South Plains College
Common Course Syllabus: PHYS 2426
Revised 08/19/2024

Department: Science

Discipline: Physics

Course Number: PHYS 2426

Course Title: Principles of Physics II

Available Formats: conventional

Campuses: Levelland

Instructor:
David Hobbs
Office: S67
Office Hours: MW 1:00 – 2:00 pm, TT 1:30 – 3:30 pm, F 1:00 – 3:00 pm
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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: *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. 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 Kirchhoff'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 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 the percentages shown below:

Task	Weight
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.

Late Work: Late work will not be accepted.

Extra Credit: This course will not include any extra credit opportunities.

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 with excessive absences (more than 5) will be administratively dropped from the class. It is the student's responsibility to know how many absences they have accumulated.

Daily Work: Daily work consists of reading quizzes, in-class practice (problem solving sessions with feedback), 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.

Daily Work Grade Determination: 15% of your daily work grade will come from the reading quizzes, 50% from problem solving sessions, and 35% from lab.

Homework: Do your homework! There is no substitute. Students who don't put in a good effort often struggle in the course. Homework will be assigned and graded online with some detailed solutions written and handed in for review. A better semester average 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% of the course grade. 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 semester average 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.

For information regarding official South Plains College statements about intellectual exchange, disabilities, non-discrimination, Title IX Pregnancy Accommodations, CARE Team, and Campus Concealed Carry, please visit
https://www.southplainscollege.edu/syllabusstatements/.

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 Fall 2024

Week	Tuesday		Thursday	
	Readings	Topics	Readings	Topics
1	08/27 **Ch22**	Electric Charge, Coulomb's Law	08/29 **Ch22**	Electric Field Lab 1 – Basic Observations in Electrostatics
2	09/03 **Ch23**	Superposition of Electric Fields PS1 – Using Superposition to Find $\vec{E}$	09/05 **Ch23**	Electric Field of Continuous Charge Distributions PS2 – Using Integration to Find $\vec{E}$
3	09/10 **Ch24**	Symmetry, Electric Flux, Gauss's Law PS3 – Electric Flux and Enclosed Charge	09/12 **Ch24**	Applying Gauss's Law PS4 – Finding $\vec{E}$ using Gauss's Law
4	09/17 **Ch25**	Electric Potential Energy, Electric Potential PS5 – Energy Conservation with V	09/19 **Ch25**	Superposition of Electric Potential PS6 – Using Integration to Find V
5	09/24 **Ch26**	Connecting Electric Field and Electric Potential PS7 – Finding ΔV from $\vec{E}$	09/26 **Ch26**	Capacitance, Energy Stored in an Electric Field PS8 – Finding $\vec{E}$ from V
6	10/01	Review of Chapters 22 through 26	10/03	**Test 1 Chapters 22 – 26**
7	10/08 **Ch27**	Electric Current, Establishing and Maintaining a Current PS9 – Surface Charge on Current-Carrying Wires	10/10 **Ch27**	Conductivity, Resistivity, Ohm's Law Lab 2 – Ohmic versus Non-Ohmic Devices
8	10/15 **Ch28**	Kirchhoff's Laws, Analysis of Simple Circuits Lab 3 – Simple DC Circuits	10/17 **Ch28**	Multi-loop Circuits, RC Circuit PS10 – Applying Kirchhoff's Laws
9	10/22 **Ch29**	Magnetic Field, Sources of Magnetic Field, Ampere's Law Lab 4 – RC Circuit	10/24 **Ch29**	Forces and Torques Exerted by Magnetic Field, Magnetic Properties of Matter PS11 – Magnetic Field Calculations
10	10/29 **Ch30**	Induced Currents, Lenz's Law, Faraday's Law PS12 – Applying Faraday's Law	10/31 **Ch30**	Induced Fields, Inductors, LC and LR Circuits PS13 – LC and LR Circuits
11	11/05	Review of Chapters 27 through 30	11/07	**Test 2 Chapters 27 – 30**
12	11/12 **Ch31**	Electromagnetic Field, Maxwell's Equations PS14 – Applying Maxwell's Equations	11/14 **Ch31**	Electromagnetic Waves PS15 – Wave Properties
13	11/19 **Ch32**	AC Circuits – Phasors, RC Filter Circuits PS16 – Parallel RC Circuit	11/21 **Ch32**	Series RLC Circuit, Power in AC Circuits Lab 5 – Series RLC Circuit
14	11/26 **Ch33**	Interference of Light, Young's Double Slit, Diffraction Grating Lab 6 – Interference and Diffraction	11/28	Thanksgiving – No Class
15	12/03 **Ch34**	Ray Optics -Reflection, Refraction, Thin Lenses, Lens Maker's Equation Lab 7 – Thin Lenses	12/05	Review of Chapters 31 through 34
16	12/10		12/12	**Test 3 Chapters 31 – 34** **8:00 – 10:00 am**

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