College Physics II (Phys 186)
Syllabus

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1 How to Find Me

The best way to reach me is e-mail, *edis@truman.edu*.

My office is MG 3004, and my office hours are: Tuesdays 10:30–11:50 and 13:30-15:20, Wednesdays: 12:30–14:20, and Thursdays 10:30–11:50 and 14:30-15:20. If you want to see me then, come by my office. Then we will use the blackboard immediately outside my office door.

I'm also available most times when I am not actually teaching or have another meeting scheduled: see my calendar (*edis.sites.truman.edu/schedule/*). When I'm not on campus, at strange hours and so forth, there's still Zoom. Emailing me ahead of time is best: we can set up a time that is good for both of us, and I'll put it on my calendar so that others can see that it's not available. In any case, my Zoom meeting ID is `taneredis`.

The College Physics II page (*edis.sites.truman.edu/college-physics-ii/*) is where course-related documents will live. I have no use for Brightspace; I'll keep a gradebook there to satisfy administrative requirements, but it you want up-to-date details about how you're doing, it's best to email me.

2 Course Description

Physics 186 continues the broad survey of physics started in Physics 185. While it does not rely on calculus, it does require a solid understanding of algebra and trigonometry. Both the lectures and the labs will deal with

abstract problem solving. The labs emphasize using mathematics to explain the experiments performed; the lectures acquaint you with basic concepts in waves, electromagnetism, and modern physics.

This course involves a fair amount of individual problem-solving. Physics is notorious in that you might think you grasp the concepts, but often discover otherwise when confronted with a problem you have to solve. *Much of your learning will come about as you solve problems!* You will work (and be graded) both individually and as part of your lab group.

Physics 186 is an Honors Scholars Course, and it fulfills the *STEM Perspective* of the *Dialogues Requirements*.

3 Schedule

Lectures: Tuesday and Thursday from 9:00 to 10:20 in MG 1000.

Lab: Wednesday 8:30–10:20, 10:30–12:20, 14:30–16:20 in MG 1002.

Final Exam: Thursday May 9, all day.

4 Required course materials

We will not use a conventional textbook. The online, free textbook *College Physics*, by Urone, Hinrichs, Dirk, and Sharma will serve if you want a text to help you study and to provide you with problems and exercises to practice. You are not required to use this textbook, but if you don't, you will have to make sure you closely follow my lectures and take good notes.

I will not, in any case, closely follow any textbook. Standard textbooks are designed for large classes with hundreds of students. I will have a chance to interact with each of you in a closer manner, and I can teach in a less mass-produced fashion.

5 Assignments

You learn physics by solving problems. I recommend that you use a selection of problems associated with each chapter in your online textbook to help you study and practice.

I will not, however, formally assign any of these problems to you. Instead, I will assign you a set of questions, answers which will be due about every two weeks. These questions will be drawn from past exams I have given in this course. Just write your answers on loose sheets of paper, staple them, and turn them in during the class meeting on deadline days. Alternatively, you can take pictures of your work and email them to me. The assignment due dates are listed on the Course Calendar.

These past exam questions are much more similar to what you will encounter on my actual exams. Standard textbook problems are designed for large courses, and they tend to tempt students to adopt a find-an-equation-and-plug-in-numbers approach. I'm not interested in that—I design my questions to get students to think about the physics, to work with symbols and graphs rather than numbers, and to elicit the sort of complex reasoning process physics demands. I also want students to communicate with me about the problems they are working on—to walk into my office or send me email, and tell me about your thought process so far.

As an incentive for you to practice, 10% of your final grade will be based on your homework assignments. Note that 10% is not a lot. I don't want you to have to worry about homework being a major influence on your overall grade, but I also want you to take it seriously and not fall behind—you need to consistently practice problem solving.

I don't like to be overly strict with assignment deadlines: homework is supposed to be practice, not a mini-exam. *If you need an extension for any reason, just email me.* I will extend your deadline, no questions asked. On the other hand, you need to do these assignments on time so that you don't fall behind, which is a really bad idea in physics. So please respect the deadlines as best as you can.

6 Exams

You will have three exams. You may consult your notes during exams. You can also look things up online, including the online textbook.

My exams are unusual. On the date of each exam, I will email you the PDFs of the exam around midnight. You will have all the time you need during the next 24 hours to complete the exam. You can either submit a paper copy of the exam, or take pictures of all the pages with your answers and email them back to me. I don't expect you will need more than two or

three hours, but if you do, that's perfectly fine.

