COURSE OUTLINE

PHYS 115 – BASIC PHYSICS

Prepared By: Feng Hong
Revised by: Feng Hong
Revision Date: March 12th, 2012
A. **TITLE:** Basic Physics

B. **COURSE NUMBER:** PHYS 115

C. **CREDIT HOURS:** 4

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall/Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   4 lecture hours per week

H. **CATALOG DESCRIPTION:**
   Topical coverage includes systems of units, scientific method, scientific mathematics (including basic trigonometric functions), vectors, friction, forces and translational equilibrium, torques and rotational equilibrium, uniformly accelerated motion, Newton’s Laws, work, energy, and power. Emphasis is on development of laboratory and problem-solving skills including description, organization, analysis, summarization, and criticism in accordance with the scientific method.

I. **PRE-REQUISITES/CO-REQUISITES:**
   a. Pre-requisite(s): MATH 100 (Beginning Algebra) or permission of instructor
   b. Co-requisite(s): None

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

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<th>Course Objective</th>
<th>Institutional SLO</th>
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<tr>
<td>a. Understand the methods scientists use to explore natural phenomena, including observation, hypothesis development, measurement, and data collection, experimentation, evaluation of evidence, and employment of mathematical analysis</td>
<td>2. Crit. Thinking</td>
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<td>b. Apply scientific data, concepts, and models in physics</td>
<td>2. Crit. Thinking</td>
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<td>c. Solve problem in the physical sciences in a logical, defendable manner</td>
<td>2. Crit. Thinking</td>
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<td>d. Demonstrate how the various topics of physics are related to everyday life</td>
<td>1. Communication 2. Crit. Thinking</td>
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K. **TEXTS:**

L. **REFERENCES:** None

M. **EQUIPMENT:**
A twelve inch (12") clear, flexible, plastic ruler with a centimeter/millimeter scale. A protractor. A simple inexpensive scientific calculator with trigonometric and inverse trigonometric functions. A solar powered calculator is recommended.

N. **GRADING METHOD:** A-F

O. **MEASUREMENT CRITERIA/METHODS:**
   - Exams
   - Quizzes
   - Homework
   - Projects

P. **DETAILED COURSE OUTLINE:**

   I. Introduction
      A. Definition of physics
      B. Motivation for studying physics

   II. Mathematics for physics
      A.) Algebra
      B.) Scientific notation
      C.) Graphs
      D.) Plane geometry
      E.) Right triangle trigonometry

   III. Measurements in physics
      A. Fundamental quantities and units
      B. Prefixes
      C. Significant figures and uncertainty
      D. Unit conversion

   IV. Vectors
      A. Scalar and vector quantities
      B. Graphical methods of vector addition
      C. Vector components
      D. Vector resultants
      E. Analytic vector addition
      F. Subtraction of vectors

   V. Translational Equilibrium
      A. Newton's laws
      B. Translational equilibrium
      C. Free-body diagrams
      D. Translational equilibrium problems and methods of solution
      E. Friction

   VI. Torque and rotational equilibrium
      A. Conditions for rotational equilibrium
      B. Moment arm
      C. Torque
      D. Resultant torque
      E. Rotational equilibrium problems and methods of solution
      F. Center of gravity

   VII. One-Dimensional Motion
      A. Speed versus velocity
B. Acceleration
C. Uniform acceleration
D. One-dimensional uniformly accelerated motion problems and solution methods
E. Falling bodies

VIII. Two-Dimensional Motion
A. Horizontal and vertical components of projectile motion
B. Range, maximum height, and time of flight

IX. Newton's Second Law
A. Force, mass, and acceleration: mathematical relationships
B. Mass, weight, and the acceleration of gravity, free-body diagrams for constant acceleration

X. Work and Energy
A. Work
B. Kinetic Energy, Potential Energy and the Work-Energy Theorem
C. Conservation of Mechanical Energy
D. Conservation of Energy in General
E. Power

Q. LABORATORY OUTLINE: N/A