, magnetic field, induction, and Maxwell's Laws.
2. State the general nature of electrical forces and electrical charges, and their relationship to electrical current.
3. Solve problems involving the inter-relationship of electrical charges, electrical forces, and electrical fields.
4. Apply Kirchoff's Laws to analysis of circuits with potential sources, capacitance, and resistance, including parallel and series capacitance and resistance.
5. Calculate the force on a charged particle between the plates of a parallel-plate capacitor.
6. Apply Ohm's law to the solution of problems.
7. Describe the effects of static charge on nearby materials in terms of Coulomb's Law.
8. Use Faraday's and Lenz's laws to find the electromotive forces.
9. Describe the components of a wave and relate those components to mechanical vibrations, sound, and decibel level.
10. Articulate the principles of reflection, refraction, diffraction, interference and superposition of waves.
11. Solve real-world problems involving optics, lenses, and mirrors.

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 electricity and magnetism.
3. Relate physical observations and measurements involving electricity and magnetism 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 electricity and magnetism.
6. Identify appropriate sources of information for conducting laboratory experiments involving electricity and magnetism.

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 (reading, homework, and lab assignments), six 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%

$$\text{Overall Average} = 0.10 \cdot D + 0.60 \cdot T + 0.30 \cdot F$$

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.

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.

Tests: Six 90-minute tests will be given during the semester as shown on the course calendar. Students are required to take all six tests; however, the lowest two test scores will be dropped. There will be no make-up tests given, so a test missed due to an excused absence will be one of the two 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.

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. However, your health and the health of your classmates is of highest priority. If you have any of the following symptoms: fever, cough, runny nose or nasal congestion with repeated sneezing, chills, muscle or body aches, fatigue, headache, shortness of breath or difficulty breathing, new loss of taste or smell, sore throat, diarrhea, nausea or vomiting please stay home and participate in class remotely. Missed work can be made up or in some cases excused entirely.

Face Covering Policy: It is the policy of South Plains College for the Spring 2021 semester that as a condition of on-campus enrollment, all students are required to engage in safe behaviors to avoid the spread of COVID-19 in the SPC community. Such behaviors specifically include the requirement that all students properly wear CDC-compliant face coverings while in SPC buildings including in classrooms, labs, hallways, and restrooms. Failure to comply with this policy may result in dismissal from the current class session. If the student refuses to leave the classroom or lab after being dismissed, the student may be referred to the Dean of Students on the Levelland campus or the Dean/Director of external centers for Student Code of Conduct Violation. Students who believe they have been exposed or may be COVID-19 positive, must contact Health Services, DeEtte Edens, BSN, RN at (806) 716-2376 or dedens@southplainscollege.edu.

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](mailto: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.

Calendar

Phys 2426.001

Spring 2021

Week	Monday		Wednesday	
	Readings	Topics	Readings	Topics
1	01/18	Martin Luther King Day – No Class	01/20	Course Introduction
2	01/25 13.1 – 13.5	Electric Charge; Electric Force; Electric Field of a Point Charge; Superposition Lab – Glowscript/VPython Review/Intro	01/27 13.6 – 13.9	Electric Field of a Dipole; Retardation Lab – VPEM01: Electric Field of a Point Charge
3	02/01 14.1 – 14.4	Charged Particles in Matter; Conservation of Charge; Polarization Lab – VPEM02: Electric Field of a Dipole	02/03 14.5 – 14.8	Polarization of Conductors; Properties of Metals in Equilibrium; Charging and Discharging; Feedback Test 1
4	02/08 15.1 – 15.2	Calculating Electric Field of a Distributed Charge: Uniformly Charged Thin Rod Lab – VPEM03: Motion in a Dipole Field	02/10 15.3 – 15.4	Calculating Electric Field of a Distributed Charge: Uniformly Charged Ring, Uniformly Charged Disk Lab – Electroscope and Charging by Induction
5	02/15 15.5 – 15.9	Calculating Electric Field of a Distributed Charge: Capacitor, Spherical Shell, Solid Sphere Lab – VPEM04: E-Field of a Charged Rod	02/17 16.1 – 16.4	Electric Potential Energy; Electric Potential; Relating Potential and Field Test 2
6	02/22 16.5 – 16.8	Potential Difference in a Nonuniform Field; Path Independence of Potential Difference; Potential at a Single Location Lab – VPEM05: E-Field of a Charged Ring	02/24 16.9 – 16.11	Electric Field and Potential in Insulators; Electric Field Energy Density; Finding the Potential of a Distributed Charge Lab – Experiment: Measuring Potential Differences
7	03/01 17.1 – 17.6	Magnetic Field; Biot-Savart Law; Electron Current and Conventional Current; Biot-Savart Law for Currents Lab – VPEM06: B-Field of a Moving Charge	03/03 17.7 – 17.10	Magnetic Field of Current Distributions: Long Straight Wire, Loop; Magnetic Dipole Moment Test 3
8	03/08 17.11 – 17.14	Bar Magnets; Atomic Structure of Magnets; Solenoid Lab – Experiment: Measuring B-Field of a Wire	03/10 18.1 – 18.3	Current in Electric Circuits – Steady State Lab – Experiment: Magnetic Dipoles
	03/15	Spring Break – No Class	03/17	Spring Break – No Class
9	03/22 18.4 – 18.7	Surface Charge Model of Electric Circuits; Initial Transient; Feedback Lab – Experiment: Measuring Current	03/24 18.8 – 18.11	Surface Charge and Resistors; Energy Conservation in a Circuit Test 4
10	03/29 19.1 – 19.4	Capacitors; Non-Steady State Conditions in a Circuit; Resistors; Power in Circuits Lab – Experiment: Investigating Simple Circuits	03/31 19.5 – 19.8	Batteries; Meters; Quantitative Analysis of RC Circuits Lab – Experiment: Capacitors and RC circuit
11	04/05 20.1 – 20.4	Forces Produced by Magnetic Fields; Hall Effect Lab – Experiment: Real Batteries	04/07 20.5 – 20.7	Motional emf; Magnetic Torque Test 5
12	04/12 20.8 – 20.9	Potential Energy of a Magnetic Dipole; Motors and Generators Lab – Constructing a Simple Motor	04/14 21.1 – 21.4	Patterns of Electric Field – Gauss’s Law Lab – VPEM07: Moving Charge in B-Field
13	04/19 21.5 – 21.7	Gauss’s Law for Magnetism; Patterns of Magnetic Field – Ampere’s Law; Maxwell’s Equations Lab – Problem Solving	04/21 22.1 – 22.4	Changing Magnetic Fields and Curly Electric Fields: Faraday’s Law; Maxwell’s Equations Updated Lab – Experiment: Faraday’s Law
14	04/26 22.5 – 22.7	Superconductors; Inductance; Magnetic Field Energy Density; RL and LC circuits Lab – RLC circuits	04/28 23.1 – 23.4	Maxwell’s Equations in Final Form; Electromagnetic Waves; Accelerated Charges Produce Radiation Test 6
15	05/03 23.5 – 23.8	Energy and Momentum in Radiation; Effects of Radiation on Matter; Refraction Lab – Problem Solving	05/05 23.9 – 23.10	Thin Lenses Optics Lab – Optics
16	05/10	Final Exam – 1:00 to 3:00 pm	05/12	