- *CLASSICAL PHYSICS II* -
- *ELECTRICITY and MAGNETISM* -

PHYSICS 342 - Syllabus

Spring 2015

Instructor : Dr. Channon Price, Reichardt 120, x6106, cpprice@alaska.edu
If you email me, include "PHYS 342" in the subject line so that I can promptly read your message.

Office hours : Monday through Friday, 8:00 am to 9:00 am, or when available (consult my calendar on google.alaska.edu under my email address.)

Class hours : MWF 2:15pm-3:15pm, Reichardt 204 and R 2:30pm-3:30pm, Reichardt 202

Prerequisites : Physics 220, Physics 301, and Physics 341.

Text : **Introduction to Electrodynamics** by D. J. Griffiths, 3rd edition, Prentice Hall Publishing, 1999 (ISBN 0-13-805326-X). See the course website for links to the book website and errata. (If you have the 4th edition, please see me about variations between the two editions.)

Topics: From the catalog: "Statics and dynamics of electric and magnetic fields in vacuum and in the presence of materials. Lorentz force law. Maxwells equations." We will cover the material from chapters 2-8 of Griffiths in the course of the semester. However, our pace will vary (for example, we won't even open the book for the first three weeks.) Additional material will be distributed in class. See the course website for the reading schedule.

Grading : 4 credits. Homework (11 sets, each problem of equal weight, total weight 30%) and three examinations: a midterm test Friday 2/20 (20%), a midterm test Friday 4/3 (20%), and a final examination (30%) scheduled for Thursday, 5/7. See the course website for the homework assignments. Late homework will not be accepted, since solutions will be made available at the beginning of class on the due date. The examinations will be closed book and closed notes. The course will be graded on a rubric (attached), and will be graded plus/minus. Please see the grading rubric for a detailed explication of the basis for assigning marks.

Remarks : Homework will be assigned weekly on Monday and will be due one week following; solutions will be made available on the due date. The examinations will cover the material assigned for the homework sets; solutions will be made available at the end of each examination. Passing marks for the class will require substantial performance of the homework problems; the homework is a mutually diagnostic instrument, capable of informing the instructor *and* the student about learning difficulties, but only if all problems are attempted in an honest fashion. If you have completely mastered a problem, then a 'clean' copy of your solution may be submitted, but I am unable to give concrete aid if presented with a 'clean' version of your work. (Further, if you haven't finished a problem, it really is a waste of time to recopy it. Do not err too far in the other direction, either: I cannot give credit for work that I cannot read.) Even partial work is valuable; if you haven't finished a problem, you should still submit your work – you will get partial credit, and it can help us pinpoint the "sticking point" and thus assist you in getting past that point and on to success!

Without doubt, solutions for the homework problems can be found in various locations. Further, it is natural for students to work together. Those points notwithstanding, there are two things to remember. First, understanding of the material in this course will be greatly facilitated for the student who invests the time to master the detailed calculations. Second, it is against the UAF Honor Code to misrepresent work which is not your own; plagiarism on homework or on an exam will result in a failing grade.

I am here to help you learn. I will be happy to suggest alternate texts. Class participation, although not graded, is its own reward.

Website : The course website is located at http://137.229.43.8/physics/phys342.html

Accommodations : The Physics Department will work with the Office of Disabilities Services (203 WHIT, x5655) to provide reasonable accommodation to students with disabilities.

Grading Rubric
for
PHYS 342 “Electricity and Magnetism”
Spring 2015

What is a grading rubric, and why is it useful?

A grading rubric is simply a table showing expected performance levels for various aspects of graded work. By giving the student a clear description of the criteria applied in grading, and explicit standards of performance for those criteria, a rubric gives the student the opportunity to direct their efforts productively.

Why is there a grading rubric for PHYS 342?

To help the student understand the basis for grading answers, and thus to understand the answer to the following question: “I got the right answer, why didn't I get full credit for this problem?”

Why can't I do problems in the way that I always have? Why do I have to learn a new way of doing problems?

