PHY 180 - Physics II

Instructor: Dr. Kevin B. Aptowicz

Fall 2009

(revised: August 31^{st}, 2009)

Course Summary

Welcome to Physics II! In this course, you will learn about (1) physical phenomena (like electric charge, diffraction, and magnetism); (2) the mathematical framework to analyze physical phenomena (like dot products, cross products, the right-hand-rule, area integrals, and line integrals); (3) central concepts used to analyze physical situations (like electric and magnetic fields, electric potential, magnetic flux, and Gauss' Law); and finally (4) the procedures devised to attack physics problems in a methodical fashion.

Wait! We aren't done yet. This course will also reinforce or develop your time-management skills, your critical and analytical thinking skills, and your communications skills (in particular exchanging ideas about how the physical world works). And, if dreams do come true, this course will nurture in you a long-lasting love (or at least appreciation) for the field of physics. This syllabus will serve both as a contract between instructor and student on how the course will be run and as a guide for the student on the design and content of the course. Please flip through all of the sections and become familiar with the content. I am looking forward to getting to know you through the coming months.

Contents

1 Objectives

This course serves as a required course for certain majors and as a general education science elective. Below are the objectives for both of these roles.

1.1 Physics Objectives

Upon comletion of this course, you should be comfortable analyzing and solve problem involving the following topics:

- Electrostatics (Coulomb's law, electric field, electric potential, electric potential energy, electric flux, Gauss's law)
- Capacitance
- Current, resistance, and DC circuits (Ohm's law, Kirchhoff's laws)
- Magnetic fields in free space (Ampere's law, Biot-Savart law, magnetic flux)
- Faraday's law of induction and motional emf;
- Lenz's law
- Lorentz force law
- Wave properties
- Polarization
- Geometrical optics
- Diffraction

In order to solve these problems, you need a firm grasp the physical phenomena at play, a mastery of the mathematical tools available, and thoroughly understand the procedures devised for each type of problem. This is no easy task and will require a whole semester of effort on both our parts. However, the results of your hard work will bear fruits and I think you'll be delighted with the results.

1.2 General Education Objectives

This course strives to have students meet the following general education goals.

- Ability to communicate effectively
- Ability to employ quantitative concepts and mathematical methods
- Ability to think critically and analytically

2 Course Structure

How do we accomplish the objectives set forth in Section 1? It will require a great deal of effort on both our parts. You will need to be a dedicated student with good time-management skills as well as enough confidence to keep your chin up during rough stretches. I will need to develop pedagogically sound teaching tools that make efficient use of your valuable time and directly address those concepts or material that you find most challenging. This section gets at the heart of both of our roles and addresses how your time will be spent inside and outside the classroom.

2.1 The Calculation ... Student's Time on Task

The life of a student isn't easy. You have many demands on your time beyond this course. I need to be reasonable by not assigning more work than is humanly possible. This calculation is an attempt to due just that. In order to determine how much time a student can commit to my course, I've made the following assumptions.

- The student (that's you!) spends a total of 54 hours a week on their college studies.
- The student course load is 15 credits.

Therefore, the total time a student is able to commit per week to this course is $\frac{54\,\text{hours}}{15\,\text{credits}} \times 4\,\text{credits} = 14.4\,\text{hrs}$. These precious hours are allotted to the following tasks.

Table 1: Student time on task per week.

Task	**Time (hrs)**
actively participating in lecture, lab, and recitation	6
preclass reading	3
practice problems	4
laboratory assignments	1.4

Details about each of these tasks are given in the next subsection.

2.2 Course Components

Here is a list of the different aspects of the course and the thinking behind each one.

Preclass Reading Yes, you must read before coming to class. Since we have so little lecture time, we must focus on the more challenging concepts in the course. Thus, it critical that you come to lecture knowing the basic elements which we will build on in lecture that day. I have allotted one hour of reading before each lecture. The reading for each day will compose of approximately 6 pages. You need to think deeply about the content and might need to read certain section multiple times. To help you focus on the import points in the text I will devise reading questions for each reading assignment.

Lecture You should be familiar with this part. I attempt to make it engaging and encourage lots of questions.

Concept Questions This is a pedagogical tool to test whether you understand the main point I'm trying to make during lecture. I might also use it to check if you are clear about a subtle issue. Concept Questins also improve your ability to discuss and explain your critical and analytical thinking with your classmates. They promote active thinking during lecture time (rather than rote note-taking) which is critical to the learning process.

