ROCHESTER COMMUNITY AND TECHNICAL COLLEGE

COMMON COURSE OUTLINE

Course discipline/number/title: PHYS 1127: Classical Physics I

A. CATALOG DESCRIPTION
1. Credits: 5
2. Hours/Week: 4 Lecture, 3 lab
3. Prerequisites (Course discipline/number): Students should either have already taken or be concurrently enrolled in Calculus I (MATH 1127).
4. Other requirements: Or permission of Instructor
5. MnTC Goals (if any): Goal 3/Natural Sciences

B. COURSE DESCRIPTION: This course is the first semester of a two-semester introduction to classical physics using the mathematics of vectors and calculus. Topics studied include vectors, motion in one and two dimensions, Newton's Laws of motion, work and energy, conservation of momentum, torque and rotational motion, simple harmonic motion, waves, and sound. These topics are studied through lecture, discussion, interactive problem solving, demonstrations, hands-on laboratories, and independent work. Free-body diagrams are used extensively. Emphasis is on both conceptual learning and problem solving. The laboratory experience will provide the student with opportunities for discovery, measurement, technical writing and data analysis. Students should either have already taken or be concurrently enrolled in Calculus I (MATH 1127).

C. DATE LAST REVISED (Month, year): February, 2019

D. OUTLINE OF MAJOR CONTENT AREAS:
1. Background
   a) Measurements, significant figures
   b) Unit systems, conversions
2. Mechanics
   a) Kinematics
   b) Newton's Laws of Motion, Force Analysis
   c) Work and Energy
   d) Linear Momentum
3. Rotational Mechanics
   a) Rotational Kinematics
   b) Torque
   c) Angular Momentum
   d) Static Equilibrium
4. Vibrations and Waves
   a) Oscillations
   b) Traveling Waves
   c) Sound
   d) Superposition and Standing Waves
   e) Doppler Effect
5. Applications of Calculus to Physics

The laboratory activities are used to enhance, correlate and demonstrate a variety of methods and equipment used in scientific inquiry and as verification of various scientific laws and theories. Laboratory measurement are obtained and recorded by students during the lab period. The results are analyzed, and certain specified calculations are required to demonstrate and verify related laws and relationships. Evaluation may consist of reports and/or lab packets and/or quizzes.

E. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Use common definitions of terms found in physics.
2. Explain and apply basic physics principles to their everyday lives.
3. Use critical thinking and problem-solving skills to evaluate physical systems and predict future behavior.
4. Read and interpret graphs of physical data.

F. LEARNING OUTCOMES (MNTC):
Goal 3/Natural Sciences: The student will be able to:
1. Demonstrate understanding of scientific theories.
2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, student's laboratory experience in the collection of data, it's statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
1. Objective exams
2. Lab exams
3. Research papers
4. Quizzes
5. Written homework
6. Online homework
7. Small group projects
8. Oral presentations
9. Laboratory reports

H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s):
Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.

I. SPECIAL INFORMATION (if any):
1. A scientific calculator is required