



# Physics 107

## Conceptual Physics and Scientific Inquiry

### SPRING 2008



Physics 107 is a 4 unit upper division course for Liberal Studies majors and candidates for the Blended Multiple Subject credential program. This course focuses on force and motion, waves and energy, electricity and magnetism, light and color and the process of scientific inquiry. There is a strong emphasis on hands on cooperative learning. In addition to structured physics experiments and activities students will be expected to pose their own testable scientific question, conduct experiments, analyze data and present scientific findings. The course is of special benefit (but not limited to) students preparing to be elementary school teachers. Geology 8T, Biology 7, Math 17 and Chemistry 106 are all prerequisites for Physics 107.

**INSTRUCTOR:**

Dr. Lynn Tashiro  
 Professor of Physics  
 Office: Sequoia 436, AIRC 4002B  
 Ext. 8-7687, 8-2802  
 Office Hours:  
 Tues. 1:00-2:00 pm and by  
 appointment  
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**TEXTBOOK**

Paul G. Hewett, *Conceptual Physics Tenth Edition*, Addison-Wesley, 2002  
 Physics 107 Laboratory Manual Spring 2008

**SUPPLIES**

A 3 ring binder to compile workbook handouts  
 Ruler, protractor  
 Saclink account

**GRADING**

Homework	5%
Inquiry Project 1	10%
Inquiry Project 2	15%
Inquiry Project Summary	10%
Quizzes	20%
2 Unit Exams (10% each)	20%
Final Exam	20%

**MEETING TIMES**

- Tuesday and Thursday 10:30 am to 1:00
- The course uses an integrated Discussion/ Activity format
- Class will meet 2 hours 30 minutes twice a week

**HOMEWORK:**

Homework from the textbook and Physics 107 laboratory manual will be assigned weekly and will be due at the beginning of class on the date specified. Homework may also include the construction of demonstration devices or experiments. Homework is due at the beginning of class. **No late homework will be accepted.**

**INQUIRY PROJECTS:**

Inquiry Project 1 – Group Investigation on Motion ending in a poster presentation  
 Inquiry Project 2 – Group Investigation ending in a poster presentation  
 Inquiry Project Final Report– Individual report on either Inquiry project 1 or 2. Template will be provided

### **INQUIRY PROJECTS: (CONTINUED)**

You will be asked to design and conduct two group inquiry projects, Project 1 and 2. You will pose a testable scientific question and carry out an experiment where numerical data is collected to discover answers. These inquiry projects will be presented to the class through either a short oral presentation or a poster. The Inquiry Project final report will be an individual report on one of the two inquiry projects you participated in. This report will be in the form of a technical brochure on your inquiry and will include photos, charts, graphs, diagrams as well as text. **Note: the final inquiry report will be due the 15<sup>th</sup> week of the semester and will include a self-reflection essay.** (You will be given an inquiry project description, checklist, and grading rubric that will contain more details)

### **QUIZZES, AND FINAL EXAM**

Quizzes and exams in Physics 107 may be composed of essay questions, numerical problems and may require designing and performing experiments. Student solutions must demonstrate logical reasoning through mathematical calculations, detailed diagrams, and/or narrative explanations. Full credit will not be given to a correct answer without providing reasoning to support it. Quizzes and exam problems will be similar to "Assessment" exercises in the P107 lab manual.

**NO MAKE-UP QUIZZES or EXAMS WILL BE GIVEN.** If you miss one unit exam with a valid and documented excuse, the weight of your final will be greater to compensate for the missed exam.

**FINAL EXAM DATE: Thursday May 22, 2007 10:15 am -12:15 am**

### **GENERAL LEARNING OBJECTIVES FOR PHYSICS 107**

#### **• Students will understand the following physics content:**

Students will know 65% of the CA science standards for K-8\* students for physical science with emphasis on waves and energy, force and motion, and electricity and magnetism. (30 % of the physical science standards are covered by Chemistry 106 or Geology 8).

Assessment of physics content knowledge will include:

- i) Weekly homework assignments from the text and workbook
- ii) 9 to 12 quizzes
- iii) 2 midterm exams
- iv) Comprehensive final exam

These assessments will test students the ability to apply concepts described in the K-12 CA science standards and will consist of short answer, problem solving, and essay questions. Some questions will be similar to those on the standardized CSET test.

\* Students will also know selected CA science content standards for Grades 9-12

## GENERAL LEARNING OBJECTIVES FOR PHYSICS 107 (continued)

### **• Students will participate in the process of and be able to identify the key elements of scientific inquiry**

Students will be able to:

- i) generate and identify a testable scientific question
- ii) design an experiment to answer their question
- iii) identify flaws in experimental design and sources of experimental error and uncertainty
- iii) collect and analyze data
- iv) make connections between their data and existing scientific theories, facts, and other experiments.
- v) present scientific findings through posters, reports and oral presentations.

Assessment of inquiry skills will include:

- i) Midterm and final exams will require students to write a testable scientific question and design an experiment to test the question.
- ii) Group inquiry projects will be conducted in and outside of class. The inquiry projects will produce a working inquiry journal, a poster presentation, written report and/or slides for an oral presentation. The final inquiry project will produce individual inquiry project reports. All inquiry projects will be graded using a checklist of key elements and a rubric for the scientific content and procedures. The checklist and rubrics will be provided before the beginning of the projects.

### **• Students will have the following technology skills:**

- i) ability to use a word processor
- ii) ability to use a spreadsheet
- ii) ability to navigate the Internet and use search engines to locate and evaluate K-12 science resources
- iii) ability to use instructional software (ie. Data Studio by PASCO) to acquire, graph, analyze, and present scientific data.
- iv) ability to use presentation software (ie. Powerpoint) or overhead slides to make an oral presentation

Assessment of technology skills will include:

- i) Quizzes, midterm exam and final exams will require students to use the computer and instructional software to acquire, graph, and analyze experimental scientific data.
- ii) Inquiry projects will require students to use a computer to graph, analyze, and present experimental scientific data. Students will be required to use a computer to produce a poster presentation and a written report which will include graphics, photos, and text.
- iii) Inquiry project oral reports will require students to use technology (computer or overhead projectors) to make presentations.

### **COURSE CATALOG DESCRIPTION: PHYS107. Conceptual Physics and Scientific Inquiry.**

Concepts in Physics 107 include matter, waves and energy, force and motion, electricity and magnetism, and scientific inquiry. Instruction emphasizes hands on cooperative learning. Students will engage in scientific inquiry by posing testable scientific questions, conducting experiments, and analyzing and presenting their findings to their peers. Physics 107 is appropriate for Liberal Studies majors and Blended Multiple Subject Credential students. Geology 8, Biology 7, Math 17 and

Chemistry 106 are prerequisites. Two activity/discussion sessions per week 150 minutes each. 4 units.

This course is part of the Liberal Studies elementary subject matter program for students who are preparing to become K-8 teachers in California. Physics 107 provides important subject matter study in the natural science portion of the curriculum.