Physics 112—General Physics II: Electricity & Magnetism

Section 1, MWF 11:00 a.m. – 11:50 a.m.
Section 2, MWF 1:10 a.m. – 2:00 p.m.
Course Description, Spring 2016

Professor: Michael Alexander
Office: HSC 028; 610-330-5207
E-mail: alexamic@lafayette.edu
Web Page: http://www.masteringphysics.com

Office Hours: 2–3 p.m. on Wednesday; 10–11 am on Thursday
Beyond office hours, my door is always open. Please do not hesitate to stop by my office
if you have questions about material covered in class, homework problems, or anything
related to the class. Outside of office hours, making an appointment is best to ensure that
I am available but drop-ins are absolutely encouraged.

General availability, 9 a.m. – 5 p.m. weekdays: This means that outside of this
range, I will likely a) not be in my office and b) not answer emails.

Supplemental Instruction: PHYS 111 participates in the Supplemental Instruction
program (SI) run through Lafayette’s Academic Tutoring and Training Information Center
(http://attic.lafayette.edu). The student instructor for the class is Sarah Henderson
(email: henderss@lafayette). She will hold additional help sessions and be available for
extra instruction. More information will be available on the first day of class.

Description:
This course is an introduction to the foundations of electricity and magnetism, waves,
geometrical and physical optics, and quantum and nuclear physics. The course is designed
primarily for students in science who do not require a calculus-based physics course. Recogniz-
ing and applying physical ideas is stressed; there will also be an emphasis on problem
solving. We will study electric fields and potentials, basic circuits, magnetic fields, electro-
magnetic waves, and the basic particle/wave duality of quantum physics. The student work
in this course is in full compliance with the federal definition of a four credit hour course.

Student Learning Outcomes: After completing this course, a student should be able to

• understand, identify, and apply the fundamental principles of physics in a variety of
  physical situations.
• use both qualitative reasoning and quantitative problem-solving skills in applying
  those principles.
• Calculate the electric potential and field due to a variety of charge configurations,
• Predict the motion of charges in an electric field,
• Calculate the magnetic field due to current-carrying wires,
• Predict the motion of charges in a magnetic field,
• Find the images produced by simple lens combinations,
• Analyze interference and diffraction patterns, and
• Interpret atomic spectra in terms of quantum energy levels.

Students also should be able to engage in the process of doing physics, including such
tasks as
• developing and testing models,
• generating and interpreting experimental data,
• understanding the role of uncertainty,
• solving problems, and
• communicating results.

**Prequisite:** Physics 111, or equivalent.

**Required Materials:**

- **Calculator** – Some homework and exam problems may require the use of a calculator. Cell phones are fine for homework, but will NOT be allowed during exams.
- **Lab manual** – Students taking the PHYS 111 Lab will need to purchase the laboratory manual from the bookstore.

If you purchased a used book or do not otherwise have access to Mastering Physics, then you may purchase it online at [http://www.masteringphysics.com](http://www.masteringphysics.com). Our course ID for this semester is PHYS112ALEXANDER.

**Your Responsibilities:**

**Read the text.** Your text is a critical resource for this class—it is a source of definitions, facts, ideas, explanations, derivations, and worked examples. I do not intend to spend class time simply repeating the text. Instead, class time will be used to discuss those ideas, answer your questions, observe demonstrations, do examples, and practice applying those ideas to various physical situations.

Accordingly, you should read the text ahead of time. I have included a detailed daily syllabus so you know approximately where we will be on a given day.

**Ask questions.** If you do not feel comfortable with a particular topic, it is important that you stop me and try to sort it out rather than falling behind. *Please* interrupt and stop the class whenever anything isn’t clear. Remember that if you are confused, there are almost certainly many others who are confused as well, and they would welcome your question.

**Do all assigned work.** A good rule of thumb is that you should anticipate spending approximately two hours outside of class for each hour in class for a college course. This means you should anticipate spending an average of six hours per week outside of class for physics (not including the lab). Plan ahead. I am here to help. If you start on your homework ahead of time, I will be available to help you if you get stuck. Don’t wait until the night before an assignment is due before starting it.

**Participate in class.** Class time will be used to go beyond merely reading the text. Your active engagement during class can play an important part in helping you to master the material. Class time will also be used to announce changes to the syllabus. It is *your* responsibility to keep up.

**Exams:**

There will be three exams on the dates indicated on the syllabus, as well as a final exam
that will be scheduled by the registrar. I will announce the final exam date for this class
as soon as possible. You will receive an equation sheet with each test that will contain all
necessary formulae and constants. The idea is that you will use your study time to focus
on the fundamental ideas and practice doing physics rather than to memorize formulae.

**Homework Problems:**
All planned homework will be assigned through *Mastering Physics*, though I reserve the
right to give written homework if necessary. Homework assignments will be due at 11:59
p.m. one week after they are assigned, typically on Fridays. Notes on homework:

- Homework problems have a maximum of 5 attempts, with point deductions for each
  wrong answer. I *highly* recommend working out all problems on paper before
  submitting an answer. I cannot help you if I don’t know what you did!!

