PHYS 115 INQUIRY INTO PHYSICS FALL 2010

Instructor: Dr. Simone Kulin
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Office Hours: MTuW 9:15 am -10 am in Room 3316, Physics Building
Teaching Assistant: TBA

Where and When

Physics 3316, MTuW 10 am – 11:50 am

Course website

We shall have a course space on Blackboard. There you will find an up to date syllabus, the semester schedule, homework assignments and your grades. Any general announcements will be posted on the Blackboard course space as well.

Course description: Inquiry into Physics

Your experience in this class will likely be different from your experience in previous science courses. In this course, you will not be memorizing facts listed in a textbook, nor will you apply formulae to problems without full comprehension of the underlying concepts. Instead, you will act as a scientist and learn physics by discovering 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, how to communicate effectively with others and receive criticism or confirmation. 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 are wrong.

Laboratory activities are at the heart of this course. Along with your laboratory group you will observe physical systems, predict their behaviour, draw conclusions and build models of how these systems work. In the process, will continually refine your ideas and develop your own understanding. Your teachers are resources, they can facilitate your learning, but they cannot do the understanding for you.

Prerequisite

No prerequisites. Enrollment is limited to Elementary Education and Early Childhood majors. You may receive credit for only one of PHYS 115 or PHYS 117.

Homework

There will usually be one homework assignment per week. It will be posted on the Blackboard website Wednesday afternoon and it is due on the following Tuesday at the beginning of class. The homework assignments will consist of essay questions based on the laboratory work you did in class and of related problems, which will help you test your understanding of a concept. The answers to the essay questions should be typed and should be no longer than one page. Each essay should be on a separate sheet. Necessary diagrams and sketches can be added by hand. Answers to problems need not be typed, but should also be submitted on a separate sheet.

You may submit homework late, but 20% of the total point value will be deducted for each day it is late.

In order to prepare good essays, you might want to consider the following:

Observation: The first skill you must develop in this class is making careful observation and describing, in your own words, what you observed. This may require you to use words, but also diagrams or even graphs.

Evidence: The best evidence you can offer is "I saw it", and not "I read it in a book", or "Dr. X said so." The instructors will help you gain confidence in this way of thinking, but you it is your responsibility to cultivate it.

Explanation: Explanations for things observed, offered by you, your labmates, your TA, your teacher, and from other sources must always be greeted with skepticism. Your observations, on the other hand, if carefully done, are more reliable and can always be verified by repeating them. We should recognize that although we might all be observing the same event, we might not all "see" the same thing. When an explanation for what we observe involves second hand information or inferences rather than direct observation, however correct it may turn out to be, it should always be treated as a working hypothesis, as an attempt to fully understand a concept.

Textbook and other Materials

There is no textbook for this course. You will be handed activity sheets each class and they become part of your notebook.
You are required to bring a basic calculator to class. *You may not use your cell-phone for this purpose.*

Notebook

You will maintain a laboratory notebook. It must be **a three ring binder** that includes labeled section dividers separating the different types of material. Your name should appear on the cover.
The following items should be included in the notebook:

1) Syllabus and semester schedule
2) Experiment and activity guideline sheets that will be handed out each day
3) Graded homework assignments
4) Graded exams
5) Daily summary sheets that you will prepare during the last ten minutes of class each day
6) Lots of blank paper for recording your observations, the observations of your peers, your ideas and evidence for or against them, your reasoning, any relevant data analysis such as graphs, diagrams of experimental set-ups. Each page must be dated.

The experiment guideline sheets, your notes and any graphs should be grouped by experiment. General notes can be in a separate section.

Daily summary sheets should contain the major things you did during the period that day, any conclusions you reached, or any major changes in ideas, as well as unanswered questions that you might have.

Notebooks should be kept neatly and be complete to date. All ideas, right and wrong, should appear. It must be possible to track and reconstruct your thinking with help of the notes you took. Notebooks will be checked during the semester and graded toward the end of the semester.

Grading of the laboratory notebook will be as follows:

Three ring binder with all sections listed above	0.15
Partial documentation of fewer than half the activities	0.3
At least 75% of the activities documented clearly	0.2
All activities documented clearly	0.25
All daily summary sheets	0.05
All graded homework and exams	0.05
Total:	1.0

Examinations

Two two-hour exams: Wednesday, October 6
Wednesday, November 10
Final Exam: Saturday, December 18 8 am -10 am

Each exam will have a laboratory component, to be performed with your laboratory group and an individual part that includes essays and problems similar to the ones on the homework assignments.

