OTHER THINGS YOU SHOULD KNOW (IMPORTANT STUFF & WORTH A READ !)

I am not your mother, but if my mom were here she would expect you to be engaged in what we are doing when you are in class. I expect the same. That means no texting, web surfing, sleeping, etc. Those activities are best done somewhere else. In class (& per my mother), I consider those activities rude, as would you if I were doing them while you were trying to speak with me in my office. You cannot learn physics while 'multi-tasking'. The human brain focuses on only one thing at a time. It does not multi-task, but 'channel surfs'. Nothing is gained from simply occupying a seat in the room during the class period.

SOME FREQUENTLY ASKED QUESTOINS

What sections in the textbook are going to be on the exam?

While the material we will cover is in the textbook, I do not lecture from the textbook. I sort & shuffle topics to fit my perspective and lecture alternative approaches when I think they are useful. I consider the textbook to be your 'professional reference'. While you will need access to the homework system, any calculus based text is suitable as a professional reference. I write exams based on what I have lectured in class and assigned in the homework. For that reason, I believe that a good set of class notes should be your primary reference for this course. *If you expect to follow my lectures by simply 'turning the pages' in your textbook, you need to register for a different instructor.* A topic guide w\ approximate time frames is included on the last page of this syllabus. That is the best that I will do in answering this question. Beyond that, all textbooks have a Table of Contents and an Index.

Why should I do homework?

The purpose of homework is two-fold:

- As a learning tool:

  It provides an opportunity for you to develop a deeper understanding of the concepts covered in class. You are encouraged to form study groups and to discuss homework.

  It requires that you engage in the material of the previous lecture. In doing so, it exposes and addresses weaknesses in your understanding of that material.

  It may require that you read ahead for material that has not yet been covered in lecture. In this way it can be used as an introduction to what we will be doing in the next class meeting.

- As an assessment tool: It is where you demonstrate your ability to apply physical concepts to sophisticated problems. Unfortunately, we simply don't have the time to thoroughly assess your ability to do this during a written exam.

Why don't the exams look like the homework?

Well, actually they do but in a 'college level work' kind of way. Physics is not matching numbers to memorized formulas, nor is it reworking problems that you have already solved. Perhaps that is fine at some level, but it is not likely to earn you an engineering or science degree. And if by chance it does, you aren't likely to be the most valued member of your work group, whether in industry, government, or education. I write exams with questions/problems that I think you should be able to handle if you have developed a rigorous understanding of the material that has been covered in class and (sometimes "or") represented in the homework.

I'm in class every day and do all the homework, so why aren't my exam grades better?

As difficult as it may be to believe, 'more time spent' does not necessarily result in higher exam scores. For what they are worth, here are some of my thoughts on why:

- An exam score should correlate with the level of rigor to which you have mastered the material. Every student brings a different skill set to this class. For some, an 'A' will require almost no effort. For others, there simply isn't enough time in the term to reach the level of understanding needed to get an 'A' this semester in this course.

- There is a 'right way' to approach homework, which results in greater understanding and higher exam scores. There is also a 'wrong way' to approach homework, which results in high homework scores but does little to help you on an exam. **Please COMMENTS ON "Homework and Collaborative Learning" included below.**

- At the college level, being 'in class' means more than just showing up and writing down everything the professor writes down. You must be engaged and take 'professional' notes. So what do I mean by 'professional' notes? In 'real' applications, the purpose of note taking is to document the content of a meeting/presentation. In learning situations, you need to be able to look at what you have written and **reconstruct what went on in class providing a proper explanation of the content.** Since everyone brings a different skill set into the classroom, what is required in notes will vary from person to person. Notes should be more detailed when you are unsure or confused and will likely be less detailed when things are familiar. *The challenge is to recognize the difference while you are sitting in the class lecture.* Even if you can follow it in the class lecture, you may not be able to do it (or even recall it) outside of the class lecture. Therein lies the difficulty. *As an aside: content is not always written. Much of it is spoken!*

I thought I knew this stuff, but got a poor exam score. How should I study for exams?

It sounds sort of silly, but the first challenge of 'proper studying' is to recognize what you actually know and what you actually do not know. That is one reason that we take class time to answer polling questions. Here is what worked for me when I was an undergraduate:

- Set aside a regular time each week to work with classmates on physics. Put it on a schedule and treat it like a job. I think 3 is the ideal group size.

- Begin your weekly group meeting with a comparison of class notes. Pull out a pen and fill in 'holes' in your notes. **Add explanations, so that if you were to give your notebook to someone who is taking physics for the first time they could understand the material from what you have written.** If you can't do that, then find the corresponding section in the text book or ask questions of folks until you can do that.

- Spend some time looking at the homework problems before you meet with your group. Having actively engaged in the class notes, begin to tackle the homework problems with your group using the strategy described in the Canvas discussion posting.

- Having done this every week, when exam week comes you should already have mastered the material. Now you want to supplement your studying under exam conditions. Print a copy of the formula sheet that will be provided with the exam. From the practice homework, make a list of the 'extra' problems that I have suggested from the text. Pick a problem and attempt to work it using only the formula sheet. If you get stuck, your first "lifeline" is your class notes. Your second lifeline is 'phone a friend' (ask someone, or send me an email). Your last lifeline is to look for a solution. This process supplements your studying using lifelines in an order from 'most effective' to 'least effective' for exam preparation. Having completed the problem, choose another one and repeat the process.

HOMEWORK AND COLLABORATIVE LEARNING

For this course the homework is your primary opportunity to engage in peer-to-peer collaborative learning. Education research shows that this can be more effective than student-tutor or even student-professor interactions. For that reason, I have opened this discussion forum.

I do want to say a bit about the "right way" to do homework.

There are two major pitfalls for students who are solving physics problems:

"Formula shopping"- You read the problem, make a list of what you know and what you don't know, then search for a formula that connects the two. Unfortunately, nowhere in this process have you thought about the 'physical principles' involved and how they are applied to the problem.

"Problem solving by analogy"- You read the problem and then begin a search for a similar problem that has a posted solution. Having found one, you force-fit your numbers into that solution. Again, nowhere in the process are you considering the 'physics' of your solution. Don't misunderstand. EXPERTS frequently use analogies to short-cut problem solutions, and this is good. Experts already know the concepts that are being applied and are skilled at recognizing valid analogies. BUT this is your first time in physics. Most of you are not experts.

After A LOT of time slugging away, these two 'problem solving strategies' will eventually get you a good homework score. Unfortunately, they do little to improve your understanding of the physics. For that reason, they are of no help in improving exam scores.

So how should you approach a homework problem? Read the problem. Identify what physical idea from class might apply to the problem (e.g. this is a force problem so maybe we can use Newton's 2nd Law). Attempt to apply the physical idea to the problem. Look back to your class notes & talk to classmates if you are unsure how to apply the idea. Work the idea until it starts to spit out answers. Then look back at the problem to see if the answers you are getting are related to a question that is asked. **The struggle in this process is what will develop your understanding of the physics!** If class notes & friends still leave you stuck, turn to your reference material (the textbook) and read more about the idea that you are trying to apply. Having tried that, if you are still stuck, then & only then might you consider searching for an analogy.

Whatever process you use, the focus of the process should be on understanding the physical principle and how it is applied to different situations. That develops your understanding. If your process is focused on getting an answer, you will eventually get an answer but you will probably not achieve the 'understanding'.

For what it's worth - just some thoughts based on what I have read in the education research, memory of my own experience as a student, and my years of trying to help students learn physics...