Principles of Physics II

Common Syllabus

**Department**: Science

**Discipline**: Physics

**Course Number**: Physics 2426

**Course Title**: Principles of Physics II

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

Instructor: Dr. Gerald Bottrell

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Conference: M – Th 10:16 – 11:09

F(A) 10:40 – 11:45

F(B) 9:30 – 10:35

General Policies:

* Homework assigned alternate days, but not collected
* Quiz over selected homework problems
* Late work: 1 class day late – subtract 20 points

2 class days late – subtract 40 points

> 2 class days late – score of 0

* No extra credit

**This course satisfies a core curriculum requirement**: Yes – Life and Physical Science

**Prerequisites**: Phys 2425

**Available Formats**: conventional

**Campuses**: Levelland Campus, Reese Campus

**Textbook**: **Matter & Interactions**, 3rd Edition, Chabay and Sherwood, Wiley, 2011

**Supplies**: Scientific Calculator

**Course Specific Instructions**: None

**Course Description**: Topics covered include electric and magnetic fields, dielectrics, magnetic properties of materials, electromagnetism, geometrical and physical optics.

**Course Purpose/Rationale/Goal** – This course serves to provide the student with the physics background necessary for continued study in engineering and the physical sciences. Emphasis will be on the concepts of electric and magnetic fields and an introduction to field theory, in terms of the classical theory of electricity and magnetism.

**Course Requirements**: The course will emphasize rigorous problem-solving in physics 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 be in a position to attack physics problems efficiently, based on a clear understanding of the fundamental physical principles that underlie all successful analyses. 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. You must turn in your own clearly organized solution. In addition to your time in class each week, you are expected to spend about 10 hours studying outside of class. 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!

**Course Evaluation:** Please see the instructor’s course information sheet for specific items used in evaluating student performance.

**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. In-class work missed because of an absence due to illness or a college-sponsored activity will be excused provided you contact the instructor within 24 hours of the absence and furnish appropriate documentation (A note from the school nurse or a doctor, official college documentation for college-sponsored activities). If you accumulate a total of four absences (either unexcused or excused), you will be dropped from the class. If you stop attending class and wish to avoid an “F” you must obtain an official drop form, have it signed, and take the completed form to the registrar’s office before your fourth absence. See the current class schedule for the last day you can drop a class.

**Student Learning Outcomes/Competencies:**

1. Students should develop a good functional understanding of physics. They should be able to:
   1. describe and explain physics concepts including knowing where and when they apply.
   2. apply physics concepts when solving problems and examining physical phenomena.
   3. apply concepts in new contexts (transfer).
   4. translate between multiple-representations of the same concept (for example: between words, equations, graphs, and diagrams).
   5. combine concepts when analyzing a situation.
   6. evaluate explanations of physical phenomena.
2. Students should begin developing expert-like problem solving skills. They should be able to:
   1. apply a small set of fundamental physical principles to a wide variety of physical situations.
   2. use these principles to satisfactorily solve standard textbook problems.
   3. model complicated physical systems by making approximations and idealizations in order to be able to apply fundamental principles.
   4. solve more challenging problems, including: context-rich ("Real World") problems, estimation problems, multi-step problems, multi-concept problems, problems requiring qualitative reasoning.
   5. evaluate other people’s written solutions and solution plans.
3. Students should develop laboratory skills. They should be able to:
   1. interact (set up, calibrate, set zero, determine uncertainty, etc.) with an apparatus and make measurements.
   2. explain the physical principles underlying the operation of the apparatus, measurements, physical situation being studied and analysis of data.
   3. design, execute, analyze, and explain a scientific experiment to test a hypothesis.
   4. evaluate someone else’s experimental design.
4. Students should develop technology skills. They should be able to:
   1. create simple computer models of physical situations.
   2. utilize a spreadsheet to graph and do curve fitting.
   3. find information on the web.
   4. use microcomputer, video, and web-based software and hardware for data collection and analysis.
5. Students should improve their communication, interpersonal, and questioning skills. They should be able to:
   1. express understanding in written and oral forms by explaining their reasoning to peers.
   2. demonstrate their knowledge and understanding of physics in written assignments.
   3. discuss experimental observations and findings.
   4. present a well-reasoned argument supported by observations and physical evidence.
   5. evaluate oral arguments, both their own and those espoused by others.
   6. function well in a group.
   7. evaluate the functioning of their group.
6. Students should retain and/or develop student cognitive attitudes and beliefs (expectations) that are favorable for learning physics with deep understanding. They should:
   1. believe that understanding physics means understanding the underlying concepts and principles instead of focusing on knowing and using equations.
   2. see physics as a coherent framework of ideas that can be used to understand many different physical situations.
   3. see what they are learning in the classroom as useful and strongly connected to the real world.
   4. be cognizant of the scientific process/approach and how to apply it.
   5. indicate a willingness to continue learning about physics and its applications.
   6. see themselves as part of a classroom community of learners.