Assigned Problems These are problems assigned from the back of the text. They serve to reinforce the course material as well as to act as practice problems for the exam. You are expected to work on these problems after each lecture. If you find yourself struggling with the problems, please seek out a study group, a tutor, or my help. Of course, recitation is an excellent time to receive additional help.

Recitation I use recitation to reinforce problem solving skills that you need to perform well on the exam. It is general driven by which problems students are struggling with the most.

Lab The laboratory portion of this course is separate from the lecture portion. Your lab instructor will provide you with a syllabus on how the laboratory section will be run.

3 Instructor and Course Information

Course:	PHY 180
Text:	Halliday, D, R. Resnick, and J. Walker. 2005. Fundamentals of Physics (Eighth Edition). Hoboken, NJ: John Wiley & Sons.
Website:	http://courses.wcupa.edu/kaptowicz/courses/phy180/PHY180.html
Lecture Location:	112 Merion Hall
Lecture Time:	MWF 10:00 am - 10:50 am
Recitation Location:	112 Merion Hall
Recitation Time:	Tuesday 2:00 pm to 3:00 pm

Instructor:	Kevin B. Aptowicz (Dr. Aptowicz)
Office Location:	Merion 128
Office Phone:	(610) 436-3010
Email:	kaptowicz@wcupa.edu
Office Hours:	Tu 3:00 -4:00 pm WF 11 am - 12 pm and 1 pm - 2:00 pm

4 Grading Procedure

Grades! For some, this is the most interesting secton. Enjoy.

4.1 Methods for Calculating Your Grade

Two methods will be used to calculate your grade. The resulting highest grade will be your grade for the course.

Method #1	
Regular Exams	66%
Final Exam	22%
Lab	12%

Method #2	
Regular Exams	60%
Final Exam	20%
Lab	12%
Reading Quizzes	4%
Practice Problems	4%

4.2 Grading Components

Regular Exams: There are a total of four regular exams that will occur though-out the semester. The highest three will be averaged to determine your grade for this component.

Final Exam: The final exam is a cumulative exam that occurs at the end of the course. It will focus on the topics listed in Subsection 1.1.

Lab: The grade for this component will be determined by your lab instructor.

Reading Quizzes: Twelve times during the semester you will be asked to take a multiple choice reading quiz. The scoring for that quiz is

Number Correct	**Score**
0	10%
1	50%
2	80%
3	100%

The highest nine scores of these twelve reading quizzes will be averaged to determine your grade for this component.

Assigned Problems: Assigned Problems are the weekly assigned problems or questions fromt he back of the chapter. I will collect your work at recitation each week and reutrn it to you the following day. There will be no grades assigned just a check for meets class standards or a NG for not gradeable. Your grade for this component will be the fraction that meet standards multiplied by 100. Thus the highest score for this component is an 100.

4.3 Letter Grade Assignment

I assign letter grades according to the following scale.

Numerical Grade	Letter Grade
93.4 - 100.0	A
90.0 - 93.3	A-
86.7 - 89.9	B+
83.4 - 86.6	B
80.0 - 83.3	B-
76.7 - 79.9	C+
73.4 - 76.6	C
70.0 - 73.3	C-
66.7 - 69.9	D+
63.4 - 66.6	D
60.0 - 63.3	D-
below 60.0	F

I do not normalize (or curve) grades.

5 Course Policies

There are numerous course policies that can be found below. If you need more details or have a question, stop by my office.

5.1 Exams Policy

There are no make-up exams. Since one exam is dropped, please do not miss more than one exam.

5.2 Academic Integrity Statement

If you violate the University policies of academic integrity, you will receive zero credit for the entire course. This is not negotiable, and I will not waste time on the odd student who does not have a proper respect for the education process. Ignorance of what constitutes a violation of academic integrity is not an excuse. See the section on Academic Integrity starting on page 47 of the Undergraduate Catalog for more details.

5.3 Assigned Problems

Assignred problems (aka problem sets or homework) will be collected and checked each week. If you are unable to attend reciation, you may slide you assigned problems under my door. More information can be found in subsection 4.2.

5.4 Attendance and Lateness Policy

If you are late to class and the reading quizzes have been collected, you will not be allowed to take the quiz and receive a 0 for that quiz grade. Note, a fraction of the quiz grades are dropped when calculating your final grade. More information can be found in subsection 4.2.

5.5 Teaching Style

This course will rely heavily on lectures using the chalk board as well as concept questions projected onto a screen. If you have problems seeing the chalk board, please move to the front of the class.

