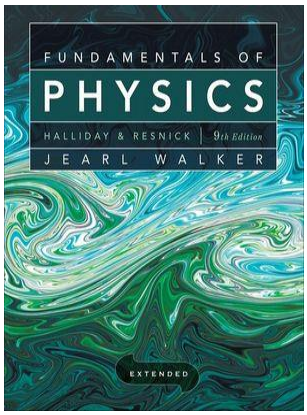
PHYS 241-1 Electricity, Magnetism and Light Fall, 2013
Instructor: Dr. Cattell Office: W4-33



PHYS 241 is the second course of the standard calculus-based Physics sequence required for Engineering and the physical sciences. Calculus II and PHYS 140, both with a grade of C or better, are prerequisites for this course. (Calculus II may be taken concurrently.)

Text: *Fundamentals of Physics* (ninth edition) by Halliday, Resnick and Walker. Published by John Wiley & Sons, Inc. *Notes:* You should have the ninth edition in order to do the homework problems. The Extended Edition is recommended but not required.

Outline

Chapter 21 Electric Charge
Sections 21-1 to 21-6

Chapter 22 Electric Fields
Sections 22-1 to 22-9

Chapter 23 Gauss' Law
Sections 23-1 to 23-9

Chapter 24 Electric Potential
Sections 24-1 to 24-12

Chapter 25 Capacitance
Sections 25-1 to 25-6

Chapter 26 Current and Resistance
Sections 26-1 to 26-7

Chapter 27 Circuits
Sections 27-1 to 27-9

Chapter 28 Magnetic Fields
Sections 28-1 to 28-10

Chapter 29 Magnetic Fields Due to Currents
Sections 29-1 to 29-6

Chapter 30 Induction and Inductance
Sections 30-1 to 30-11

Chapter 31 Electromagnetic Oscillations and Alternating Currents
Sections 31-1 to 31-11

Chapter 32 Maxwell's Equations; Magnetism of Matter
Selected Sections

Chapter 33 Electromagnetic Waves
Sections 33-1 to 33-10

Chapter 34 Images
Sections 34-1 to 34-7

Chapter 35 Interference
Sections 35-1 to 35-7

Chapter 36 Diffraction
Sections 36-1 to 36-3, 36-7, 36-8

Resources

1. Library References
   a. *Physics* (ninth edition) by Cutnell and Johnson; Wiley (2009)
   b. *University Physics* (fourth edition) by Sears, Zemansky and Young; Addison-Wesley (1970)

2. Computer Resources
   a. *Maple*. This is a computer algebra system that will be used in the lab.
   b. *PSpice*. Computer software for solving electric circuit problems. This will be demonstrated in the lab.

3. Online Resources
   a. *Fundamentals of Physics* ninth edition site has a link to the Student Companion site. Click the picture of the textbook on your Professor's website.
   b. *The Fundamental Physical Constants* features the latest values for the constants. This is on your Instructor's website.
   c. *Guide for Metric Practice* summarizes the SI system of units. This is on your Instructor's website.
   d. *Physics Today Online*, the current issue of *Physics Today* with latest physics news. http://www.aip.org/pt/

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Tests

Tests given in this course:

1. Six hour tests during the semester. The first is on Thursday, September 19.
   (See the homework assignments for the dates of the other tests.)

2. A comprehensive final exam at the end of the semester.

Determination of Grade

Homework 10%

Lab Reports 20%

Tests 45%

Final 25%

If you take all the hour tests, your lowest hour test grade will be dropped. At the end of the course you will have a course average calculated from the averages of your homework, lab reports and hour test grades and your grade on the final (with the weights shown above). Your course average will be a number between 0 and 100. If your laboratory average is at least 60% the following scale determines the letter grade you receive for the course:

90-100 A

80-89 B

70-79 C

60-69 D

Below 60 F

If your laboratory average is less than 60% you will receive an F regardless of your overall course average.

Homework

The only way to learn a subject is to practice it yourself. It is therefore important that you do the homework and turn it in. Your test scores will reflect how well you learned the material assigned for homework. (Note that homework and tests together account for 55% of your final grade.)

Laboratory Sessions

You should be scheduled for a two-hour laboratory session, which meets once a week. You are required to have Volume II of the Physics Laboratory Instructions, which is available in the Community College of Philadelphia Bookstore.

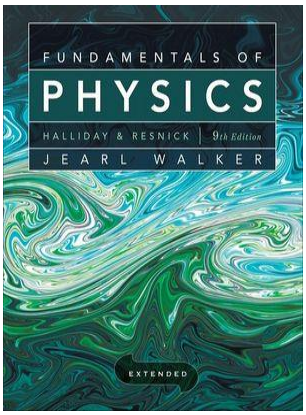
Attendance

Class attendance will be taken. It is important that you do not miss class unnecessarily. If you miss two consecutive weeks of class the instructor may initiate an official "drop" form for you and send it to the Registrar who will inform you and change the permanent record accordingly.

