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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
PHYS 121 – COLLEGE PHYSICS I

Created by: Dr. Lawretta Ononye

Updated by: Dr. Lawretta Ononye

Canino School of Engineering Technology !

Department: Physics !

Semester/Year: Fall 2018 !

A. **TITLE**: College Physics I

B. **COURSE NUMBER:** PHYS 121

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

 # Credit Hours: 3 !
 # Lecture Hours: 3 **per week** !
 # Lab Hours: **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 an introductory college physics course which uses algebra and trigonometry in developing some of the fundamental concepts of classical physics. Topics covered are units of measurement, vectors, velocity, acceleration, force, Newton's Laws of Motion, gravity, momentum., work, energy, power, circular motion, rotational motion and thermodynamics.

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

MATH 106 INTERMEDIATE ALGEBRA

OR MATH 121 COLLEGE ALGEBRA

OR MATH 122 BASIC CALCULUS

OR MATH 161 CALCULUS I

OR MATH 123 PRECALCULUS

OR PERMISSION OF INSTRUCTOR

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

I. STUDENT LEARNING OUTCOMES: (*see key below*)

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

Course Student Learning Outcome [SLO]	***Program Student Learning Outcome [PSLO]***	***GER*** *[If Applicable]*	***ISLO & SUBSETS***	
a. Understand of the methods scientists use to explore physical phenomena, including observation, hypothesis development, measurement, data collection, experimentation, evaluation of evidence, and employment of physics analysis.		2	2-Crit Think ISLO ISLO	CA Subsets Subsets Subsets
b. Compute the sum, scalar multiplication, and vector multiplication of vectors.		2	2-Crit Think ISLO ISLO	CA PS Subsets Subsets
c. Demonstrate an understanding of free-body diagram.		2	2-Crit Think ISLO ISLO	CA PS Subsets Subsets
d. Demonstrate an understanding of one dimensional and two dimensional kinematics & dynamics.		2	2-Crit Think ISLO ISLO	CA PS Subsets Subsets
e. Explain physical and engineering phenomena using the principles of physics.		2	2-Crit Think ISLO ISLO	CA PS Subsets Subsets

KEY	**Institutional Student Learning Outcomes [ISLO 1 – 5]**
ISLO #	**ISLO & Subsets**
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**

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

K. TEXTS:

Giancoli, Douglas (2013). Physics Principles with Applications, (Latest Edition). Upper Saddle River, NJ: Pearson Education .

L. REFERENCES:

None

M. EQUIPMENT: None ☐ **Needed:** Technology enhanced classroom

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

•Exams • Quizzes • Homework • Participation

P. DETAILED COURSE OUTLINE:

I. Introduction and Measurement
- **A. Standards of Length, Mass, and Time**
- **B. The Building Blocks of Matter**
- **C. Density and Atomic Mass**
- **D. Dimensional Analysis**
- **E. Conversion of Units**
- **F. Order-of-Magnitude Calculations**
- **G. Significant Figures**
- **H. Mathematical Notation**

II. Motion in One Dimension
- **A. Displacement, Velocity, and Acceleration**
- **B. One-dimensional Motion with Constant Acceleration**
- **C. Freely Falling Objects**

III. Vectors

- **A. Coordinate Systems and Frames of Reference**
- **B. Vectors and Scalar Quantities**

C. Some Properties of Vectors
D. Components of a Vector and Unit Vectors

IV. Motion in Two Dimensions
A. The Displacement, Velocity, and Acceleration Vectors
B. Two-Dimensional Motion with Constant Acceleration
C. Projectile Motion
D. Uniform Circular Motion
E. Tangential and Radial Acceleration
F. Relative Velocity and Relative Acceleration

V. A. Newton's Laws of Motion
B. The Concept of Force
C. Some Applications of Newton's Laws
D. Forces of Friction

VI. A. Circular Motion and Other Applications of Newton's Laws
B. Newton's Second Law Applied to Uniform Circular Motion
C. Nonuniform Circular Motion D. Motion in Accelerated Frames
E. The Fundamental Forces of Nature

VII. Work and Energy
A. Work Done by a Constant Force
B. The Scalar Product of Two Vectors
C. Work Done by a Varying Force
D. Kinetic Energy and the Work-Energy Theorem
E. Power F. Energy and the Automobile
G. Kinetic Energy at High Speeds

VIII. Potential Energy and Conservation of Energy
A. Potential Energy
B. Conservative and Nonconservative Forces
C. Conservative Forces and Potential Energy
D. Conservation of Energy
E. Changes in Mechanical Energy when Nonconservative Forces are Present
F. Relationship between Conservative Forces and Potential Energy
G. Energy Diagrams and the Equilibrium of a System
H. Conservation of Energy in General
I. Mass-Energy Equivalence
J. Quantization of Energy

IX. Linear Momentum and Collisions
A. Linear Momentum and its Conservation
B. Impulse and Momentum
C. Collisions D. Elastic and Inelastic Collisions in One Dimension
E. Two-Dimensional Collisions
F. The Center of Mass
G. Motion of a System of Particles
H. Rocket Propulsion

X. Circular Motion and the Law of Gravity
A. Angular Speed and Angular Acceleration
B. Rotational Motion Under Constant Angular Acceleration

C. Relations Between Angular and Linear Quantities
D. Centripetal Acceleration
E. Centripetal Force
F. Describing Motion of a Rotating System
G. Newton's Universal Law of Gravitation

XI. Rotational Equilibrium and Rotational Dynamics
A. Torque and the Second Condition for Equilibrium
B. The Center of Gravity
C. Examples of Objects in Equilibrium
D. Relationship Between Torque and Angular Acceleration
E. Rotation Kinetic Energy
F. Angular Momentum and its conservation

XII. Thermal Physics
A. Temperature and the Zeroth Law of Thermodynamics
B. Thermometers and Temperature Scales
C. Thermal Expansion of Solids and Liquids
D. Macroscopic Description of an Ideal Gas
E. Avogadro's N

Q. LABORATORY OUTLINE: None ☒ Yes ☐

NA