PHYS 2426: UNIVERSITY PHYSICS II
COURSE SYLLABUS: SPRING 2014

Instructor: Dr. Matt A. Wood
Office Location: Science 106A
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Course Location and Time

Lectures: MWF 11:00 a.m. – 11:50 a.m., BA 244
Note: Class will start promptly at the top of the hour, and end at scheduled time. Please don't be late
Labs: Monday 3:00 p.m. – 4:50 p.m., Science 146; Thursday 2:00 p.m. – 3:50 p.m., Science 146 (Note: Labs begin week 2)

Suggested Companion Course

PHYS 202: Problem Solving in Electricity & Magnetism, Call #21023, Wednesday 2:00-2:50, Science 123 (1 sch)

Materials – Textbooks, Readings, Supplementary Readings

Textbooks Required:

- Fundamentals of Physics Extended, 9th edition, Halliday, Resnick, and Walker

A lab manual will be required.

Prerequisites: PHYS 2425, MATH 2413 (Calculus I), and you should have taken (or be enrolled in) Calculus II (MATH 192).

Course Description

Physics 2426 is the second semester of a calculus-based physics sequence. University Physics II introduces electrical and magnetic phenomena in nature, including the concepts of electrical charges, electric and magnetic fields, the application of Gauss' Law, electric potential, conductors and insulators, currents, basic circuits, Maxwell's E&M Equations, and electromagnetic oscillations and waves. Yes, it's quite a bit, and there's a bit more I didn't list, as well.

Physics is how the world works. Things move and their motion is changed by forces on them. Whether it's the space shuttle burning reverse thrusters to change to an orbit that will intersect the atmosphere as part of a re-entry maneuver, or the flow of blood through arteries and capilaries pumped by a beating heart, or the flow of electrons through a computer chip. The concepts and way of critically thinking about the world that you will learn and hone in this class will change the way you think about the world. The most useful skill you may refine in this course is the ability to qualtitatively understand a process or system as a first step

towards quantitative problem solving. We all have a 'model' of the world and how it works in our heads. We also all have different ways of learning that may differ from our friends, and I'll try to accomodate that variety of learning styles. I strongly encourage you to spend a few minutes examining your own personal learning style using the online Index of Learning Styles survey.

Critical Thinking

Most students who take this course will not pursue advanced physics degrees (although some will) and many of you will not often directly use most of the physics concepts taught in the course in your careers. But what you *will* use is your ability to think about a problem, to simplify it to the fundamental essence and solve for that situation, then adding in more complexities until you've solved your original problem. And when I say "think about a problem" what I'm saying is to be able to visualize it in your head from different sides and from different scales. What happens at the moment of impact when a baseball or softball player bats a ball for a deep line drive over the fence? First you picture it as you've seen in either live or on TV: the ball is pitched, the batter decides it's in the strike zone and that they need to swing; the swinging bat hits the ball, the ball changes direction by roughly 180 degrees and moves faster after the hit than before - homerun! Now think about what happens during the impact itself. It isn't a "moment" of impact, but is spread out over some short time interval, and in that time intervall both the ball and the wall of the bat compress slightly, providing the *impulse* that reverses the direction of the ball's flight and changes the speed with respect to the dejected pitcher watching his or her ERA notch up as the ball flies out of the park. While a simple example, this captures the essence of what I mean by visualizing the problem you're thinking about before starting to work on a quantitative (equations and numbers) solution.The reason that many students find physics difficult is that it goes beyond memorization by requiring higher level thinking skills (levels 4 through 6 below). Learning physics is also like learning a foreign language since new words and symbols must be understood and applied correctly within the context of various physical situations.

Bloom's Taxonomy of the Cognitive Domain:

1. **Knowledge** - memorization of facts, words, and symbols
2. **Comprehension** - understanding the meaning of knowledge
3. **Application** - applying concepts to various situations
4. **Analysis** - breaking apart complex ideas
5. **Synthesis** - putting individual ideas together to form a complete explanation
6. **Evaluation** - judging the merits of individual ideas and making decisions

Not only are these skills needed for physics, but employers consistently rank critical thinking and problem-solving ability near the top of their list of desired traits in valued employees.

