

PHYS 100 – Concepts in Physics

Syllabus

Spring 2010 – Sections 1 and 2

INSTRUCTOR Dr. Eduardo Sánchez Velasco.

OFFICE

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Note: Do not use the phone or e-mail for grade related questions.

OFFICE HOURS

Monday, Wednesday: 10:30 a.m. – 12:30 p.m.

Friday: 10:30 a.m. – 11:30 a.m.

These are my official office hours, but frequently I am in my office at other times; you should feel free to stop in at any time, or to make an appointment, if this is more convenient.

CLASS HOURS

LECTURE: Monday, Wednesday and Friday, 1:30 p.m. – 2:20 p.m. in Magruder Hall 1096.

LAB Section 1: Thursday, 9:30 a.m. – 11:20 a.m. in Magruder Hall 1006.

LAB Section 2: Thursday, 12:30 p.m. – 2:20 p.m. in Magruder Hall 1006.

CATALOG DESCRIPTION

This course presents an overview of our understanding of the physical world, covering some of the main concepts, theories, and experimental techniques of physics. While the course focuses primarily on the conceptual understanding of physics, it also explores some of its historical, technological, philosophical, and aesthetic aspects, and its place in the history of ideas. The range of possible topics includes Newton's laws of motion, gravity, heat, sound, electricity, magnetism, light, relativity, quantum theory, elementary particles and nuclear physics. Basic algebra skills are expected of the students. The course has a laboratory component that emphasizes quantitative measurements.

Credit: 4 hours

NOTE: This course fulfills the Scientific: Physical Science Mode of Inquiry of the Liberal Studies Program. This course counts toward the 63-hour Liberal Arts and Sciences (LAS) graduation requirement.

COURSE OBJECTIVES and LSP Physical Mode of Inquiry

This course will be a big tour of the way we understand the physical world. Topics include the main aspects of “classical physics” (such as newtonian mechanics, Newton’s theory of gravity and electricity and magnetism), and an introduction to some of the ideas of “modern physics”: relativity and quantum theory. We will explore the evolution and some of the history of the main scientific ideas in Physics and of some of their applications. We will focus on a conceptual understanding of the main scientific ideas in physics and to selected aspects of the evolution and history of these ideas. **This course fulfills the requirements for the LSP Physical Mode of inquiry.**

The course has an essential laboratory component. The laboratory includes experiments that emphasize quantitative measurements, analysis of data, and interpretation of results. They require using mathematical and graphical techniques, and directly handling experimental apparatus.


TEXT AND MATERIALS

The required texts for this course are:

- *Conceptual Physics* (11th edition), by Paul G. Hewitt, Addison Wesley, 2009.
- *Laboratory Concepts*, version 3.0.0 (Spring 2010), by E. Velasco.

Hewitt's book is the official text for this course. We will use it to supplement the lectures and for reading assignments. However during class we will often cover material not found on the text. Your attendance to class will be specially important to learn this material.

For the lab you must purchase the lab manual *Laboratory Concepts* mentioned above. Make sure you obtain the lab manual specially written for your section, as different instructors use different sets of notes. The lab manual reviews the conceptual material covered in the lab and will be essential to perform the experiments. You **MUST** bring it to the lab with you. You will need it to perform the experiments and to write the results.

 In addition every student **MUST** bring to every lab and lab exam a **scientific calculator**, and to be familiar with its use. You should also bring to the labs and lab exams a **metric ruler**.

ACADEMIC DISHONESTY

Academic dishonesty of any form will not be tolerated in this class. Anyone caught cheating on a test, homework or lab will automatically receive a grade of zero on that test, homework or lab. Further disciplinary action consistent with University policy will be considered, including failing the course. Homework and exams, unless instructed otherwise, must be done individually. For more information about the University policy on academic dishonesty, consult the appropriate sections of the Student Conduct Code (see the code and related information at <http://conduct.truman.edu>).

STUDENTS WITH DISABILITIES

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Disability Services office (x4478) as soon as possible.

EXAMS AND QUIZZES

There will be four closed book exams and two lab exams in this class. The tentative exam dates are listed at the end of this syllabus. All exams, **including the final** (exam #4), will be on the material covered since the preceding test. That is, **they are not "comprehensive"**. However, you may have to use as background for one exam material covered in previous exams. Lab exams will cover material from the lab sessions. You must bring a scientific calculator to the lab exams, and be familiar with its use. In addition to these exams, there will be quizzes, usually on the content of homework assigned readings from the book or other materials. In exams and quizzes it will be expected a deep knowledge of the material. Having only a general understanding of the material without a knowledge of the relevant details will not be enough. Finally, all exams and quizzes are without books or notes and must be done individually.

