

PHYS 216

Electromagnetism

Mount Holyoke College – Spring 2010

Meeting Times:

(LECTURE) Cleveland 003L, MWF 11:00a – 11:50a, (4th-HOUR) Th 10:00a-10:50a, (LAB) Carr G12, 1:15p-4:05p (section 01 on M, 02 on T)

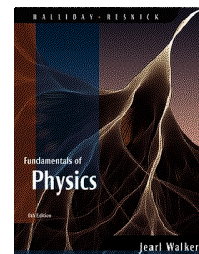
Instructor: Rob Salgado Visiting Assistant Professor of Physics Office: Kendade 215 Voice: (413)-538-2816	Email (the best way to contact me): rsalgado@mtholyoke.edu Instant-Messengers: AOL, WindowsLive[hotmail], Yahoo, Skype: mhcpyrob (do not email here)	Office hours: -to be announced
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Lab Instructor: **Christine DeRunk** (cderunk@mtholyoke.edu), **Kendade 207, (413)-538-2029** [There is a separate syllabus for the 216 Lab.]
 Physics TAs: to be announced

Catalog Description:

PHYS 216 – Electromagnetism (4 credits) - [69596]

Topics include: electromagnetism, emphasizing fields and energy; electrostatics; electric circuits; magnetism; induction; and electromagnetic radiation. Additional topics chosen according to the interests of the class and instructor.
 [Prerequisite: PHYS 115; Mathematics 202.]



Required Textbook:

“**Fundamentals of Physics (8th ed)**”, D. Halliday, R. Resnick, J. Walker [Wiley (2008), ISBN 978-0-471-75801-3]

Optional supplements (featuring review summaries and worked problems) that may be useful to you:

various Schaum’s Outlines for Physics [the prefix <http://proxy.mtholyoke.edu:2048/login?url=http://site.ebrary.com/lib/mtholyoke/Doc?id=5002213> is needed for off-campus access]

<http://proxy.mtholyoke.edu:2048/login?url=http://site.ebrary.com/lib/mtholyoke/Doc?id=10015295>

<http://proxy.mtholyoke.edu:2048/login?url=http://site.ebrary.com/lib/mtholyoke/Doc?id=10015302>

<http://proxy.mtholyoke.edu:2048/login?url=http://site.ebrary.com/lib/mtholyoke/Doc?id=10045493>

Electronic Materials:

I will maintain a website (<http://www.mtholyoke.edu/courses/rsalgado/216/>)

that links to homework assignments, pre-class assignments (via **e11a**), worked-solutions (on **e11a**), electronic-whiteboard notes, and handouts. (These materials are not a substitute for regular attendance, participation, and problem-solving.)

Course Goals:

- A. To develop the “field” concept in physics.
- B. To reinforce important concepts in physics and mathematics.
- C. To further develop physical intuition, mathematical reasoning, and problem solving skills.

Course Requirements:

Come to class **ON TIME, AWAKE, and ALERT (to the physics topic under discussion)**.

Attendance is **REQUIRED** for Lectures, for Labs, and for 4th-hours. (With advanced notice, a particular 4th hour may be used for a lecture.)

Come to class PREPARED and EQUIPPED, having read or written any assignments.

Grades are roughly weighted as follows:

- ~~20% HOUR-EXAM #1 (during your lab section)
 - ~~20% HOUR-EXAM #2 (during your lab section)
 - ~~25% CUMULATIVE FINAL EXAM (required*)
- * means that “You cannot earn a passing grade without this item”
- 15% PRE-CLASS ASSIGNMENTS (on **e11a**, lowest-three dropped)
 - 20% LAB (required*, at most one-excused and one-unexcused missing-lab)

Grades will be maintained on **e11a**, and you will be alerted when a new item is posted. **You have one (1) week to contest (by email) any grade or any missing item.** Requests for re-grading must be accompanied by a written explanation on the item which concisely identifies what is being contested and concisely explains (in physical or mathematical terms) why your answer is correct or why the grading is wrong. The entire assignment or exam may then be subject to re-grading, and may result in a higher total score, a lower total score, or an unchanged total score.

Final letter-grades are based on a modification of the **e11a** scale **A [95 90] B [87 83 80] C [77 73 70] D [67 63 60] F [59 and below]**.
 Your final grade will be no worse than what you would get on the **e11a** scale.

~~optional Homework (assigned periodically, due in “THE BOX” by the end of class on Mondays):

You are strongly encouraged to discuss the homework with other students. However, be sure that you can do the homework *by yourself* and that you present your own work. You can always ask me or the TAs for help after you have made an honest effort. Although you are encouraged to do the homework problems, you are not required to submit them for a grade.

If you submit a homework assignment, it will be due by the end of class on Mondays.

Since detailed solutions will be available via **e11a** on Monday afternoon, late submissions will not be accepted.

Submitted assignments will be graded for effort and correctness, and then returned.

Your submitted assignments will carry up to half of the weight of the next upcoming exam.

Suppose you got an 80% on Exam #1.

If you did not submit homework leading up to Exam #1, then 20% of your final grade will be 80%.

If there were three assignments leading up to Exam #1

and you submitted once and got 90%, then 20% of your grade is $(80 \cdot (5/3) + 90 \cdot (1/3)) / 2 = 81.67\%$.