Topics Covered:

- Electric Charge & Electric Field
- Gauss' Law
- Electric Potential
- Capacitance & Dielectrics
- Current, Resistance, and Electromotive Force (EMF)
- Direct-Current Circuits
- Magnetic Field and Magnetic Forces
- Sources of Magnetic Field
- Electromagnetic Induction
- Inductance
- Alternating Current (if time permits)

Student Learning Outcomes:

Students completing this course will demonstrate mastery of:

- Use of basic units, vectors, and their components
- Analysis of physical Situations involving electrostatic fields
- Basic concepts of current, voltage, resistance, power, and capacitance
- Analysis of basic electrical circuits (DC and AC)
- Analysis of physical situations involving simple magnetic fields

Collaborative Group Work

I encourage collaborative teamwork, which has multiple benefits for you both as a student and in your career. Most jobs require at least some interaction with other people, and consequently, most employers place a high value on their employees' ability to work well with other people. Also, many good ideas and solutions to problems grow out of discussions with colleagues. As many teachers will attest, you will find that the concepts covered in this course will become clearer to you as you discuss and explain problem solutions to your peers. As you work together, you should help your peers to understand confusing points, ask each other questions, and carefully critique any group assignments. You can learn a great deal by teaching each other! However, you must also realize that **YOU must know how to solve the physics problems come exam time**, so I very strongly recommend that you work on **ALL** problems yourself before you meet with your peers to work on the problems as a group. And if you get stuck on a problem or three, and you find the solution working with a group, go back and work the problem from scratch on your own, and then find another problem that's similar but that has an answer in the back of the book, and work that one.

Attendance

Studies show attendance at lectures is an important component to mastering the course material and hence earning a good grade. There will also be homework assignments that must be turned in regularly and if they are not turned in during class you will receive a zero for that assignment. The most important thing you can do in this class is to never miss a class and pay close attention during class.

Readings

You are responsible for reading the textbook and working suggested problems on your own. You should be reading ahead in the textbook before coming to class. Time spent in class is intended to be a review and elaboration on the information you should have already gathered from the textbook.

Class Participation

Class participation is an important part of this course. There are many opportunities for active student participation, both in and out of the classroom, including: responses to in-class questions, surveys that are submitted in-class or on-line, predictions for classroom demonstrations. Responses to in-class questions are scored primarily on effort, with only minor emphasis on getting the "right" answers. Note that you are expected to attend all lectures, and to be on-time. Studies show that students who miss class for minor reasons (e.g., "a minor cough"), particularly in the first 4 weeks, tend to have the lowest grades in the class, and are mostly likely to fail.

Exams

We will have two (2) midterm exams during the semester. Each will be announced at least 1 week in advance. Each midterm will focus on material covered since the previous exam. However, note that concepts and techniques build on each other, and concepts/techniques from exam 1 may be required to solve problems on subsequent exams. There will also be a cumulative final exam.

For midterms and the non-lab final, you may use a calculator (no cell phone calculators are allowed). No other books, notes, backpacks, computers, iPods, headsets, cell phones, PDAs, etc. will be permitted. Using any aids other than your calculator will result in you being removed from the exam and a grade of a zero. Hats with brims must be removed during exams.

Homework

In order to really learn the material, you need hours and hours of practice. There is no shortcut to rewiring your brain! The homework assignments will have different types of problems, including questions that test your understanding of concepts, exercises that help you learn to use these concepts in straightforward settings, and more complex problems that combine concepts under a “real-world” setting. Think of these as “sample exam questions” … because they are.

Your textbook has the answers to most odd-numbered exercises. However, homework grades will depend completely on how you arrive at the answer. If you do not explain what you are doing when solving homework problems, you will lose points.

The following are considered cheating and will not be tolerated (see section on "Academic Integrity" below): Searching for answers on the internet, obtaining copies of solutions (whether from past students or other sources), directly copying another student's answer, etc. As noted above, you *may* work with other students to complete assignments, but identical papers are considered copying.

Assignments will be announced in class and due dates will be clearly specified. Your lowest homework score for the semester will be dropped.

Labs

Labs are mandatory and are part of your grade. ***According to University policy, if you fail the lab section of the class, you will also automatically fail the course.*** Labs will be held in Science 146. Be sure to have a pencil, a calculator, and your lab manual with you. Labs are usually led by a graduate student assistant. If you have questions about lab, first ask the lab assistant. If the problem is not resolved to your satisfaction, you should then talk to me. More details on labs will be discussed on your first lab date.

