PHYS 214 Syllabus

Summer II 2011

General information

Instructor: Dr. Victor Klymko

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Web page: http://www.olemiss.edu/depts/physics_and_astronomy/faculty/klymko.html

Office hours: every business day in the Summer II term, 3 pm – 4 pm, or by appointment

Office: 5 Kennon Observatory

Lecture: Monday, Tuesday, Wednesday, Thursday, Friday 10:00 – 11:50 a.m. in 109 Lewis Hall

Text: D. C. Giancoli, *Physics: Principles with Applications,* 6th ed., Pearson, 2005,

ISBN 0-13-060620-0

Description

This is the second part of a two-course sequence on general physics. The course is mainly for pre-med majors. The first part of the sequence, PHYS 213, is a pre-requisite for this course. The students must also take, unless previously passed, the laboratory course PHYS 224.

The main topics discussed in PHYS 214 are electricity and magnetism, electric circuits, electromagnetic waves, and optics. The students are expected to have working knowledge of algebra.

Learning goals

Upon successful completion of this course, a student should

- gain understanding of the physics concepts discussed in the course and be able to express this knowledge using correct physics terms.
- develop and improve problem solving skills, including logical reasoning, ability to apply the correct concept, ability to correctly solve a set of equations for designated unknowns.

Evaluation

Homework will be **posted on blackboard** after every lecture and is due the following lecture. A homework solution example and the homework partial credit rules are at the end of the syllabus. All steps of the solution are required for full credit. A correct answer alone will

be given only 10% of the credit.

Quiz: An **online** quiz will be posted on blackboard after almost every lecture. Each quiz is due next day and contains 4 questions (multiple choice or numerical answer or short answer). The questions will reflect very basic, but important, concepts that were learned by reading the textbook. The quizzes are restricted to 20 minutes. Make sure you have read the book and also know how to use the blackboard system before you start. Do NOT use wireless or cell phone-based internet. Use the landline. You will NOT have another chance if you get disconnected during the quiz.

Tests Two **closed book** tests will be given in class. Test 1 (electricity and circuits) is on July 11. Test 2 (magnetism, electromagnetic waves, and optics) is on July 25.

Final exam is **closed book, comprehensive**.

It will take place on Thursday, July 28, at noon, in 109 Lewis Hall.

Grading

The grades will be posted on Blackboard. The students are responsible for verifying their grades and notifying their TA, grader, and professor if a mistake occurs.

The assignments will contribute to the final grade as follows:

Attendance (no more than ONE day of class is missed for ANY reason) – 10%
Quizzes - 10%
Homework assignments - 35%
Test 1 – 10%
Test 2 – 10%
Final exam – 25%

Letter grades: 90-100 is an **A**, 80-89 is a **B**, 70-79 is a **C**, 60-69 is a **D**, below 60 is an **F**.

Policies

Attendance: An absent person does not deserve the attendance credit.

Tardiness: A person who enters class late or a person who leaves early is considered absent for the day.

Late homework: A 10% **per day** penalty will apply for all late homeworks.

Missed test: Make-up **tests** are possible in three cases: 1) a documented illness, 2) participation in an official university activity, and 3) a family emergency. A written statement from a doctor, a team coach, or another official that justifies the absence is required for the

make-up. Generally, the make-up test will be harder than the initial test.

The final exam cannot be re-scheduled. There will be no make-up for the final exam.

Academic integrity: Discussion of the topics learned in class, methods for solving test and homework problems is encouraged. However, **the homework assignment must be done individually**. Identical homework assignments and their parts will be given a **zero** grade.

Tentative schedule of lectures and tests

Date	Chapter	Topic
6/30	16	Electric charge and electric field
7/1	17	Electric potential
7/5	18	Electric currents
7/6	18	Electric currents
7/7	19	DC circuits
7/8	19	DC circuits
7/11		**Test 1**
7/12	20	Magnetism
7/13	20	Magnetism
7/14	21	Electromagnetic induction and Faraday's law
7/15	21	Electromagnetic induction and Faraday's law
7/18	22	Electromagnetic waves
7/19	23	Geometric optics
7/20	23	Geometric optics
7/21	24	Wave nature of light
7/22	24	Wave nature of light
7/25		**Test 2**
7/26	25	Optical instruments
7/27		**Review session**
7/28		**Final Exam**

Resources

Do read the textbook before attempting the homework.

Do read the textbook again before the quiz or test.

Please **ask questions**. The more questions you ask, the better you understand the material, the higher your grade will be.

Free tutoring is provided in 104 Lewis Hall. Please check the schedule on the door.

Use professor's office hours to ask questions as well.