- **Please write neatly.** As someone with terrible handwriting, I know it can be
  impossible for others to read what I write. If I cannot read what you write (e.g., on
  a test), then I will assume the answer is wrong.

- Do not wait until the last minute to start your homework. I cannot help you if you
  have a question at 1 am on Thursday night.

Late work policy: 10% per day, maximum deduction 50% off. These deductions are
made automatically by the software. If you cannot complete a homework due to illness,
family emergency, or similarly compelling reason, please contact me. “My internet went
out” is NOT a compelling, unless there is a week-long, campus-wide power/internet outage.
(Also see the section on “Dean’s excuse policy” in the Student Handbook.)

I encourage you to work with other students on problems involving calculations and
analysis, working with others is the best way to learn. Try the problems yourself. When
you get stuck, talk to someone else about them. Physics is a challenging subject!

**Academic Honesty:**
The fabric of science, and indeed any intellectual endeavor, is built on the integrity of all
involved. Accordingly, I take academic honesty very seriously. I expect that you will abide
by the “Principles of Intellectual Honesty” appearing in the Lafayette College Student
Handbook.

Working with others is often a helpful way to learn physics. I encourage you to col-
laborate with each other on homework, but unless specifically directed otherwise, all work
you turn in as your own should be your own.

Academic dishonesty can hurt you in many different ways. First, of course, it is wrong
to turn in someone else’s work as your own. If you get caught, the penalties can be severe.
Second, it hurts your grade. Learning to do problems by yourself is the best preparation
for the tests. Students who take the “easy” way out and get excessive or inappropriate
help from others tend to get significantly lower grades on the tests.

There are a variety of resources available to help you in your study of physics. These
include my office hours, SI, the ATTIC, and working with classmates. Some students
also find it useful to consult other texts, friends, and even a variety of on-line sources.
In all cases, though the principles of academic honesty apply: All collaborators must be
acknowledged (apart from your instructor), and all work you turn in must be your own.

Please read the department’s Academic Honesty policy for the rules regarding collab-
oration. Feel free to ask if you have any questions about this policy.
Laboratory:
The laboratory is an essential part of this class, and successful completion of the laboratory is required in order to pass the course. You are responsible for completing all of the assigned experiments at the scheduled times. If you cannot make it to your scheduled lab, ask one of the other instructors if you can come to one of the other sections for this course. You can’t count on the equipment being available outside of the scheduled lab times.

Final Exam:
There will be a cumulative final exam at a time to be arranged by the registrar. Please do not make travel plans that conflict with the scheduled exam time.

Grades:
Your grade will be based on homework (25%), midterm tests (10% each, 30% total), the final exam (20%), and the laboratory (25%).

Accommodation: It is important to me that you do well in this class. If you have any circumstance that you feel may interfere with your ability to succeed and prosper in this class, please contact me to discuss ways of accommodating them. In compliance with Lafayette College policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Requests will be handled between the student, myself, and the Academic Tutoring and Training Center (http://attic.lafayete.edu) and must be made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be made.

Disclaimer: You may assume that this document accurately describes the course contents and policies. However, I am not perfect and this document may not be free from mistakes. As such, I reserve the right to make changes as necessary throughout the semester.

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Tentative Schedule:

Week of Jan. 25:  Ch. 19: Electric Charges, Forces, and Fields; HW 1
Week of Feb. 01:  Ch. 19: cont.; Ch. 20: Electric Potential & Energy; HW 2
Week of Feb. 08:  Ch. 20 cont.; Ch. 21: Electric Current & DC Circuits; HW 3
Week of Feb. 15:  Ch. 21 cont.; HW 4
Week of Feb. 22  Ch. 22: Magnetism

**Exam 1: Feb. 26**

Week of Feb. 29:  Ch. 22 cont.; Ch. 23: Magnetic Flux & Induction; HW 5
Week of Mar. 07:  Ch. 23 cont.; Ch. 14: Waves; HW 6
Week of Mar. 14:  Ch. 14 cont.

**Exam 2: Mar. 18**

Week of Mar. 21:  SPRING BREAK !!!!
Week of Mar. 28:  Ch. 14 cont.; Ch. 25: EM Waves; HW 7
Week of Apr. 04:  Ch. 25 cont.; Ch. 26: Optics; HW 8
Week of Apr. 11:  Ch. 27 Optical Instruments; Ch. 28: Interference/Diffraction; HW 9
Week of Apr. 18:  Ch. 30: Quantum physics

**Exam 3: Apr. 22**

Week of Apr. 25:  Ch. 31: Atomic Physics; Ch. 32: Nuclear physics; HW 10
Week of May. 06:  Ch. 32 cont.; Ch. 29: Relativity; HW 11

**Final Exam: TBD**

***SUBJECT TO CHANGE WITHOUT NOTICE***