Web Project.

To help make connections between physics and the "real world" and gain experience with webpage development, students are encouraged to publish an on-line group report that explains the physics of some form of technology of interest to their group. This *optional* project is due near the end of the course (Wednesday, May 1, 2013) and may be posted on the Web. Up to 3 percentage points (1/3 of a letter grade) of extra credit will be added to each of the authors' final course scores. More details are available following the link.

Grading

The grading breakdown is as follows:

Homework Assignments	15%
Midterms	40% (20% each)
Final	25%
Labs	20%
Class Participation	Up to 5%*

* Class participation can help your final score, but lack of participation will not hurt your score (shucks, you might be shy).
Students who choose to do the optional Web Project may receive *up to* 3 percentage points of extra credit added to their final course score.

Note: If your exam scores show improvement over the course of the semester, an additional improvement factor will be added to your final score, which may result in the next higher letter grade for borderline cases.

The nominal grading scale is:

90% to 100%	A
80% to 89.9%	B
70% to 79.9%	C
60% to 69.9%	D
Below 60%	F

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures:

Classroom behavior: I require you to follow some simple good manners that will make class time much more productive for you and your fellow students.

During lecture and labs,

- Do not be disruptive or disrespectful.
- Turn off your cell phone ringer.
- Do not answer your phone in the classroom.
- Do not send or view texts, tweets, emails, photos, or any other communication.
- Do not use computers during lecture for any purpose (laptops are lousy for taking notes in physics).
- Do not use iPods, MP3 players, Pandora, or any other type of noise-making device.

Academic integrity: A major goal of this and most every university course is for you to learn and appreciate subject material. Academic dishonesty ("cheating") actively prevents you from achieving this goal. Academic dishonesty is taken seriously by the University and by me, and will not be tolerated. (See the TAMU-C Code of Student Conduct and the TAMU-C Procedures A 13.04, 13.12, 13.31, and 13.32.)

This conduct is not only considered wrong in this course and at this University, but also in the real world. Engaging in these activities will get you fired from a job and prevent you from getting another job.

Unethical student conduct includes:

- **Plagiarism**, or copying the words of others with the intent of making it look like your own. Whether you use someone else's phrase word for word, or whether you try and change a few words, or even if you just borrow someone else's original idea and don't give them credit, that's unethical. Use your own words whenever possible, give credit to wherever you got an idea, and put direct quotes inside quotation marks.
- **Cheating** involves trying to trick me or others into thinking you did work that you really didn't do, or into thinking you know what you really don't know. This can include stealing exams, changing your answers on a graded exam or assignment and claiming it was graded wrongly, putting your name on someone else's homework, and so on. Searching the Internet for homework or exam solutions is considered cheating. Borrowing a previous student's homework, exams, or solution sets is considered cheating.
- **Collusion** is working with another person to cheat. This can include copying someone else's answers to an exam or assignment, doing work for another student, buying or otherwise obtaining homework/exam solutions from any source online or off-line, or any other instance of multiple people engaging in some form of cheating or dishonesty. Working with other students on an assignment is fine and encouraged as long as everyone contributes and each student does their own work.
- **Any other activity that, to a reasonable person, looks wrong.** If you have any doubt whatsoever whether a certain action is considered dishonest, please ask me *before* engaging in the activity. There is no need to be embarrassed about asking, and I won't penalize you for asking! In this class, if you follow the maxim "it's easier to beg forgiveness than to ask permission", don't expect forgiveness to be forthcoming.

If you engage in academic dishonesty during any graded activity, you will receive no credit for that activity. More than one instance of dishonesty by a student will result in automatic failure of the course and referral of the student for disciplinary action.

For further information, search the Texas A&M-Commerce website for "academic integrity policy".

University Specific Procedures:

Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library

Room 132
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
StudentDisabilityServices@tamuc.edu

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See *Code of Student Conduct from Student Guide Handbook).*

Course Calendar

- **Labs** begin next week.
- **Phys 202** will start next week.
- **Midterm Exams: TBD**
- **Final Exam: Wed May 7: 10:30-12:30**