

PHYS 115 INQUIRY INTO PHYSICS

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Course Philosophy: Scientists learn about the physical world around us through experimentation. They draw conclusions from data and continually refine their ideas. They design new experiments to address new questions as they arise.

In this course, you will not be memorizing facts listed in a textbook. Instead, you will act as a scientist and learn physics as a researcher would...you will discover facts for yourself! You will conduct experiments and learn how to describe your observations through words, equations and graphs. Your fellow students may draw different conclusions from the same experiment. You will learn how to present your results and defend your observations. Perhaps you will decide that your fellow students were right after all, or perhaps you can think of a way to test which ideas are right and which need further refinement.

The inquiry method of learning is particularly relevant for elementary and early childhood teachers, because scientists make discoveries in much the way children learn –by observing the world around them!

There is no textbook for the course. You are expected to keep a notebook and take a lot of notes. This will act as your textbook. Since this is a course in "inquiry" as well as "physics", make sure you record all of your ideas, even those that you eventually discard, as well as your data. You should be able to reconstruct the evolution of your thinking. You will be asked on homework and exams not only for your answers, but how you arrived at your answer.

Grades:

Your grade will be based on:

Exam 1: 20%

Exam 2: 20%

Final exam: 20%

Homework: 20%

Notebook and class participation: 20%

Attendance: Due to the nature of this class, attendance and participation are absolutely mandatory. After you accumulate 2 unexcused absences, you will lose 2% of your grade for every class missed. If you are more than 15 minutes late for class, you will be counted as absent; however, you will still be welcome to join us.

Notebook: Your notebook should contain your graded homework and exams, your notes, data, and any relevant data analyses such as graphs. You should also have plenty of additional paper so you can write down your ideas. Your notebook will be collected a few times throughout the semester and graded for completeness, neatness, and organization. Exams are open notebook, so it is important to keep a complete record.

Cell Phones: Due to the nature of this class, cell phones can present a huge distraction. Cell Phones must be turned off before entering class, and phone conversations, as well as texting, are strictly forbidden during class. If you are observed to be texting or speaking on a cell phone, you will be marked absent for the day.

Your role in PHYS 115: (or in other words, how to get a good grade)

During each class, you will be given at least one lab activity to complete.

- ✓ First, discuss the lab with your lab partner. Can you form a hypothesis regarding what the outcome will be? Why do you expect this outcome? Feel free to discuss your ideas with others and don't worry if your ideas are wrong. That's why we do experiments!
- ✓ Complete the lab activity with your partner. If your partner is having trouble, stop and try to explain what you know to your partner. You will find that assuming the role of the teacher will solidify your own understanding.
- ✓ IF YOU ARE LOST, SPEAK UP!! Ask your lab partner or start a class discussion. There is no textbook to fall back on, so don't count on cramming the night before the exam. Make sure you understand the lab before the class moves on!
- ✓ Write everything in your lab manual. Write your ideas, record all of the data, what worked, and even what didn't. Draw diagrams of your lab set

up. Write down your interpretation of the results. Take notes on any discussions you have with others.

- ✓ After you have completed the lab, you might be asked to present your results to the class or lead a discussion. Do your results agree with everyone else's? In talking about your results, you might decide your original interpretation is inconsistent, or you may realize you made an error. That's okay. It's all part of the process.
- ✓ If you "finish" your lab before the other groups, you may think of something else to try or a new avenue of investigation to pursue. You may have finished all of the assigned tasks, but do you understand the subject well enough to explain it to others? If not, you still have work to do. You may also wish to observe what other groups are doing. Do they need your assistance? Have they tried something you didn't?
- ✓ Turn your homework in on time. In grading, the teaching assistant and I will be paying particular attention to how much effort you put into the assignment. Please give us answers that are well thought out.

Exams are open notebook.

The role of your professor and teaching assistant: This is a class on how to conduct scientific investigations. We are not going to lecture to you! Our job is to moderate discussions, help you develop your own ideas, and point you in the right direction when you get stuck. We might answer your question with a question. One day when you are teaching school, there will not be a professional scientist around all of the time to answer your questions. You need to learn how to draw reliable conclusions on your own. You will also find that you learn more effectively from your own experience than you would if you were just asked to memorize a list of facts.

Course website: You will need to check your elms account for the class regularly for course announcements, materials, grades etc. www.elms.umd.edu