The test problem solutions will be presented after each test.

How to solve homework problems

1. Read the problem carefully. Pay attention to all details.
2. Realize what quantities are **known** and what quantities you will be looking (solving) for. What are the units of these values?
3. Read the problem again and **make a sketch** of the situation described in it. **Always start with a coordinate system.** Draw symbols for all known and unknown values on the sketch.
4. In the book, **find** the physics concepts or the laws of physics that will be used in the solution. **Write down the concepts** (laws) **that will be used** to solve the problem. This is your plan for solving the problem.
5. **Write down the formula** or equation that represents each concept. You must have as many equations as there are unknowns.
6. Solve the equations using algebra. Obtain the answer in a symbolic form. **Do not use a calculator at this stage.**
7. Substitute the numbers in the symbolic solution. Obtain the answer in a numeric form. **Verify the units.**

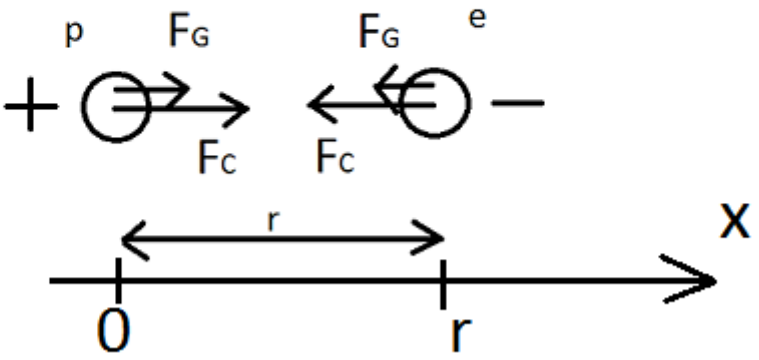
Example:

Compare the electric force holding the electron in orbit around the proton in the hydrogen atom with the gravitational force between the same electron and proton. Find the ratio of these forces.

Known: *from the problem:* distance between electron and proton $r = 0.53 \times 10^{-10}$ m;
from the book or internet:
charge on electron $q_1 = -1.60 \times 10^{-19}$ C; charge on proton $q_2 = 1.60 \times 10^{-19}$ C; proportionality constant in Coulomb's law $k = 9.0 \times 10^{9}$ Nm^2/C^2 ; proton mass $m_p = 1.67 \times 10^{-27}$ kg;
electron mass $m_e = 9.11 \times 10^{-31}$ kg; gravitational constant $G = 6.67 \times 10^{-11}$ Nm^2/kg^2

Unknown: Coulomb force F_C, Gravitational force F_G; their ratio F_C / F_G

Sketch:



Solution:

Concept(s): I will use the Coulomb's law and Newton's law of gravitation to solve this problem.

Equations: Coulomb's law $F_C = k\, q_1\, q_2 / r^2$; gravitation law: $F_G = G\, m_p\, m_e / r^2$;
ratio = $F_C / F_G = | k\, q_1\, q_2 | / | G\, m_p\, m_e |$ [the r^2 term cancels when two formulas are divided, the value of r is not even needed to solve this problem !]
This is the answer in a **symbolic form** !
Calculations: ratio = $| 9.0 \times 10^{9}\ Nm^2/C^2 \times (-1.60 \times 10^{-19}\ C) \times 1.60 \times 10^{-19}\ C | /$

$$/ |6.67 \times 10^{-11}\ Nm^2/kg^2 \times 9.11 \times 10^{-31}\ kg \times 1.67 \times 10^{-27}\ kg|$$

$$= 0.23 \times 10^{9-19-19-(-11)-(-31)-(-27)} = 0.23 \times 10^{40} = 2.3 \times 10^{39}$$ [units cancel]

Note1: We are interested in the ratio of the forces, not their directions. Therefore, we take absolute value of each force and thus ignore the negative sign. The **sign represents the direction** of the force. Note the opposite direction of the forces acting on proton and electron.

Note 2: The result is rounded to the smallest number of significant figures in the initial data, i.e. 2 figures.

Note 3: Carefully check and see that all units cancel out (**only in this problem !**) during the calculation.

Note 4: When dividing the powers of 10, the power in denominator must be subtracted.

Homework partial credit rules:

Work done for each problem	Credit for each problem
Sketch with coordinate system and lables	20%
Plan for solving the problem: which concept(s) to use	20%
Equation(s) that represent the above concept(s). Equations must be specific to the particular problem, for instance, use the coordinate system and labes from your sketch when you write the equations.	20%
Algebraic solution of the equations	20%
Numerical solution	10%
Answer with units	10%
Total	100%