Final date to drop courses without penalty of an F grade:
Monday, November 18, 2013.

PHYS 241-1 Homework **Fall, 2013**

Text: *Fundamentals of Physics* by Halliday, Resnick and Walker, ninth edition Dr. Cattell



Homework is to be done through WileyPLUS. WileyPLUS can be accessed at http://edugen.wileyplus.com/edugen/class/cls341687/ or through your instructor's web page. You must first register for WileyPLUS using the instructions that came in the package with your textbook and lab manuals. See your instructor if you have questions or need help. The problem numbers given below are for your reference and practice before you submit your answers through WileyPLUS. (*Note:* The problems will be the same but numerical values may be different when you use WileyPLUS.)

Homework should be done through WileyPLUS by the date specified below. ***Homework is due by 11:00 PM on the indicated due date.*** You will not be able to work on the assignment after this time.

Chapter 21 Electric Charge
p. 575 2, 3, 5, 7, 9, 12, 27, 29, 51, 54

Chapter 22 Electric Fields
p. 598 2, 3, 9, 19, 21, 22, 24, 32, 35, 49, 53, 61

Chapter 23 Gauss' Law
p. 621 1, 2, 5, 7, 19, 21, 29, 36, 37, 41, 45, 47

Homework for Chapters 21, 22 and 23 is due on Friday, September 20. Test 1 is on Thursday, September 19.

Chapter 24 Electric Potential
p. 647 3, 5, 11, 17, 19, 29, 35, 41, 45, 47, 63, 65

Chapter 25 Capacitance
p. 676 2, 5, 9, 10, 15, 19, 26, 31, 34, 36, 45

Homework for Chapters 24 and 25 is due on Friday, October 4. Test 2 is on Thursday, October 3.

Chapter 26 Current and Resistance
p. 700 1, 5, 13, 16, 17, 19, 21, 25, 39, 41, 43, 49

Chapter 27 Circuits
p. 725 Question 6, Question 8
p. 726 4, 5, 19, 25, 27, 29, 37, 41, 51, 49, 59, 62, 69, 70

Homework for Chapters 26 and 27 is due on Friday, October 18. Test 3 is on Thursday, October 17.

Continued on the other side

PHYS 241-1 Homework **Fall, 2013**
Text: *Fundamentals of Physics* by Halliday, Resnick and Walker, ninth edition Dr. Cattell

Chapter 28 Magnetic Fields
p. 757 1, 9, 14, 19, 17, 21, 29, 41, 39, 51, 53, 55, 61

Chapter 29 Magnetic Fields Due to Currents
p. 782 1, 3, 8, 9, 13, 17, 21, 31, 41, 43, 49, 57, 63, 64

Homework for Chapters 28 and 29 is due on Friday, November 1. Test 4 is on Thursday, October 31.

Chapter 30 Induction and Inductance
p. 818 2, 15, 21, 31, 37, 40, 44, 55, 63, 69

Chapter 31 Electromagnetic Oscillations and Alternating Current
p. 855 2, 5, 9, 13, 19, 25, 31, 37, 43, 47, 45, 53, 55, 63

Homework for Chapters 30 and 31 is due on Friday, November 15. Test 5 is on Thursday, November 14.

Chapter 32 Maxwell's Equations; Magnetism of Matter (*Extra credit*)
p. 883 3, 15, 17, 18, 40

Chapter 33 Electromagnetic Waves
p. 915 4, 5, 7, 8, 11, 17, 21, 25, 26, 33, 35, 45, 51, 57, 65, 69

Homework for Chapters 32 and 33 is due on Friday, November 29. Test 6 is on Tuesday, November 26.

Chapter 34 Images
p. 949 1, 3, 7, 11, 13, 43, 45, 58

Chapter 35 Interference
p. 981 4, 11, 13, 19, 29, 33, 39

Chapter 36 Diffraction
p. 1014 3, 5, 7, 9, 37, 40, 45

Homework for Chapters 34, 35 and 36 is due on Monday, December 9.
Thursday, December 5 is the last day of class.

Calculus Formulas and Techniques you should know for PHYS 241

You should be able to find all the following in your Calculus text.

Derivatives

You should know the power rule, product rule, and quotient rule.

You should know the derivatives of all six trigonometric functions.

You should know the chain rule and how to do implicit differentiation.

You should know how to calculate differentials.

You should know the derivatives of ln(x), e^x and a^x.

You should know the derivatives of $Sin^{-1}(x)$, $Cos^{-1}(x)$ and $Tan^{-1}(x)$.

