MASTER SYLLABUS

PHYS 125 – PHYSICS LABORATORY I

CIP Code: 40.0801

Created by: Dr. Feng Hong

Updated by: Dr. Lawretta Ononye

Canino School of Engineering Technology

Physics

Fall 2023
A. **TITLE:** Physics Laboratory I

B. **COURSE NUMBER:** PHYS 125

C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

# Credit Hours: 1
# Lecture Hours: 
# Lab Hours: 2 per week
  Other: per week
Course Length: 15 Weeks

D. **WRITING INTENSIVE COURSE:** Yes

E. **GER CATEGORY:** GER 2 Natural Sciences
   Does course satisfy more than one GER category? If so, which one?

F. **SEMESTER(S) OFFERED:** *(Fall, Spring, or Fall and Spring)* Fall and Spring

G. **COURSE 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.

H. **PRE-REQUISITES:** None

   **CO-REQUISITES:**
   PHYS 121 or permission of instructor

I. **STUDENT LEARNING OUTCOMES:**

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>PSLO</th>
<th>GER</th>
<th>ISLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Understanding of 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>N/A</td>
<td>Understanding of 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-Comm Skills 2-Crit Think 4-Soc Respons</td>
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<tr>
<td>b. Application of scientific data, concepts, and models in physics</td>
<td>N/A</td>
<td>Application of scientific data, concepts, and models in one of the natural sciences</td>
<td>1-Comm Skills 2-Crit Think</td>
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<tr>
<td>KEY</td>
<td>Institutional Student Learning Outcomes</td>
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<tr>
<td>ISLO #</td>
<td>ISLO &amp; Subsets</td>
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<tr>
<td>1</td>
<td>Communication Skills</td>
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<td></td>
<td>Oral [O], Written [W]</td>
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<tr>
<td>2</td>
<td>Critical Thinking</td>
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<td></td>
<td>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</td>
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<td>3</td>
<td>Foundational Skills</td>
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<td>Information Management [IM], Quantitative Lit./Reasoning [QTR]</td>
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<td>4</td>
<td>Social Responsibility</td>
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<td></td>
<td>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</td>
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<tr>
<td>5</td>
<td>Industry, Professional, Discipline Specific Knowledge and Skills</td>
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</tbody>
</table>

c. Use computer assisted data collection and analysis. | N/A | Application of scientific data, concepts, and models in one of the natural sciences | 1-Comm Skills |
| 2-Crit Think |
J. **APPLIED LEARNING COMPONENT:** Yes ☒ No ☐

If YES, select one or more of the following categories:

- ☒ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service
- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship (program, class, project)

K. **TEXTS:** N/A

L. **REFERENCES:** None

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

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

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

- 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.