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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
PHYS 131 - UNIVERSITY PHYSICS I

Created by: Feng Hong

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Canino School of Engineering Technology !

Department: PHYSICS !

Semester/Year: FALL/2018 !

A. **TITLE**: UNIVERSITY PHYSICS I

B. **COURSE NUMBER:** PHYS 131

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 basic calculus in developing some of the fundamental concepts of classical physics. Topics covered are measurement, vector manipulation (including unit vector notation), linear kinematics and dynamics, motion in a plane, and conservation of energy and linear momentum.

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

Pre-Calculus or Three years of high school mathematics or permission of instructor

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

University Physics Lab I and MATH 161 (Calculus I)

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 the methods scientists use to explore physical phenomena, including observation, hypothesis development, measurement, data collection, experimentation, evaluation of evidence, and employment of physics 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	2-Crit Think ISLO ISLO	CA Subsets Subsets Subsets
b. Apply scientific data, concepts, and models in physics.	N/A	Application of scientific data, concepts, and models in one of the natural sciences	2-Crit Think 1-Comm Skills ISLO	PS W Subsets Subsets
c. Demonstrate an understanding of one dimensional and two dimensional kinematics & dynamics.	N/A	Application of scientific data, concepts, and models in one of the natural sciences	2-Crit Think 1-Comm Skills ISLO	PS W Subsets Subsets
d. Demonstrate proficiency in solving physical problems by analytical methods.	N/A	Application of scientific data, concepts, and models in one of the natural sciences	2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	PS Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets 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   ☐ Civic Engagement
☐ Internship   ☐ Creative Works/Senior Project
☐ Clinical Placement   ☐ Research
☐ Practicum   ☐ Entrepreneurship
☐ Service Learning   (program, class, project)
☐ Community Service

K.   TEXTS:

Serway and Jewett (9th edition). Physics for Scientists and Engineers with Modern Physics. Boston, MA: Brooks/Cole Cengage Learning.

L.   REFERENCES:

None

M.   EQUIPMENT: None ☐   Needed: Technology enhanced classroom

N.   GRADING METHOD: A-F

O.   SUGGESTED MEASUREMENT CRITERIA/METHODS:

- **Exams**
- **Quizzes**
- **Homework**
- **Project(s)**

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. Newton's Laws of Motion
A. The Concept of Force
B. Some Applications of Newton's Laws
C. Forces of Friction
VI. Circular Motion and Other Applications of Newton's Laws
A. Newton's Second Law Applied to Uniform Circular Motion
B. Nonuniform Circular Motion
C. Motion in Accelerated Frames
D. 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

Q. **LABORATORY OUTLINE**: None ☒ Yes ☐