MISSING A TEST, QUIZ, LAB OR CLASS

Students are expected to attend all class sessions and labs, and to be familiar with the content of exams and quizzes. If you have a valid conflict that does not allow you to take an exam or quiz, or to be at the lab at the scheduled time, **contact me as soon as possible**, preferably before the event takes place. In any case you should see me **in person** as soon as possible. Missing a

test, lab or quiz requires a valid excuse, otherwise a grade of zero will be assigned. I reserve the right to determine what is, and is not, a valid excuse. As a rule only extreme situations, such as serious medical problems, will be considered valid excuses. Field trips and sport events are not usually considered valid excuses unless previously arranged personally with me. In general, having other exams in the same day is not a valid excuse. Adjustments to make up missed exams, labs, or quizzes, if any, will be made at my discretion, and only in extreme situations.

It is your responsibility to be on time for all classes and labs. You are also responsible for showing on time to exams and quizzes. Alarm clock malfunctions and similar events are NOT considered valid excuses for being late or absent. If you are late to a class, you may not be able to take a quiz, which usually are done at the beginning of the class. If you are late to a lab you may not be allowed to do it. Being late to an exam or lab exam may disqualify you from taking that exam. In general, **DO NOT BE LATE!** The exact date of a quiz will be announced in a previous class; it is your responsibility to know that date. If you miss a class, make sure to ask if a quiz was announced in it. "I did not know there was a quiz today" is NOT a valid excuse for missing a quiz. The same applies to changes of date or time of an exam, date of due homework, or the content of the exams.

In most lab meetings there will be lab activities that will count towards the grade. Of course, you have to be in the lab on time to get a grade in that lab. In general, lab makeups will not be given. If you miss a lab due to unusual circumstances, please see me **as soon as possible**. Unless other arrangements have been made, any missed lab will be counted as zero. However, **I will throw away the worst lab when computing the final grade**. You can safely miss one lab for whatever reason without damaging your grade. Use it as a sick leave day.

GRADING POLICY

The grade for this class will be obtained from 4 tests, two lab exams, lab activities, and from homework assignments and quizzes. Each exam will count 15% towards the final grade, lab activities (with the worst one thrown away) 20%, each lab exam 5%, and the remaining 10% from the occasional homework assignments and quizzes, each quiz counting the same as a regular homework. You **MUST** keep all graded materials, and be able to produce them in case of grade disputes.

Homework and quizzes	10%
Exam #1	15%
Exam #2	15%
Exam #3	15%
Exam #4	15%
Lab activities	20%
Lab exam #1	5%
Lab exam #2	5%
Total :	100%

The minimum guaranteed grading scale is as follows:

Final Percentage	Final Letter Grade
85 to 100	A
70 to 85	B
60 to 70	C
50 to 60	D
below 50	F

Final letter grades are normally assigned according to the table above. However, at the end of the semester I may curve grades upward. If this curving is done and, for example, I add 1% to the all

the final grades, a person with a final percentage of 69% may receive a B as the final letter grade, even though the above table indicates that a C would normally be assigned. However, **curving is not guaranteed, and you should not count on it.** I will never curve downward. As a rule, only the grades in the above table (A, B, C, D or F) will be given. Any other grade, like incomplete (IC), will be given at my discretion, and only under **very unusual and extreme circumstances**, like a serious medical problem. Poor performance will not qualify you for a grade other than A, B, C, D, or F.

TENTATIVE COURSE OUTLINE

Some of the topics I intend to cover in the lectures, in their approximate order, are indicated below.

- Introduction and overview. Classical, relativistic and quantum physics.
- Motion. Kinematics. Vectors. Velocity and acceleration.
- Interactions and forces. Newton's laws of mechanics. Momentum.
- The basic building blocks of nature. Elementary particles.
- The atomic nucleus. Radioactivity.
- The solar system. Kepler laws. Newton's theory of gravity.
- Electromagnetism. Electrostatics. Coulomb's law. Electric and magnetic fields.
- Electromagnetic induction. Electromagnetic forces. Electric motors and generators.
- Maxwell's equations and electromagnetic waves. Waves and optics.
- Reflection, refraction, and dispersion. Interference and diffraction.
- Special theory of relativity. Relativistic mechanics.
- Relativity and gravitation. Black holes and other weird stuff.
- The birth of Quantum Theory. Planck, Einstein and Bohr.
- Quantum Mechanics.

Note that this is only a tentative list of material. I may change it to adapt to the needs of the class as we go along. The purpose of the class is for you to learn, not to follow a rigid plan. Your feedback in this matter will be very helpful. Please let me know if you think I am going too fast or too slow, or if there are topics for which you would like a more detailed explanation.

TENTATIVE EXAM DATES

Exam #1: Monday, February 8 in class.


Exam #2: Wednesday, March 3 in class.

Exam #3: Wednesday, April 7 in class.

Exam #4: Tuesday, May 4, 1:30 p.m. – 3:20 a.m. (Finals week).

Lab exam #1: Thursday, March 4 in the lab.

Lab exam #2: Thursday, April 29 in the lab.

 This schedule may change during the semester. Updated versions of this syllabus will be posted on line at <http://www2.truman.edu/~velasco>