With two submissions (90% and 85%), then 20% of your grade is $(80 \cdot (4/3) + 90 \cdot (1/3) + 85 \cdot (1/3)) / 2 = 82.50\%$.

With three submissions (90%, 85%, and 50%), then 20% of your grade is $(80 \cdot (3/3) + 90 \cdot (1/3) + 85 \cdot (1/3) + 50 \cdot (1/3)) / 2 = 77.50\%$.

In some sense, you are optionally doing part of your exam as homework.

By clearly writing *in ink* “FEEDBACK ONLY” on your assignment before submission,

you can get your assignment graded and scored without carrying any weight for the next exam. (No changes can be made after submission.)

Missed exams or labs:

There are no makeup exams or labs. There are no exceptions.

If you are absent for an exam or a lab, **within one (1) week, you must send me an email with your excuse.** Only if that excuse is valid, your final exam will carry the weight of a missed exam, or your lab will be declared as an “excused missing lab” [which won’t be averaged in to your lab grade]. Otherwise, you will get zero credit for the missed exam or lab. You are, of course, responsible for the content of any missed exam or lab. **Be aware that some exam questions may make reference to what was done in an earlier lab!**

Alternate arrangements:

Requests for alternate arrangements must be **made in advance** and **must be accompanied by an email addressed to me.** I will reply by email with my decision on your request.

Proposed Sequence of PHYS 216 topics (subject to adjustments, as needed):

	Mo	Tu	We	Th	Fr		Last day to...
(Ch 21) Electric Charge [COULOMB]				27	28	29	JAN
(Ch 22) Electric Field				3	4	5	FEB
(Ch 23) Gauss' Law [GAUSS]				8	10	11	12
				15	17	18	19
(Ch 24) Electric Potential				22	24	25	26
(Ch 25) Capacitance				1	3	4	5
(Ch 26) Current and Resistance				8	10	11	12
				15	-	-	-
(Ch 27) Circuits				22	24	25	26
(Ch 28) Magnetic Fields [LORENTZ]				29	31	1	2
(Ch 29) Magnetic Fields Due to Currents [AMPERE]				5	7	8	9
(Ch 30) Induction and Inductance [FARADAY]				12	14	15	16
(Ch 32) Maxwell Equations, (Ch 33) Electromagnetic Waves				19	21	22	23
(Ch 37) Relativity (we will not closely follow the text)				26	28	29	30
[EINSTEIN and MINKOWSKI]				3	5		
				9	10	11	12
				13			
(Ch 31) Electromagnetic Oscillations and Alternating Current [some aspects in LAB]							

AAPT/APS conference (Washington DC)

LABS: Vectors
Equipotentials
DC-Circuits and Kirchoff Laws
RC circuits (Oscilloscope)
Ampere and Faraday
Special Relativity (Rob S.)
e/m + motors

Some advice:

Physics is a **challenging** subject that requires your dedicated attention, but rewards you with skills that you can apply in **any** discipline!

Physics is **cumulative**: For example, understanding Ch 24 requires that you understand many of the chapters before it.

You must not fall behind! If you find yourself falling behind, you must get some help. Ask for help from your classmates! Your TAs! Me!

Physics is written and spoken in a **Mathematical** language.

This is a calculus-based course: techniques of Differentiation and Integration will be used.

No matter how well you may have done in calculus, **don't neglect Algebra, Trig, Geometry and Pre-Calculus!** Review basic math!

Physics is about “understanding **relationships** between physical quantities”,

which we uncover by experiment and by logical and mathematical reasoning.

Physics is **NOT about formulas** and merely plugging-in numbers.

Formulas are often only “special cases of expressions of those relationships”.

“Knowing a formula without knowing when it applies” is generally useless.

The act of “plugging-in numbers” measures your ability to do Arithmetic or to use a calculator.

The resulting number is only useful when you interpret it physically. *“The right number with the wrong physics” is just plain wrong.*

YES, YOU CAN understand and succeed in Physics only if YOU put in the required work.

Just attending lectures and labs is not enough. Just taking good notes is not enough.

Just reading the textbook is not enough. Just memorizing formulas and definitions is not enough.

Just doing the homework is not enough. Just reading the solutions is not enough.

There are no shortcuts. **YOU HAVE TO DO IT ALL.**

Most of the learning you will do is done by **you working out numerous physics problems outside of class!** (I am merely a guide for you.)

Your goal should be to do many physics problems so that

you learn how to approach new problems by thinking critically and logically ---not to merely redo old problems with new numbers.

Your textbook offers many sample-problems and end-of-the-chapter problems. Additional problems with worked solutions are in the electronic books listed on the first page of this syllabus. There are many textbooks in the physics lounge that also provide problems and worked-solutions.

While there are a lot of physics problems around, you should focus on physics problems

that are similar to the assigned homework problems and that are nearby problems in the same section of the assigned problems.

I choose problems to help illustrate various physical ideas and mathematical skills that I feel are important.

You miss out on learning if you do not recognize and you do not reflect on what those ideas and skills are as you complete the problems.

You should be regularly reading ahead of the lecture.

Don't wait until I discuss a topic or wait until the end of the chapter before attempting the homework problems.