Above and beyond mastery of specific subject matter, we are trying to advance you in three central ways: 1) as a physical thinker [ability to articulate your reasoning; metacognition; expert-like approaches to problems; independence and discipline], 2) as a problem-solver [expert problem analysis; use of expert problem-solving methods], and 3) mathematical sophistication [conceptual and physical understanding of mathematics; translating physics to mathematics and vice versa]. The rubric can thus also be regarded as a useful bridge towards learning how to work as a Physicist. A Physicist doesn't spend her/his time writing down algebraic or numerical solutions to well-posed problems – in fact, they rarely do that. Physics is about understanding how the natural world works, and about interpreting physical phenomena. Implicit in that description is the expectation that the Physicist communicates that understanding and those interpretations to others, both within and outside the field. Especially for someone outside the field, a purely mathematical answer (“solution”) is the worst way to communicate a result. In this context, one can understand why the “right answer” should not merit full credit – in fact, why it should not merit much credit at all.

How do I read or use this rubric?

The process of doing a Physics problem can be broken into three main parts: “Set-up and Preparation”, “Solution”, and “Analysis of Result”. Each of those main parts can be further subdivided: for example, the part labeled solution includes outline of attack, commented mathematical analysis, and citation of non-derived expressions employed in the course of the solution. These parts and subparts are elucidated in the first two columns of the rubric. The remaining columns show the criteria used to identify the quality of the response to an assigned item, at three levels: Not To Expectations, Developing Mastery, and Complete Mastery. As you are preparing your solutions, you can examine your work in light of the rubric and see how it will be evaluated. I have placed some additional comments about specific items immediately after the rubric. Finally, please see the homework solutions for explicit examples of the elements described in the rubric.

Will the rubric be applied to all graded material?

Yes, the standards displayed in the rubric will be applied to all homework problems and all exam problems. Note that use of a rubric allows the instructor to assign the grade which each student deserves (in contrast to grading on a curve, which forces a distribution of grades regardless of student performance.)

Stage	Criteria \ Standard	Not To Expectations	Developing Mastery	Full Mastery
Set-up and preparation	Explicit statement of problem (1)	Absent	Incomplete: missing text and/or reference	Complete
	Problem interpretation, placement into context (2,7)	No discussion of problem context	Partial discussion of problem context	Thorough interpretation of problem, noting general area and specific points
"Solution"	Outline of attack (3)	No preview to solution	Partial preview of method to solution	Clear preview of method to solution
	Commented mathematical analysis (4)	Sloppy, sketchy mathematics; no commentary on methods	Mathematics is directed properly but not always correct; some comments on methods	Precise and correct mathematics, with explicit notes on methods at each step
	Explicit citation for non-derived equations (5)	External equations introduced *inter alia*	Partial citation of non-derived expressions	All non-derived materials are completely cited
Analysis of result (6,7)	Summary statement of result	No recapitulation of result	Partial summary of result	Complete summary of result in plain English
	Physical interpretation of result	No interpretation of result	Partial interpretation of result	Thorough interpretation of result in context
	Critical examination of result	No examination of result	Partial examination of result	Full critical examination of result

Comments:

1. The value of an explicit statement of the problem cannot be overstated! Not only does the student avoid doing the wrong problem, but the problem statement is the key part of the context of the answer. This can be copied and pasted.
2. Placing the problem into context can help motivate it, and promotes connections to other results.
3. Although I think that John Archibald Wheeler's statement to "Never start a problem to which you do not already know the answer" is a bit extreme at this stage of your career, one is always well-served by knowing what you are going to do mathematically before you start doing it. Not only does it help guide your steps, it can help you pinpoint where you have run into difficulties.
4. Similarly, a running commentary during a mathematical analysis is also very illuminating, both to the student and to the grader. (I personally hope to reduce the number of times that I think to myself: "this student has no clue what they are doing".)
5. If you use a formula which is not immediately recognizable (*e.g.* Newton's Second Law, or Ampere's equation), or if you employ a mathematical result which is also not immediately obvious, you must cite your source. Every time. Whether you found the integral in a handbook or using Mathematica, give the source. If you use an equation from the text – whether as a starting point, or during the course of your answer, cite it completely. Failure to do so could constitute plagiarism – which has wrecked careers. Note that some problems specify that you are to derive or calculate an analytic result, in which case it should be obvious that you are to report the full chain of manipulations.
6. I know – from years of experience – that when you finally wrestle the math into place and have ***the*** answer, you want to be done with the problem immediately. Go take a break, but come back, because that answer is incomplete. It needs to be interpreted and to be critically examined. What does it tell us? Does it make physical sense? Is there a way of testing it – perhaps by taking a limiting case, or by making a comparison to another known result?
7. You should not be writing a small book in providing an interpretation, discussion or analysis. A few well chosen sentences is typically sufficient.