

**STATE UNIVERSITY OF NEW YORK  
COLLEGE OF TECHNOLOGY  
CANTON, NEW YORK**



**MASTER SYLLABUS**

**PHYS 137 – UNIVERSITY PHYSICS LABORATORY III  
CIP Code:**

**Created by: Dr. Lawretta Ononye**

**Updated by: Dr. Lawretta Ononye**

**Canino School of Engineering Technology**

**Physics**

**Fall 2023**

- A. **TITLE:** University Physics Laboratory III
- B. **COURSE NUMBER:** PHYS 137
- 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:**

This laboratory course is to accompany University Physics III (PHYS 133). The student will perform experiments related to rotational motion, oscillations and waves, static equilibrium, properties of material, and thermal physics.

H. **PRE-REQUISITES:** None

**CO-REQUISITES:**  
 PHYS 133, University Physics III or permission of instructor

I. **STUDENT LEARNING OUTCOMES:**

<b><u>Course Student Learning Outcome [SLO]</u></b>	<b><u>PSLO</u></b>	<b><u>GER</u></b>	<b><u>ISLO</u></b>
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	N/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	1-Comm Skills 2-Crit Think 4-Soc Respons
b. Application of scientific data, concepts, and models in physics	N/A	Application of scientific data, concepts, and models in one of the natural sciences	1-Comm Skills 2-Crit Think

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

<b>KEY</b>	<b><u>Institutional Student Learning Outcomes</u></b> <b><u>[ISLO 1 – 5]</u></b>
<b>ISLO #</b>	<b>ISLO &amp; Subsets</b>
<b>1</b>	<b>Communication Skills</b> Oral [O], Written [W]
<b>2</b>	<b>Critical Thinking</b> <i>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</i>
<b>3</b>	<b>Foundational Skills</b> <i>Information Management [IM], Quantitative Lit./Reasoning [QTR]</i>
<b>4</b>	<b>Social Responsibility</b> <i>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</i>
<b>5</b>	<b>Industry, Professional, Discipline Specific Knowledge and Skills</b>

J. **APPLIED LEARNING COMPONENT:** Yes  No

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

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement              |
| <input type="checkbox"/> Internship               | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement       | <input type="checkbox"/> Research                      |
| <input type="checkbox"/> Practicum                | <input type="checkbox"/> Entrepreneurship              |
| <input type="checkbox"/> Service Learning         | (program, class, project)                              |
| <input type="checkbox"/> Community Service        |  |

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. **Circumference of a Circle and Pi**

The circumference and diameter of different circular objects will be measured and used to determine the mathematical value of Pi ( $\pi$ ).

III. **Moment of Inertia**

The moment of inertia of a ring and a disk will be determined experimentally.

These dynamic results will be compared to the theoretical moment of inertia and calculated from the mass and dimensions measurement of the objects.

IV. **Conservation of Angular Momentum**

A non-rotating ring will be dropped onto a rotating disk and the final angular speed of the system determined and compared with the value predicted using conservation of angular momentum formula.

- V. Static Equilibrium**  
When a rigid body is acted on by a system of forces that do not all pass through the same point, a change may be produced in the angular (rotational) velocity of the body as well as in its linear (translational) velocity. Under certain conditions the body will be in equilibrium. This experiment presents a study of the conditions for the equilibrium of a rigid body under the action of several forces.
- VI. Hooke's Law**  
The linear behavior of a metal spring will be determined; also, measurement will be made on the behavior of something that is not quite ideal (non-linear).
- VII. Simple Harmonic Motion**  
Measurements will be made on a pendulum and a mass hanging from a spring to determine which variables have the most influence on the period of the motion.
- VIII. Waves on Elastic String**  
A vibrating string apparatus will be used to determine resonant frequencies of waves generated on a string. A frequency generator fed through an amplifier will be used to drive the vibrator.
- IX. Thermal Expansion of Metal**  
The coefficient of linear expansion of different metals will be determined.
- X. Specific Heat and Heat of Fusion**  
The amount of energy needed to increase the temperature and change the state of a substance will be studied using a calorimeter.