5.6 LGBTQA Ally

Based on West Chester University's commitment to diversity, I believe that everyone in my classroom should feel safe. I have completed the University's Lesbian, Gay, Bisexual, Transgender, Queer, Questioning Ally training. In becoming an ally I made the commitment to offer a safe space for all of my students, not just those who identify as LGBTQA. If you or someone you know would like to know more about this program, or needs to speak confidentially about issues of sexual orientation or gender identity, please feel free to see me during my office hours.

5.7 Disability

We at West Chester wish to make accommodations for persons with disabilities. Please make your needs known by contacting the Office of Services for Students with Disabilities at extension 3217 as well as myself. Sufficient notice is needed in order to make the accommodations possible. The University and I desire to comply with the ADA of 1990.

5.8 Public Safety

The Emergency Communication Committee has made the recommendation that the emergency phone number for WCU's Department of Public Safety be listed on all course syllabi. That number is 610-436-3311. This specific recommendation is made to help the campus be prepared in case of an emergency situation.

6 Schedule

To accomplish all of the objectives set forth in Section 1 will require us to stick to a firm schedule. I've listed the schedule below. I will send out more information at that time. However, no matter what, the exams for this course will fall on the designated days.

Table 2: Schedule of lectures and reciations.

Class	Date	Day	Lecture	Topic	Sections
1	Aug 31	M	1	Introduction; Electrostatics	21-1 to 21-4, 21-5, 21-6
2	Sep 2	W	2	Electrostatics	21-4
3	Sep 4	F	3	Electrostatics	22-1 to 22-5, 22-8
	Sep 7	M		No Class - Labor Day	
4	Sep 9	W	4	Gauss' Law	23-1 to 23-4, 23-6
5	Sep 11	F	5	Gauss' Law	23-7 to 23-9
6	Sep 14	M	6	Electric Potential	24-1 to 24-4
7	Sep 16	W	7	Electric Potential	24-5 to 24-7, 24-10
8	Sep 18	F	8	Capacitance	25-1 to 25-3
9	Sep 21	M	9	Capacitance	25-4 to 25-5
10	Sep 23	W		**Exam #1 ... Chapters 21-24**	
11	Sep 25	F	10	DC circuits	26-1 to 26-3
12	Sep 28	M	11	DC circuits	26-4 to 26-6
13	Sep 30	W	12	DC circuits	26-7, 27-1 to 27-4
14	Oct 2	F	13	DC circuits	27-5, 27-6
15	Oct 5	M	14	DC circuits	27-7
16	Oct 7	W	15	RC circuits	27-9
17	Oct 9	F	16	Magnetostatics	28-1 to 28-4
	Oct 12	M		No Class - Fall Break	
18	Oct 14	W	17	Magnetostatics	28-6, 28-7
19	Oct 16	F		**Exam #2 ... Chapters 24-27**	
20	Oct 19	M	18	Magnetostatics	28-8, 28-9, 28-10
21	Oct 21	W	19	Magnetostatics	29-1, 29-2
22	Oct 23	F	20	Magnetostatics	29-3 to 29-5
23	Oct 26	M	21	Induction	30-1 to 30-4
24	Oct 28	W	22	Induction	30-5, 30-6
25	Oct 30	F	23	Induction	30-7 to 30-10
26	Nov 2	M	24	AC circuit	31-1 to 31-4
27	Nov 4	W	25	AC circuit	31-5 to 31-7
28	Nov 6	F	26	AC circuit	31-8
29	Nov 9	M	27	AC circuit	31-9
30	Nov 11	W	28	Maxwell's Equations	32-1 to 32-4
31	Nov 13	F		**Exam #3 ... Chapters 28-31**	
32	Nov 16	M	29	Maxwell's Equations	32-5, 32-6, 32-8
33	Nov 18	W	30	EM Waves	33-1 to 33-3
34	Nov 20	F	31	EM Waves	33-7, 33-8
35	Nov 23	M	32	Geometrical Optics	34-1 to 34-5
	Nov 25	W		No Class - Thanksgiving	
	Nov 27	F		No Class - Thanksgiving	
36	Nov 30	M	33	Geometrical Optics	34-7
37	Dec 2	W	34	Interference	35-1 to 35-3
38	Dec 4	F	35	Interference	35-4
39	Dec 7	M	36	Interference	35-5, 35-6, 35-8
40	Dec 9	W	37	Diffraction	36-1 to 36-4
41	Dec 11	F		**Exam #4 ... Chapters 33-35**	
42	Dec 14	M		Review	
	Dec 16	W		**Final Exam** (10:30 to 12:30)	