You should also be familiar with indeterminate forms and L'Hôpital's rule.

Integrals

You should know the basic list of integral formulas in the chapter on techniques of integration in your calculus text.

You should also know the following techniques of integration:

Integration by substitution.

Integration by parts.

Trigonometric substitutions.

You should also know how to calculate improper integrals.

Student Learning Outcomes for Physics 241

1. Demonstrate an understanding of the concepts of electric charge and electric field and be able to find forces, fields and flux using Coulomb's and Gauss's law.

2. Demonstrate an understanding of the concept of electric potential and use it together with the concept of resistance and current to solve DC circuit problems.

3. Demonstrate an understanding of the concepts of networks and circuit theory by solving network problems and problems involving AC circuits.

4. Demonstrate an understanding of the concept of the magnetic field and how magnetic fields are produced by electric currents.

5. Demonstrate an understanding of electromagnetic induction.

6. Demonstrate an ability to solve problems related to the refraction and diffraction of light, including image formation and diffraction patterns.

Policy for Missed Tests and Repeated Work

The following policy applies to hour tests given during the semester.

All Tests Taken

If you take all the tests, your lowest test grade is discarded when determining your average at the end of the semester.

One Test Missed

If you miss one test, you are not allowed to make it up. (This policy is followed *regardless of the reasons* you missed the test.) Instead, the grade of the missed test is counted as the lowest grade and discarded as stated above. All remaining test grades are counted in the average.

More Tests Missed

If you miss more than one test, the first test you missed is handled as stated above under "One Test Missed" and the rest that you missed are counted as zeros and are not dropped. (Again, this policy is followed *regardless of the reasons* you missed the tests.)

Remarks

You should always be aware of the test schedule. You will always be told in advance when you are going to have a test.

If you had a grade of at least 70 in the last test you took[1] in the course and you know in advance that you will not be able to take the next test at its scheduled time (due to work, a doctor's appointment, etc.) let the instructor know *before* the time of the next test. The instructor may let you take the test at an alternate time. If you do not take the test at the alternate time, the instructor, at his discretion, may drop the test or count the test as a zero according to the policy given above. *You may make up only one test*.

(*Note:* Tests taken during the class period *before* the scheduled time for a test are not counted as make up tests. Let the instructor know by the day before the test if you need to take the test before its scheduled time.)

Repeated Work

Tests once taken cannot be repeated, including the Final. Work resubmitted after the due date will not be accepted; only work submitted by the due date will count as part of your grade.

[1]If you are requesting an alternate time for the *first* test you have to take the second test at its regularly scheduled time and obtain a grade of at least 70.

COMMUNITY COLLEGE OF PHILADELPHIA
DEPARTMENT OF PHYSICS
POLICY CONCERNING
ACADEMIC DISHONESTY

American higher education and science have an old and strong tradition of honesty. There is no room in academia or science for cheating or any other type of academic dishonesty. Many of the nation's universities and colleges rely on an honor system concerning examinations; to be found cheating during an examination is the basis for immediate expulsion.

Cheating may be defined as (a) looking at another student's examination paper, (b) asking another student for any type of help during an examination, (c) bringing notes of any type not allowed by the instructor to an examination, (d) presenting work done by another as your own (plagiarism), (e) falsification of information including laboratory data, (f) lying, (g) making notes during an examination on scrap paper to give to another student, (h) stealing an examination, (i) asking another person for help on take-home examinations, (j) writing notes on desk tops, (k) passing calculators that contain information to another student, (1) changing answers on an examination after it has been turned in, and (m) having another student take an examination for you. Any of these violations constitutes a highly serious offense which will ultimately result in some type of disciplinary action.

Persons properly trained in science, perhaps more so than the general public, find scientific and academic cheating highly offensive. How can one trust the laboratory data or scientific findings of a person known to cheat? Will this person make an honest scientist or engineer? Does this person or his personal work have any integrity? One single instance of cheating can cast doubt on everything that person does, and it can follow one for a lifetime.

Students caught cheating will find that it may result in (a) a grade of zero on the test or assignment, (b) removal from the course, (c) your name being reported to the Office of Academic Affairs, with the recommendation that you be expelled from the college. If you are not expelled, all your present and subsequent professors will be notified of your academic dishonesty. Last, you will never receive any letter of recommendation from any Community College of Philadelphia Physics Department faculty member.

Now think it over, is cheating worth the risk of having the above happen to you? If you think these things won't happen, you are sadly mistaken. You will find out the hard way. The great majority of students are honest, and cheating is not usually a problem. We apologize to those of you who work honestly that we have found it necessary to write this statement because of a few who are dishonest.

The above is based on the Community College of Philadelphia Department of Chemistry Policy Concerning Academic Dishonesty dated September 1994.

