MISSOURI WESTERN STATE UNIVERSITY

COLLEGE OF LIBERAL ARTS AND SCIENCES

DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS, AND PHYSICS

COURSE NUMBER: PHY 110

COURSE NAME: College Physics I

COURSE DESCRIPTION:

Classical treatment of mechanics, waves, energy, and heat. Three hours lecture, three hours lab. Offered fall and spring semesters.

PREREQUISITE:

MAT 116. Not open to students with credit in PHY 210.

TEXT:

Physics Tech.UPDT-TEXT, Walker, Edition 4th 14, Pearson
ISBN 9780321903082

COURSE OBJECTIVES:

This course is intended to serve as a course option in the natural sciences category of the general studies requirements for a baccalaureate degree. The primary objective of this course is to provide the student with an understanding of the fundamental laws and principles of the topics covered, and for the student to be able to apply these laws and principles in appropriate problem and laboratory situations. In order to meet this objective, the student will learn how to:

1.   Test Newton's laws in the laboratory and apply these laws in statics and dynamics problems (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

2.   Apply the work-energy principle and the impulse-momentum principle in laboratory and problem situations (*I G, VII A, VII B, VII C, VIII A, VIII B, VIII C*).

3.   Apply the equations of simple harmonic motion to appropriate laboratory and problem situations (*I G, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*)

4. Test Pascal's, Archimedes', and Bernoulli's principles in the laboratory, and apply them in hydrostatics and hydrodynamics problems (*I G, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*)

5. Apply the first law of thermodynamics in ideal gas problems (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

6. Analyze the implications of the second law of thermodynamics and apply it to problems and laboratory exercises (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

STUDENT COMPETENCIES:

In order to meet the above objectives, successful students must demonstrate:

1. An ability to understand and explain in writing the fundamental laws and principles of the course (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

2. An ability to analyze given information in the physics problem and identify the principles that apply (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

3. An ability to formulate the laws and principles physics in mathematical form (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

4. An ability to utilize algebra and elementary trigonometry in the solutions of physics problems (*I G, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

5. An ability to formulate a laboratory procedure, gather relevant data, process the data, and use graphical skills to test relationships (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

6. An ability to write a well organized laboratory report that includes an objective, a theory, an error analysis, and a conclusion (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

COURSE OUTLINE:

I. Mechanics

A. Rectilinear Motion
B. Projectile Motion
C. Newton's Laws of Motion
D. Translational Equilibrium and Dynamics

E.   Work/Energy Theorem
F.   Impulse/Momentum Theorem
G.   Circular Motion
H.   Rotational Equilibrium and Dynamics

II.   Solids and Fluids

A.   Deformation of Solids
B.   Pascal's and Archimedes' Principles
C.   Bernoulli's Principle and the Equation of Continuity

III.   Thermodynamics

A.   Kinetic Theory of Gases
B.   Specific Heat and Latent Heat
C.   Conduction, Convection, and Radiation
D.   First and Second Laws of Thermodynamics
E.   Heat Engines

IV.   Vibrations and Waves

A.   Simple Harmonic Motion
B.   Wave Motion
C.   Superposition of Waves
D.   Sound
E.   Doppler Effect
F.   Standing Waves in Organ Pipes

ASSESSMENT:

The stated course objectives and student competencies are assessed through the evaluation of homework exercises, worksheets, quizzes, exams, and in-class participation as determined by the instructor. (Note: The state-level goal and instructional competencies addressed by each course objective and student competency are identified in italics.)

LEGEND

I.   **Communicating**
   Students will demonstrate the ability to. . .
   A.   make formal written and oral presentations employing correct diction, syntax, usage, grammar, and mechanics.
   B.   focus on a purpose (e.g., explaining, problem solving, argument) and vary approaches to writing and speaking based on that purpose.
   C.   communicate effectively in groups by listening, reflecting, and responding appropriately and in context.

D.   use mathematical, statistical, standard quantitative, or various graphical methods to present information with clarity, accuracy, and precision.

II. **Higher-Order Thinking**

Students will demonstrate the ability to. . .

A.   recognize the problematic elements of presentations of information and argument.

B.   formulate questions for clarifying issues and solving problems.

C.   use linguistic, mathematical, or other symbolic approaches to describe problems, identify alternative solutions, and make reasoned choices among those solutions.

D.   analyze and synthesize information from a variety of relevant sources and use the results to address complex situations and problems.

E.   defend conclusions using relevant evidence and reasoned argument.

F.   reflect on and evaluate their critical-thinking processes.

III. **Managing Information**

Students will demonstrate the ability to. . .

A.   assess and/or generate information from a variety of sources, including the most contemporary technological information services.

B.   evaluate information for its currency, usefulness, truthfulness, and accuracy.

C.   organize, store, and retrieve information efficiently.

D.   reorganize information for an intended purpose, such as research projects.

E.   present information clearly and concisely, using traditional and contemporary technologies.

IV. **Valuing**

Students will demonstrate the ability to. . .

A.   recognize the ramifications of ones' value decisions on self and others.

B.   recognize conflicts within and between value systems.

V. **Social and Behavioral Sciences**

A.   explain social institutions, structures, and processes across a range of historical period.

VI. **Mathematics**

Students will demonstrate the ability to. . .

A.   recognize and use connections within mathematics and between mathematics and other disciplines.

B.   read, interpret, analyze, and synthesize quantitative data (e.g., graphs, tables, statistics, and survey data) and make reasoned estimates.

C.   formulate and use generalizations based upon pattern recognition.

D.   apply and use mathematical models (e.g., algebraic, geometric, statistical) to solve problems.

VII. **Life and Physical Sciences**

Students will demonstrate the ability to. . .

A.   explain how to use the scientific method and how to develop and test hypotheses

B.   evaluate scientific evidence and argument.

C.   describe the basic principles of the physical universe.

D.   describe concepts of the nature, organization, and evolution of natural systems.

E.   explain the effect of human interactions with natural systems.