

Community College System  
University of Hawaii  
Maui Community College

COURSE OUTLINE FORM

Course Alpha : PHYS 170

Course Name : General Physics I

Course Description : Presents fundamental principles in classical mechanics, thermodynamics, and wave motion. Emphasizes the mathematical techniques used in the explanation of physical phenomena. Introduces experimental methods in mechanics, heat, and sound with the emphasis on error analysis, measurement techniques, and report writing. For students majoring in the physical sciences, engineering, or mathematics.

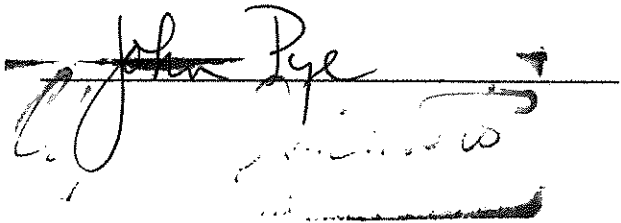
Semester Units : 5

Hours per Week : 4 hours lecture, 3 hours lab

Purposes and Standards : Transfer

Prerequisites : Credit or registration in MATH 205, or satisfactory score on Math placement exam.

Date : February 12, 1994

Instructor Signature : 

**1. COURSE OBJECTIVES:**

To provide an interesting and rigorous introductory course in physics for students majoring in the physical sciences, engineering, and mathematics. To introduce the student to the history, philosophy, and general culture of physics in particular and to science in general. The course will prepare students to live in a technologically oriented society with confidence and insight.

**2. GENERAL EDUCATION AND RELATIONSHIP TO OTHER COURSES:**

This course serves as a foundation to all other forms of scientific reasoning. It allows students to apply their knowledge of mathematics to real situations, and to apply the physical intuition and reasoning skills gained in this course to other areas of their lives, both academic and non-academic.

**3. TEXT AND MATERIALS:**

Fundamentals of Physics (4th Ed) by Halliday/Resnick/Walker

**4. REFERENCE MATERIALS:**

There are numerous textbooks at this level available in the Library and in the instructor's office. There are also several reference and laboratory manuals available from the instructor as well as scientific magazines and journals.

**5. AUXILIARY MATERIAL AND CONTENT:**

Extensive handouts are provided to the students. Slides, videos, overhead transparencies, and demonstration equipment and apparatus are used to illustrate concepts throughout the course. The Mechanical Universe telecourse and student tutorial software are also available. Extensive use of laboratory equipment is required to complete the laboratory component of the course.

**6. METHODS OF INSTRUCTION:**

Lectures, discussion, visual aids, and demonstrations are used in this course. Students also participate in laboratory activities and experiments which involves the gathering and analysis of experimental data. Homework assignments are given to practice problem solving skills, and all assignments are collected, graded, and discussed with students when returned. Quizzes are given on each chapter assigned to reinforce concepts learned. Reading and interpretation of important scientific articles as they relate to the objectives of the course are also used.

**7. COURSE CONTENT:**

The course is divided into four units as follows:

Unit 1: Classical Mechanics I

Vectors  
Laws of Statics  
Linear Motion  
Newton's Laws of Motion  
Law of Universal Gravitation  
Rotational Motion

Unit 2: Classical Mechanics II

Energy  
Linear and Angular Momentum  
Conservation Laws  
Rotational Dynamics  
Fluids (hydrostatics, Bernoulli's Principle,  
and viscous forces)

Unit 3: Heat, Thermodynamics, and Kinetic Theory

Calorimetry  
Heat Transfer  
First and Second Laws of Thermodynamics  
Entropy  
Kinetic Theory  
Basic Gas Processes

Unit 4: Waves and Sound

Harmonic Motion  
Waves  
Resonance  
Sound

**8. EVALUATION:**

Homework Assignments (26 @ 10 points each)

Unit Exams (4 @ 100 points each)  
(emphasizes reasoning/problem solving skills)

Quizzes (8 @ 10 points each)  
(emphasizes conceptual understanding)

Laboratory (15 experiments @ 20 points each)

Final Exam (200 points, comprehensive)

Grades: A: 90-100% B: 80-89% C: 70-79% D: 60-69%

## LABORATORY

### 1. COURSE OBJECTIVES:

To give the student an understanding of the purpose, role, and underlying philosophy of experimental work in science. To teach students the fundamental laboratory techniques and familiarize them with elementary equipment and methods of measurement. To teach students the mathematical, graphical, and statistical methods of treating data and obtaining results from data. To teach students how to estimate the error in their experimental measurements, and how errors are propagated to affect the results. To give the student instruction and practice in writing reports.

### 2. GENERAL EDUCATION AND RELATIONSHIP TO OTHER COURSES:

The laboratory component of the Physics 170 course.

### 3. TEXT AND MATERIALS:

Selected experiments from Edmonds: Cioffari's Experiments in College Physics (7th Edition) plus laboratory experiment handouts from the instructor.

### 4. REFERENCE MATERIALS:

There are numerous physics textbooks at this level in the library, as well as several scientific magazines and journals, many reporting results of current experiments, which can be used for reference in the lab.

### 5. AUXILIARY MATERIALS AND CONTENT:

Physics laboratory apparatus.

### 6. METHODS OF INSTRUCTION:

Lecture/Discussion, demonstrations, and advising during student experiments.

## 7. COURSE CONTENT:

Physics 170 Laboratory Schedule (1 three-hour lab per week):

- Expt. 1 - Absolute and Percent Errors, Significant Figures
- Expt. 2 - Propagation of Errors from Measurements to Results
- Expt. 3 - Determination of Errors in Measurements
- Expt. 4 - Data Reduction - Linear Graphs
- Expt. 5 - Linear Motion and Acceleration
- Expt. 6 - Data Reduction - Log-Log and Semi-Log Graphs
- Expt. 7 - Ballistic Pendulum
- Expt. 8 - Centripetal Force
- Expt. 9 - Rotational Dynamics
- Expt. 10 - General Approach to Propagation of Determinate & Random Errors
- Expt. 11 - Archimedes' Principle
- Expt. 12 - The Gaussian Error Curve, Standard Deviation, Chi-squared test
- Expt. 13 - Specific Heat
- Expt. 14 - Least Squares, Correlation Coefficient, and Random Processes
- Expt. 15 - Velocity of Sound in Air and in a Solid

## 8. EVALUATION:

Each laboratory is to be performed, written up, and turned in to the instructor. Each lab will be evaluated on accuracy, data analysis, and neatness and completeness of report, for a total possible of 20 points. Thus there is a possible 300 points to be earned over the course of the semester. See Physics 170 course outline for final grade evaluation.