A. **TITLE**: University Physics Laboratory I

B. **COURSE NUMBER**: PHYS 135

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

   - # Credit Hours: 1
   - # Lecture Hours: per week
   - # Lab Hours: 2 per week
   - Other: per week

   Course Length: 15 Weeks

D. **WRITING INTENSIVE COURSE**: Yes ☑ No ☐

E. **GER CATEGORY**: None: ☐ Yes: GER 2 Natural Sciences

   *If course satisfies more than one: GER*

F. **SEMESTER(S) OFFERED**: Fall ☑ Spring ☐ Fall & Spring ☐

G. **COURSE DESCRIPTION**:  
   
   This is a laboratory course to accompany PHYS 131, University Physics I. Experiments will include one and two dimensional translational mechanics and graphical analysis.

H. **PRE-REQUISITES**: None ☑ Yes ☐ If yes, list below:

   **CO-REQUISITES**: None ☐ Yes ☑ If yes, list below:

   PHYS 131, University Physics I or permission of instructor
I. **STUDENT LEARNING OUTCOMES:** *(see key below)*

By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>Program Student Learning Outcome [PSLO]</th>
<th>GER [If Applicable]</th>
<th>ISLO &amp; SUBSETS</th>
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</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>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>
</tr>
<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 ISLO</td>
</tr>
<tr>
<td>c. Use computer assisted data collection and analysis.</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 ISLO</td>
</tr>
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<td>ISLO ISLO ISLO</td>
<td>ISLO ISLO ISLO</td>
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</tbody>
</table>

*(see key below)*

- **[SLO]** Course Student Learning Outcome
- **[PSLO]** Program Student Learning Outcome
- **GER** [If Applicable]
- **ISLO & SUBSETS**
| ISLO # | Communication Skills  
Oral [O], Written [W] |
|--------|-------------------|
| 2      | Critical Thinking  
Critical Analysis [CA], Inquiry & Analysis [IA], Problem Solving [PS] |
| 3      | Foundational Skills  
Information Management [IM], Quantitative Lit./Reasoning [QTR] |
| 4      | Social Responsibility  
Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T] |
| 5      | Industry, Professional, Discipline Specific Knowledge and Skills |

*Include program objectives if applicable. Please consult with Program Coordinator!
J. APPLIED LEARNING COMPONENT: Yes ☒ No ☐

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

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

K. TEXTS:

N/A

L. REFERENCES:


M. EQUIPMENT: None ☐ Needed: 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: None ☐ Yes ☐

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.