PHYS 213 Syllabus for section 5

Fall 2010

General information

Instructor: Dr. Victor Klymko

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Office hours: Monday, Wednesday, Friday 10:00 am – 10:50 am or by appointment

Office: 5 Kennon observatory; Phone: 662-915-7849

Lecture: Tuesday, Thursday 9:30 – 10:45 am in 101 Lewis Hall

Text: D. C. Giancoli, *Physics: Principles with Applications,* 6th ed., Pearson, 2005, including Mastering Physics student access kit. ISBN 0-13-060620-0

Description

This is the first part of a two-course sequence on general physics for pre-med majors. The students must also take, unless previously passed, the laboratory course PHYS 223.

The main topics discussed in PHYS 213 are kinematics and dynamics, work, energy, linear and angular momenta, equilibrium, basic physics of fluids, vibrations and waves, sound, temperature, and heat.

The students are expected to have working knowledge of algebra and trigonometry, i.e. be able to solve linear, quadratic, and trigonometric equations and systems of linear equations that consist of symbols. After a symbolic solution is obtained **without** using a calculator, a student should be able to substitute the numbers into this algebraic solution to obtain the numerical answer.

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 and to use the correct equation, ability to solve a set of equations for designated unknowns and to check the answer for common sense.

Evaluation

Homework will be assigned for every chapter covered in class and is due the following week. A homework solution example is attached to the syllabus. All steps of the solution described in the example are required for full credit. The partial credit rules for the homework are attached to this syllabus as well. Please follow the

requirements described in these rules when solving a problem. A correct answer alone will be given only a small portion of the credit.

Quiz: A 5 to 10 min quiz will be given at the beginning of random classes. Each quiz will contain 2 or 3 questions. A one sentence answer will be expected. The main purpose of the quizzes is to ensure that the students actually do read the textbook.

Tests Two **closed book** tests will be given after chapters 4 and 9.

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

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 (less than 3 classes missed) – 10%

Quizzes - 10%

Homework assignments - 35%

2 Tests – 10% each

Final exam – 25%

Letter grades: 89-100 is an **A**, 79-89 is a **B**, 69-79 is a **C**, 59-69 is a **D**, < 59 is an **F**.

Policies

Absences

Students who missed 3 or more days will lose 10% of the total credit.

Any **missed quiz, test,** or **homework** assignment will be given a **zero** grade.

Late homeworks will **not** be accepted. There will be **no make-ups for quizzes**.

Make-up **tests** are possible in three cases: 1) a documented illness, 2) participation in an official university activity, 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. The make-up test will be generally harder than the initial test.

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

Tardiness: A missed quiz at the beginning of the class will be given a zero grade.

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 and test assignments and their parts will be given a **zero** grade.

Tentative schedule

Dates	Chapter	Topic
8/24-8/26	1	Measurements
8/26-8/31	2	Kinematics in one dimension
9/1-9/7	3	Kinematics in two dimensions
9/2-9/7	4	Dynamics
September 14		**Test 1**
9/14-9/16	5	Circular motion
9/21-9/23	6	Work and Energy
9/28-9/30	7	Linear Momentum
10/5-10/7	8	Rotational Motion
10/12-10/14	9	Static Equilibrium
October 14		**Test 2**
10/19-10/26	10	Fluids
10/28-11/4	11	Waves
11/9-11/11	12	Sound
11/16-11/30	13	Temperature
12/2	14	Heat
December 9		**Final exam**

Resources

Do read the textbook before attempting the homework.

Do read the textbook again before the 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 posted on blackboard after each test.

How to solve homework and test problems

1. Read the problem carefully. Pay attention to all details.
2. List all **known** values and their units.
3. List all **unknown** values and their units.
4. 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.
5. Determine which physics concepts or laws may be applicable to the problem that you are solving. Write down these concepts, laws, or ideas.
6. **Write down the formula** or equation that represents each concept. You must have as many equations as there are unknowns.
7. Solve the equations using algebra. Obtain the answer in a symbolic form. **Do not use a calculator** at this stage.
8. Substitute the numbers in the symbolic solution. Obtain the answer in a numeric form. **Verify the units.**

Homework and test partial credit is given for:

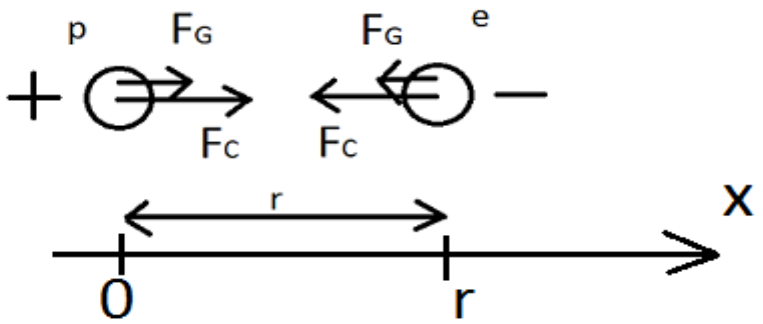
- List of known values - 10%
- List of unknown values – 10%
- Sketch with a coordinate system and symbolic notations – 10%
- Concept, idea, or explanation of the solution ("I will use the Coulomb's law. I will also use the Newton's gravitational law.") - 10%
- Formula(s) or equation(s) that represents the concept -10%
- Algebraic solution (using letters) – 10%
- Correct answer in the algebraic form (using letters) - 10%
- Substituting numbers to algebraic solution – 10%
- Correct numerical answer – 10%
- Units for the numerical answer- 10%

Example: Giancoli, p. 465, problem 16-10

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; ratio F_C / F_G
Solution:
Sketch:



Concepts: 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 in a specific coordinate system. 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 from the power in numerator.