Community College System
University of Hawaii
Maui Community College

COURSE OUTLINE FORM

Course Alpha	:	PHYS 151
Course Name	:	College Physics I
Course Description	:	Presents fundamental theories and problem solving methods in mechanics, heat, and sound. Emphasizes applications of physical principles. Introduces experimental methods in mechanics, heat, and sound.
Semester Units	:	4
Hours per Week	:	3 hours lecture, 3 hours lab
Purposes and Standards	:	Transfer
Prerequisites	:	MATH 140 or satisfactory score on Math placement exam.
Date	:	February 12, 1994
Instructor Signature	:	John Pye

1. **COURSE OBJECTIVES:**

To provide students with an introduction to the history, philosophy, and general culture of physics in particular, and to science in general. To teach critical thinking and problem solving skills using applications of physics principles to fundamental phenomena. To emphasize the spirit of experimental science, and to teach skills in gathering and analyzing experimental data.

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

This is the first of a two-semester course sequence which fulfills the one-year college physics requirement for many majors in the biological and social sciences. It satisfies the laboratory course requirement for the natural science core curriculum for transfer level students. It is the prerequisite for Physics 152.

3. **TEXT AND MATERIALS:**

Contemporary College Physics (2nd Edition) by Jones and Childers, Laboratory notebook, Physics 151 Laboratory Manual, and calculator.

4. **REFERENCE MATERIALS:**

There are numerous other textbooks available in the Library and in the instructor's office. There are also several reference and laboratory manuals available from the instructor.

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. 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 homework and laboratory assignments are collected, graded, and discussed with students when returned. Quizzes are given on each chapter assigned. The course is divided into five units, and a review session and exam are given on each one. There is a cumulative final exam.

7. COURSE CONTENT:

The course is divided into three major sections, comprised of five units, as follows:

Section 1 - Mechanics

Unit 1: Measurement and Analysis, Motion in One and Two Dimensions

1. Physical quantities, units, conversions
2. Average speed, displacement, and velocity
3. Acceleration
4. Motion with constant acceleration
5. Vectors and displacement
6. Two-dimensional kinematics
7. Projectile motion

Unit 2: Dynamics, Uniform Circular Motion, Gravitation

1. Forces
2. Inertia
3. Newton's Laws of motion
4. Friction
5. Equilibrium
6. Applications
7. Uniform circular motion
8. Centripetal force
9. Law of Universal Gravitation
10. Applications

Unit 3: Work, Energy, Momentum, Conservation Laws, and Rotational Dynamics

1. Work and energy
2. Kinetic and potential energy
3. Conservation of mechanical energy
4. Power
5. Linear momentum
6. Impulse
7. Conservation of momentum
8. Collisions
9. Systems with changing mass
10. Elastic and inelastic collisions
11. Collisions is two dimensions
12. Motion in a gravitational potential
13. Angular velocity, acceleration, and momentum
14. Torque and static equilibrium
15. Conservation of angular momentum
16. Rotational kinetic energy
17. Applications of conservation principles

Section 2 - Fluids, Heat, and Thermodynamics

Unit 4: Fluids, Thermal Physics, Gas Laws, and Thermodynamics

1. Hydrostatic pressure
2. Pascal's Principle
3. Archimedes' Principle
4. Bernoulli's Principle
5. Temperature and states of matter
6. Thermal expansion
7. Calorimetry
8. Phase changes
9. Heat transfer
10. Gas laws and applications
11. Thermal equilibrium
12. The first and second laws of thermodynamics
13. Entropy
14. Energy and thermal pollution

Section 3 - Wave Phenomena

Unit 5: Periodic Motion and Wave Motion

1. Hooke's Law
2. Simple harmonic motion
3. The simple pendulum
4. Forced harmonic motion and resonance
5. Waves
6. Energy transfer by waves
7. Sound waves and sound intensity
8. The Doppler Effect
9. Standing waves
10. Superposition of waves

Laboratory Experiments

Graphing techniques and functional relationships
Graphing techniques using a computer
Measurement of the acceleration due to gravity
Projectile motion
Forces, equilibrium, and vectors
The Atwood Machine
Friction
Conservation of momentum
Rotational inertia
Archimedes' Principle
Specific heat
Measurement of the speed of sound

8. **EVALUATION:**

Quizzes: 14 quizzes worth 10 points each; highest 10 used in grade computations

Exams: Five unit-exams worth 100 points each

Labs: 10 graded laboratory reports worth 20 points each

Final: Cumulative, worth 200 points

Grades: A: 90-100% B: 80-89% C: 70-79% D: 55-69%