COURSE OUTLINE

PHYS 125 - PHYSICS LABORATORY I

Prepared By: Feng Hong
Revised by: Feng Hong
Revision Date: May 2015
A. **TITLE:** Physics Laboratory I

B. **COURSE NUMBER:** PHYS 125

C. **CREDIT HOURS:** 1

D. **WRITING INTENSIVE COURSE:** Yes

E. **COURSE LENGTH:** 15 weeks

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

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   2 laboratory hours per week

H. **CATALOG DESCRIPTION:**
   Physics Laboratory I is a laboratory course to accompany PHYS 121 (College Physics I). Students will have laboratory experiments concerning one and two dimensional translational mechanics and graphical analysis.

I. **PRE-REQUISITES/CO-REQUISITES:**
   Pre-requisite(s)/Co-requisite(s): PHYS 121 or permission of instructor

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

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
</tr>
</thead>
<tbody>
<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>1. Communication</td>
</tr>
<tr>
<td></td>
<td>2. Crit. Thinking</td>
</tr>
<tr>
<td></td>
<td>4. Inter-Intrapersonal</td>
</tr>
<tr>
<td></td>
<td>Skills</td>
</tr>
<tr>
<td>b. Application of scientific data, concepts, and models in physics</td>
<td>1. Communication</td>
</tr>
<tr>
<td></td>
<td>2. Crit. Thinking</td>
</tr>
<tr>
<td>c. Use computer assisted data collection and analysis.</td>
<td>1. Communication</td>
</tr>
<tr>
<td></td>
<td>2. Crit. Thinking</td>
</tr>
</tbody>
</table>

K. **TEXTS:** N/A

L. **REFERENCES:** None

M. **EQUIPMENT:** Existing physics laboratory equipment will be used.

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

O. **MEASUREMENT CRITERIA/METHODS:**
   - Quizzes
   - Lab reports
   - Projects
   - Participation
P. **DETAILED COURSE OUTLINE:** N/A

Q. **LABORATORY OUTLINE:**

I. Graph Plotting and Graphical Analysis
   Prepared data will be plotted by hand. The same data is then plotted using computer software.

II. Graphical Analysis
    Additional graphical analysis will be done with the aid of computers.

III. Tools for Scientific Thinking - Investigations #1, 2, 3
    Sonar will be used to relate position and motion with computer generated graphs.

IV. Force Table
    Analytical and graphical solutions to vector addition of equilibrium forces will be checked out on a force table.

V. Tools for Scientific Thinking - Investigation #4
    Sonar will be used to investigate velocity.

VI. Tools for Scientific Thinking - Investigations # 5, 6
    Sonar will be used to investigate acceleration.

VII. Acceleration of Gravity
    The acceleration of free falling objects will be determined.

VIII. Forces and Motion
    The acceleration of carts along a track and experiencing a constant force is measured.

IX. Plotting Data – The Spring
    The behavior of loaded springs is studied.

X. Measurement and Significant Figures
    Areas, volumes and time are measured with attention to accuracy and precision.

XI. Projectile Motion
    Small plastic balls are fired from a spring gun. Calculated and measured ranges are compared.

XII Work and Energy
    Students will determine the work done on a (nearly) frictionless cart and show that the work done is equal to the increase in kinetic energy of the cart. Furthermore, they will show that the increase in energy of the cart is equal to the decrease in potential energy of the falling weight that supplies the force on the cart.