

Physics 251

Tentative Syllabus

Lectures T, W, R, F 12:00 to 12:50 PM in Kettler Hall room 132

Text: None required. Suggested text: Knight's Physics for scientists and engineers. You may use whatever text you have. However, you are expected to read along in the text.

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Office Hours: T 2PM-4PM, R 9AM-11AM. While these seem like limited hours, please feel free to stop by and see me at almost any time I am not in class or make an appointment.

Grading:	3 - 50 minute exams	300 points
	1 - 110 minute final	200
	Homework and Participation	scaled to 200
	Lab	scaled to 200
	Extra Credit	?
	Total	900+ points

% Grade	Letter Grade	% Grade	Letter Grade
93-100%	A	73-77%	C
90-93%	A-	70-73%	C-
87-90%	B+	67-70%	D+
83-87%	B	63-67%	D
80-83%	B-	60-63%	D-
77-80%	C+	<60%	F

Exam Schedule: September 24, 2010; October 15, 2010; November 12, 2010; Final - December 14, 2010 1:00PM

About the course: Physics 251 is the second course of a **two** semester sequence of calculus based physics. As such, I have the expectation that you remember and can use basic mechanics (i.e. what is a force, what is acceleration, work and energy, etc.). Even though this is a separate course, you **MUST** be able to work with these physical concepts such as force, acceleration, work and energy. I also expect that you have a basic understanding of math and calculus. I expect that you can perform derivatives and integrals and know what an integral and derivative is. I expect that you can write clearly and concisely in English. I **will not** give full credit for partial sentences.

Class method In class, you **MUST** be an active MEMBER of YOUR class. This means that you must participate. You must THINK! The only things not acceptable in this class are saying “I can’t”, “I won’t”, and being brain dead!

I like to have the class have an informal atmosphere. I want you to feel free to ask questions and interrupt. I want you to have fun. Learning new things is fun!

Participation: You are required to participate. Answers such as “I don’t know” (which may be true) or shrugs of shoulders are not acceptable. While you may not know an answer you can think about what the answer could be using what we have discussed in class or you have read previously. I **WANT** you to be thoughtful. I am not worried about whether your answer is wrong as much as if you **Think** about your answer.

Attendance: Students are responsible for all materials covered in class and all assignments **must** be in on time. No late homework will be accepted. Exams must be neat and legible, showing **all** work and answered using complete sentences. **Any** appearances of copying work will result in a zero grade for all parties.

How I will teach class: This class will be presented in a way that is, perhaps, different from any other class you have ever had. The method I use is known as interactive engagement. In this approach, I will **NOT** really lecture and YOU will actively participate in your learning. Learning is not a passive activity. For example, you may passively watch a TV show about magnetic levitation. While you may be inspired by the show to investigate magnetism and be aware that magnetic levitation exists, it is unlikely that you will understand it. **Understanding is not memorizing.** To understand requires work.

Certainly, if I wanted, I could lecture and cover all of the material in the textbook in a single semester. However, how many of YOU would understand any of the material at the end of such a class? My goal is for you to understand the physics. To understand physics you have to think about the physics, work with the physics, wrestle with the physics. Physics is NOT just plugging in numbers to get some answer. There is a deeper understanding to physics. One of the main goals of physics is to take a complex system, simplify it so that we can understand it, then add the complexity back in with a deeper understanding of the system as a whole.

There will be frustration, but frustration is not necessarily a bad thing because it is an indicator of struggling with the ideas. You already have ideas (preconceptions) about physics whether you admit them or not. In order to replace these preconceptions you have to first recognize that you have a preconception then you have to build new concepts, but that is difficult. My role in this class is to help you to recognize these preconceptions and to help you build new correct concepts of the physics. My goal is to have you UNDERSTAND the physics.

In particular, you must always consider asking yourself these questions:

- What is happening?
- How do I know what is happening?
- How is this happening?
- Why is that happening?
- Am I being consistent and paying attention to things I already know?

My expectations of you are:

You will spend at least **2 hours** out of class for every hour in class in preparation for class.

You will be prepared for class.

You will think about the physics of every situation.

You will stay on task and not talk about what you are going to do after class or on the weekend or whatever.

You will not cheat or endeavor to cheat.

You will be responsible for your learning.

You will work in groups and I will assign groups.

You are able to do basic mathematics and calculus

You are able to write in complete sentences using proper English.

Topics covered:

Part 1 [Week 1-4]

- Thermodynamics
 - What is heat? What is temperature?
 - Development of specific heat.
 - Transfer mechanisms
 - Cycles: Engines and refrigerators

Part 2 [Week 5-11]

- Electrostatics, Magnetostatics, Induction
 - What is electric charge? What is an electric force? Work and energy issues.
 - What is magnetism? How do magnets interact?
 - How do we generate electrical current by mechanical means?

Part 3 [Weeks 12-15]

- Light, Geometric Optics, Electromagnetic Waves and Physical Optics
 - What is light? The models of light
 - Point and Extended sources
 - Mirrors and lenses
 - What is a Wave?
- Polarization, Interference and Diffraction

Masters' Classroom Rules

1. You will occupy a seat in the first four rows – I grade by row!
2. You will not yawn – a yawn is the equivalent to raising your hand.
3. If you answer a question with an “I don’t know” (or equivalent) without any thought you will be expected to entertain the class with a rendition of “I’m a little teapot,” including acting out all of the actions.
4. If you ever use “human error” as a source of error you will be introduced to Mr. Hammer.
5. If you have a question, you will ask it.
6. I reserve the right to throw things at you if you snore in class
7. When you are talking in class you had better be on topic or else!!!
8. New rules will be assigned at my discretion.

Disabilities Statement: If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb Union, Room 113, telephone number 481-6658) as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modification, bring the letter to me. For more information, please visit the web site for SSD at <http://www.ipfw.edu/ssd/>

Learning outcomes:

1. Have a basic understanding of thermal physics: heat, transfer mechanisms and cycles
2. Have a basic understanding of electric charge, electric fields and electric potential
3. Have a basic understanding of magnetic interactions, and magnetic fields
4. Have a developing understanding of geometric optics and waves