Moreover, *I expect you to ask questions during the exam.* On exam days, I will be in the lab, taking questions in person. At other times, I will be in front of my computer, answering questions students send in by email. You may, for example, show me what you have done so far on a question and have me look it over. I will then tell you if you're on the right track, point out any mistakes, and so forth. My exams are not just an occasion to test you. I design them to force you to enter into a conversation with me and learn something in the process. When you first look at a question, you may feel completely lost. That's not a problem: you're then supposed to sit down and type an email to me, asking some questions. **If you do not ask questions during an exam, you're probably doing something wrong!** I'm not bothered by lots of questions. Never get the idea that you have to stop after a while, that it annoys me, or anything like that. As I say, I design my exams to force you ask questions.

Be forewarned: my exams are *difficult.* I want to see if you can think about physics, not just maneuver to solve problems very similar to what you have encountered before. I give plenty of partial credit, but to get it, you will need to write clearly, and make sure you work with symbols as much as possible rather than plugging in numbers from the outset.

Typically, about a half of my students get A's from the course. But my exams are difficult.

For exam dates, see the Course Calendar.

7 Topics

The following chapter numbers refer to the online textbook, though again, the textbook is optional; I will never refer to it in the classroom.

Assignment 1 Spring oscillations, basic waves. Chapter 16.

Assignment 2 Waves, electric fields. Chapters 16, 18, 27.

Assignment 3 Waves, electric fields, voltage. Chapters 16, 18, 19.

Exam 1 Assignments 1–3.

Assignment 4 Circuits with resistors and capacitors. Chapters 20, 21.

Assignment 5 Magnetism, electromagnetic induction. Chapters 22, 23.

Assignment 6 Special relativity. Chapter 28.

Exam 2 Assignments 4–6.

Assignment 7 General relativity, quantum physics. Chapters 29, 31, 34.

Exam 3 Assignments 1–7; mostly 7.

8 Labs

You will have ten labs throughout the course. Check the Course Calendar for a schedule.

Each lab is described in a pre-lab. These are available on the College Physics II web site. You should at least skim the appropriate pre-lab before you show up for a lab. You may also want to print it out. You only have two hours to work in the lab; don't waste time by having to read up on the lab during lab time.

This course is not for physics majors, so the object of the lab is not to introduce you to rigorous lab procedures. I will keep things informal; I will not, for example, require a special lab notebook or demand a set format for lab reports. Typically, you will write down what you are doing in the lab on loose sheets of paper. This will include observations, calculations, and graphs. This is what I will require that you turn in at the end of a lab session: a record of what you did, as you did it. Indeed, your pre-labs will provide a list of what exactly you need to turn in at the end. You do not have to collect your material and organize and prettify it for a formal report. You certainly do not need to write down a description of the experiment, the procedure, and so forth.

You will work in groups of two, or three at most. Groups can change from lab to lab. You will turn in a single report for each lab group.

If you do a competent but unimaginative lab, so that you turn in all the requirements but don't show any evidence of thinking much about what you were doing, your group will receive about a 16 or 17 out of 20 points for that lab: a B. Errors and omissions will reduce that grade. Getting closer to 20 out of 20 requires that you demonstrate to me that you gave some thought to what you were doing, beyond fulfilling requirements set out in

the pre-lab. For example, if you invent some interesting procedure to do a certain measurement, make a relevant observation and speculate on what might have caused it, or show some awareness of the possible sources of error and uncertainty in your measurements, write all these down. These show some thought, and impress me.

I might try to organize lab make-ups for the last week of classes. But lab make-ups are a nuisance, so do not count on this being available. *Please try not to not miss any labs!*

You will also have a lab exam toward the end of the semester. This will be based on activities done during lab, and each of you will work alone. If you make a habit of relying on others in your lab group to handle the equipment and make decisions, then you will not be able to complete the lab exam successfully. Make sure you actively participate in every aspect of every lab.

Check the Course Calendar for when the lab exam is scheduled.

