MASTER SYLLABUS

PHYS 136 – UNIVERSITY PHYSICS LABORATORY II
CIP Code: 40.0801

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Updated by: Dr. Lawretta Ononye

Canino School of Engineering Technology
Physics
Fall 2023
A. **TITLE**: University Physics Laboratory II

B. **COURSE NUMBER**: PHYS 136

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

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) **Spring**

G. **COURSE DESCRIPTION**:

   This is a laboratory course to accompany University Physics II (PHYS132). Experiments examine electricity, circuits, resistivity, capacitance and magnetism.

H. **PRE-REQUISITES**:

   PHYS 135, University Physics Laboratory I or Permission of instructor

   **CO-REQUISITES**:

   PHYS 132, University Physics II 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>
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<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>ISLO #</td>
<td>Institutional Student Learning Outcomes</td>
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<tr>
<td>ISLO &amp; Subsets</td>
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</tbody>
</table>
| 1 | 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 |

- c. Use computer assisted data collection and analysis.
- Application of scientific data, concepts, and models in one of the natural sciences

**KEY**

- 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:**


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:**

1. **Ohm’s Law**
   The current voltage characteristic will be obtained for different kinds of devices.

2. **Resistivity**
   The geometric and physical properties of electrical conduction will be found by exploring the IV properties of different conducting wires.

3. **Thermal coefficient of resistivity**
   The resistance of conductors and semi-conducting diodes as a function of temperature will be compared to predictions of the band theory.

4. **Oscilloscope**
   Oscilloscopes will be used to measure voltage, frequency, half peak width and phase shifts.

5. **Terminal voltage**
   The IV power curve will be obtained for the output of a power source with a large
6. **Potentiometer**
The characteristics of a voltage divider will be examined. The divider will then be converted into a potentiometer to measure the electric potential of a fruit cell.

7. **Capacitance**
Time constants will be used to measure the capacitance of series and parallel connected capacitors.

8. **Self Inductance (2 week lab)**
The self inductance of a coil will be determined using an LC circuit. The result will be compared to theoretical calculations.

9. **RLC circuits**
Impedance of an RLC circuit is examined as a function of frequency. Resonant conditions are identified.

10. **Optics**
**Reflection & Refraction**
**Lenses and Diffraction**