Exams will require you to draw on your personal laboratory experiences when you explain and support your understanding of physical concepts. Any solution of a quantitative problem must be accompanied by a conceptual explanation.

You may use your laboratory notebook during the examinations.

Class Participation:

All students are expected to participate in class discussions. You are expected to volunteer and you will be called upon individually. The grading scheme is as follows:

Never participated voluntarily:	0
Attempts to answer questions when asked	0.5
Occasionally raises hand and asks questions	0.7
Raises hand at least once a week	0.85
Raises hand daily	1.0

Attendance

Attendance in this class is of utmost importance and is highly encouraged. Learning in this course is sequential and in class activities are not available for make-up. On homework and exams you will have to justify each answer with experimental observations that YOU have made in class. Attendance will be recorded and you are allowed only two unexcused absences. A 2% reduction of your total course score will be made for each unexcused absence after two. The University Policy for excused absences will be followed. Non-emergency doctor's appointments and weather-related absences when the University does not close are not excused absences.

If you are more than 15 minutes late it will be counted as an absence. You are, however, welcome to attend and benefit from your work during class.

Grades

Your grade will be based on the following percentages:

Exam 1:	20%
Exam 2:	20%
Final exam:	20%
Homework:	20%
Class Participation:	10%
Notebook:	10 %

Subtract 2% for each unexcused absence beyond the two allowed. Subtract 5% for two incidents of disruptive behaviour in class (see below) and 10% of total score for more than three such incidents.

What to Avoid

This course is designed to make the learning of physics enjoyable and accessible to every student. Maintaining an atmosphere that fosters curiosity and learning is the responsibility of both the instructor and the students. Discussing physics with your peers and with the instructor is highly encouraged. Activities such as chatting on the internet, text-messaging, and web-browsing are prime causes for loss of focus during class for individuals who engage in the activity as well as for their fellow students. Students observed to either chat, browse, send or receive text messages, or disrupt the

class will receive one warning after the first incident, will lose 5% of their final grade after the second such incident and will lose a full letter grade from their score after three or more incidents during the semester. Simply turn your cell phones, blackberries, etc off when you enter the room and experience the fun and the satisfaction of understanding the physical world around you.

Academic Honesty

The integrity of your degree is important to me and I strongly support the Code of Academic Integrity of the University of Maryland.

In Physics 115, students and instructors are all part of a learning community in which collaborative activities play an important role. You will be most successful if you work with other students as you pursue your various assignments both in and out of the laboratory. This, however, does not mean that identical reports or homework answers are acceptable. You must respond in your own style as you rethink the conclusions that you reached through group activities.

Laboratory work is an important component of the course and it may appear tempting to try to force an outcome to be what you “think” or “know” it should be. Remember, you are acting like a real scientist during class and that means resisting this temptation and being truthful. Respect your data, and never alter it agree to what you think it should be.

Course Rationale

SHAPING THE FUTURE
New Expectations for Undergraduate Education in Science, Mathematics, Engineering and Technology
A Report on its Review of Undergraduate Education

by

The Advisory Committee to the National Science Foundation
Directorate for Education and Human Resources

Too many students leave Science, Mathematics, Engineering and Technology (SME&T) courses because they find them dull and unwelcoming. Too many new teachers enter the school systems underprepared, without really understanding what science and mathematics are, and are lacking the excitement of discovery and the confidence and ability to help children engage in SME&T knowledge. Too many graduates go out into the workforce ill-prepared to solve real problems in a cooperative way, lacking the skills and the motivation to continue learning.

We recommend that:

SME&T faculty: Believe and affirm that every student can learn, and model good practices that increase learning; start with the student's experience, but have high expectations within a supportive climate; build inquiry, a sense of wonder and excitement of discovery plus communication and teamwork, critical thinking and lifelong learning skills into learning experiences.

Inquiry: Although there is disagreement about the meaning of "science literacy" and doubt about whether agreement is possible on a list of facts everyone should know, there is no disagreement that every student should be presented with an opportunity to understand what science is and is not, and to be involved in some way in scientific inquiry, not just a "hands-on" experience.

The entire document can be found on the website of the National Academy of Sciences: http://www.nationalacademies.org/publications/

You may also want to consult:

Inquiry and the National Science Education Standards: A Guide for Teaching and Learning, Center for Science, Mathematics, and Engineering Education, National Research Council, National Academy Press, Washington DC, 7th Edition, 2002.