Are You Overloaded?

A common problem among college students is overloading – trying to handle more work than is possible. If you work at a job or have other time-consuming responsibilities while attending college it is important that you do not take on excess course work. The following describes a simple formula you can use to determine if you are overloaded.

Study Time – You must allow yourself ample study time for the courses that you take. This includes time for homework assignments. As a rule of thumb multiply the number of credit hours that you take by 2. This gives the *minimum* number of hours per week you should spend studying.

Time in Class – You must allow for the time you spend at the College attending courses. This is the number of hours you are present in class (and in lab) per week.

Hours Working – You must allow for the time you spend at work and the time you spend for other *regularly-scheduled* responsibilities that do not allow you to do college work. Add together the number of hours you spend on all these activities per week.

Add together your Study Time, Time in Class and Hours Working. This total **should not exceed 60 hours per week**. If the total exceed 60 hours per week, your course work will suffer and your grades will meet neither your expectations nor your ability.

Example 1 A student works part-time 15 hours per week and is taking 12 credits. The time she spends in class and lab amounts to 15 hours per week.

Study Time:	$2 \times 12 = 24$ hours/week
Time in Class:	15
Subtotal:	39 hours/week
Hours Working:	15
Total:	54 hours/week

This student is not overloaded.

Example 2 A student works part-time 25 hours per week. He also spends one hour every weeknight helping an elderly relative with housework. He is taking 10 credits and spends 12 hours per week in class and lab.

Study Time:	$2 \times 10 = 20$ hours/week
Time in Class:	12
Subtotal:	32 hours/week
Hours Working:	30
Total:	62 hours/week

This student is overloaded and needs to either: 1) reduce his hours working or 2) reduce the number of credits he is taking, whichever is appropriate for his situation.

Dr. David F. Cattell, Fall 2013

Office: W4-33

Office Hours: 11:30 AM to 12:30 PM on Mondays and Wednesdays; 3:00 PM to 4:00 PM Wednesdays;
11:00 AM to 12:30 PM on Tuesdays and Thursdays.

Office Telephone: (215) 751-8417
Fax: (215) 496-6059

Internet email: dcattell@ccp.edu

Dr. Cattell's Web page: http://faculty.ccp.edu/faculty/dcattell/

Students who are registered with the Center on Disability must inform the instructor by the end of the first week of classes if special accommodations are requested.

To Students Receiving Title IV Financial Aid Funds

Effective Fall 2000, students who receive Title IV financial aid funds and who withdraw from ALL their classes before completion of 60% of the term, i.e., the 10th week (or its equivalent for summer terms) may be required to return all or a portion of their financial aid award. If it is determined that funds must be returned to the financial aid programs, students must make satisfactory payment arrangements within 45 days of notification or they become ineligible for further financial aid funding.

College Catalog

The College catalog is available online. It contains, among other things, the current College calendar, information on tuition and fees, information on academic programs, admissions information, financial aid information, College notices, student policies, information on educational programs and course descriptions.

For the current College catalog see

http://www.ccp.edu/site/academic/college_catalog.php

Telephone Numbers

Main Switchboard: 751-8000
Academic Advising: 751-8893
Student Activities: 751-8210
Bookstore: 751-8150
Security: 751-8111

Declaration of Receipt of the Physics 241-1 Course Syllabus
Fall, 2013

I, the undersigned student, attest that I received the following documents from the course instructor, Dr. David F. Cattell, for section 001 of the Physics 241 course, Electricity, Magnetism and Light, at Community College of Philadelphia for the Fall 2013 semester:

- Course outline titled "Electricity, Magnetism and Light" which includes an explanation of the grading procedure for the course.
- A copy of the homework assignments which indicates when assignments are due, how they are to be submitted and the dates of hour tests.
- A document titled "Calculus Formulas and Techniques you should know for PHYS 241" which gives calculus topics the student should be familiar with for the course.
- A document titled "Student Learning Outcomes for Physics 241" which summarizes learning objectives for the course.
- A document titled "Policy for Missed Tests and Repeated Work" which includes a description of the procedure that will be followed if a student misses a test or resubmits work after the due date.
- A document titled "Community College of Philadelphia Department of Physics Policy Concerning Academic Dishonesty" which includes a definition of cheating and a description of the procedure that will be followed if a student is caught cheating.
- A document titled "Are You Overloaded?" which cautions against overloading and provides a formula for a student to determine if he or she is overloaded.
- A document titled "Dr. David F. Cattell, Fall 2013" which gives the course instructor's Website URL, email address, fax number, office telephone number, office location and office hours for this semester.

I also attest that I understand the contents of these documents and agree to abide by any policies they describe.

Name (printed) _____ Signature _____

ID Number _____ Email _____ Date _____

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