

South Plains College
Common Course Syllabus: PHYS 2426
Revised 07/30/2020

Department: Science

Discipline: Physics

Course Number: PHYS 2426

Course Title: Principles of Physics II

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: 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, a **purple or green pen** for homework corrections (get several!), a good scanner app for your smartphone that scans to PDF files

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: Five exams will be administered to assess how well students have grasped the fundamental principles studied and their ability to apply those principles in new contexts.

Course Evaluation: Student grades will be based on reading assignments, homework assignments, lab work, and five exams. Final grades will be assigned based on overall, weighted average using the weighting scheme shown below:

Weighting Scheme		
Task	Code	Weight
Reading	R	10%
Homework	H	15%
Lab	L	15%
Exams	E	60%

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. 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 Fall 2020 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.

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

Fall 2020

Week	Tuesday		Thursday	
	Readings	Topics	Readings	Topics
1	08/25 13.1 – 13.5	Course Overview; Electric Charge; Electric Force; Electric Field of a Point Charge; Superposition Lab – Glowscript/VPython Review/Intro	08/27 13.6 – 13.9	Electric Field of a Dipole; Retardation Lab – Glowscript/VPython Review/Intro
2	09/01 14.1 – 14.4	Charged Particles in Matter; Conservation of Charge; Polarization Lab – VPEM01: Electric Field of a Point Charge	09/03 14.5 – 14.8	Polarization of Conductors; Properties of Metals in Equilibrium; Charging and Discharging; Feedback Lab – Basic Electrostatic Observations with Tape
3	09/08 15.1 – 15.2	Calculating Electric Field of a Distributed Charge: Uniformly Charged Thin Rod Lab – VPEM02: Electric Field of a Dipole	09/10 15.3 – 15.4	Calculating Electric Field of a Distributed Charge: Uniformly Charged Ring, Uniformly Charged Disk Lab – VPEM03: Motion in a Dipole Field
4	09/15	Exam 1 – Chapters 13 and 14	09/17 15.5 – 15.9	Calculating Electric Field of a Distributed Charge: Capacitor, Spherical Shell, Solid Sphere Lab – Electroscope and Charging by Induction
5	09/22 16.1 – 16.5	Electric Potential Energy; Electric Potential; Relating Potential and Field Lab – VPEM04: E-Field of a Charged Rod	09/24 16.6 – 16.11	Calculating Potential using Superposition; Field and Potential in Insulators; Electric Field Energy Density Lab – VPEM05: E-Field of a Charged Ring
6	09/29 17.1 – 17.6	Magnetic Field; Biot-Savart Law; Electron Current and Conventional Current; Biot-Savart Law for Currents Lab – Experiment: Measuring Potential Differences	10/01 17.7 – 17.10	Magnetic Field of Current Distributions: Long Straight Wire, Loop; Magnetic Dipole Moment Lab – VPEM06: B-Field of a Moving Charge
7	10/06 17.11 – 17.14	Bar Magnets; Atomic Structure of Magnets; Solenoid Lab – Experiment: Measuring B-Field of a Wire	10/08	Exam 2 – Chapters 15 and 16
8	10/13 18.1 – 18.5	Surface Charge Model of Electric Circuits – Steady State Lab – Experiment: Magnetic Dipoles	10/15 18.6 – 18.11	Surface Charge Model of Electric Circuits – Initial Transient and Feedback; Energy in Circuits Lab – Experiment: Measuring Current
9	10/20 19.1 – 19.4	Capacitors; Non-Steady State Conditions in a Circuit; Resistors; Power in Circuits Lab – Experiment: Investigating Simple Circuits	10/22 19.5 – 19.8	Batteries; Meters; Quantitative Analysis of RC Circuits Lab – Experiment: Capacitors and RC circuit
10	10/27 20.1 – 20.4	Forces Produced by Magnetic Fields; Hall Effect Lab – Experiment: Real Batteries	10/29	Exam 3 – Chapters 17 and 18
11	11/03 20.5 – 20.7	Motional emf; Magnetic Torque Lab – Oscillation of a Magnetic Dipole in a Magnetic Field	11/05 20.8 – 20.9	Potential Energy of a Magnetic Dipole; Motors and Generators Lab – Constructing a Simple Motor
12	11/10 21.1 – 21.4	Patterns of Electric Field – Gauss’s Law Lab – VPEM07: Moving Charge in B-Field	11/12 21.5 – 21.7	Gauss’s Law for Magnetism; Patterns of Magnetic Field – Ampere’s Law; Maxwell’s Equations Lab – Problem Solving
13	11/17 22.1 – 22.4	Changing Magnetic Fields and Curly Electric Fields: Faraday’s Law; Maxwell’s Equations Updated Lab – Experiment: Faraday’s Law	11/19 22.5 – 22.7	Superconductors; Inductance; Magnetic Field Energy Density; RL and LC circuits Lab – RLC circuits
14	11/24	Exam 4 – Chapters 19, 20, and 21	11/26	Thanksgiving – No Class
15	12/01 23.1 – 23.4	Maxwell’s Equations in Final Form; Electromagnetic Waves; Accelerated Charges Produce Radiation Lab – Problem Solving	12/03 23.5 – 23.6	Energy and Momentum in Radiation; Effects of Radiation on Matter Lab – Problem Solving
16	12/08		12/10	Exam 5 – 8:00 to 10:00 am, Chapters 22 and 23