9 Grades

There may be minor changes in how I determine the final letter grades, but if you want to see how you are doing, you should first refer to this table to find out how much each of your tests and assignments are worth:

Online Assignments	10%
Labs	$10 \times 2 = 20\%$
Lab Exam	5%
Class Participation	5%
Exams	$3 \times 20 = 60\%$

The default percentage ranges corresponding to letter grades are:

89.5%–100.0%	A
79.5%–89.4%	B
69.5%–79.4%	C
59.5%–69.4%	D
0.0%–59.4%	F

"Class participation" represents the small amount of flexibility I will have in adjusting your grade depending on my judgment of how you've done in

learning physics. It will naturally be higher the more I get to know your work, and the more you ask questions and participate in the classroom. *I love questions in class,* and if you ask many, you'll be sure to get the full 5%.

I may shift the borderline between certain letter grades by a small amount so that the line lands in the middle of a naturally occurring gap. Thus, it is possible you may get 88% and end up with an "A," but do not count on it.

10 Attendance Policy

You will need to be present in the classroom to do well in this course. But it's *your* responsibility to make sure you do well. I will not spend time keeping track of your attendance, and if you're not there, I will assume you have good reason to be absent. For example, if you are sick, please stay home! You don't need to tell me when you expect not to be present.

I cannot guarantee opportunities to make up labs or exams that you might miss. If you let me know ahead of time, I will try and accommodate you as best as I can, and I will make decisions on appropriate make-ups on a case-by-case basis. But again, I cannot guarantee that we can work something out—your best course of action is not to miss anything.

11 Academic Integrity

I care about maintaining academic integrity, and I will apply all Truman policies concerning academic dishonesty. I expect you to be familiar with the Student Conduct Code.

Do not present something that is not your own work as your own, whether you get it from another student or online. You will have plenty of opportunity and time to consult me about anything you're not sure about, including during exams. I'm much more concerned with you learning how to think about physics than showing an ability to spit out correct answers on demand.

In any case, I do not expect academic dishonesty, nor will I go out of my way to look for it. I run my classes on a kind of honor system: I leave you alone during exams, and while it is fine to consult textbooks or look things up online, I expect you will present me with your own work in the end.

12 Learning Objectives

By the end of the course, students should be able to:

- Understand concepts related to vibrations and waves.
- Grasp the basics of electrical phenomena, including basic circuits.
- Be acquainted with the ideas concerning magnetism.
- Understand how electricity and magnetism are related to each other.
- Connect physical concepts, principles, and laws to solve real-world problems.
- Do collaborative experimental work, which includes skills in grasping the method of the experiment, manipulating apparatus, making quick and accurate observations, deriving conclusions and preparing a concise record, and evaluating the reliability of results.

13 Lawyer Avoidance

Some of the required mindless small print.

Truman policy and federal regulations require that students demonstrate that they are academically engaged in the courses they take. You must meet this requirement within the first calendar week of the semester, beginning at 12:00 am on Monday, August 23 and ending 11:59 pm Saturday August 28. Failure to do so, or to provide an explanation of an extenuating circumstance by that date and time will result in your removal from the course. Under certain circumstances, removal could impact your scholarship eligibility or financial aid. For the purposes of this class, establishing academic engagement requires, at a minimum, showing up at a lecture or lab.

Consistent with guidance for higher education institutions from the Centers for Disease Control and to help us reduce the possible spread of COVID-19, when this class meets, or you attend office hours, you will be required to wear a face covering that completely covers your nose and mouth. You will be expected to keep the covering on at all times while we are meeting. In the event you arrive to class without a face covering, you will be asked leave until you are able to obtain one and return. Thank you for your help in containing this virus and helping to protect your peers.

The minimum investment of time by the average Truman student necessary to achieve the learning goals in this course are not less than one hour (50 minutes) of classroom instruction and a minimum of two hours of out of class student work each week per credit hour awarded or at least the equivalent of three hours (2:50) of laboratory work, internships, practica, and other academic work each week per credit hour awarded. This average time per week for an average student may have weekly variations.

Education records are protected by the Family Education Right to Privacy Act (FERPA). As a result, course grades, assignments, advising records, etc. cannot be released to third parties without your permission. There are, however, several exceptions about which you should be aware. For example, education records can be disclosed to employees or offices at Truman who have an "educational need to know." These employees and offices may include your academic advisor, the Institutional Compliance Officer, the Registrar's Office, or Student Affairs depending on the type of information.

Behavior that persistently or flagrantly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be asked to leave class pending discussion and resolution of the problem and may be reported to the Office of Student Conduct.