PHYS 1081: Engineering Physics I

A. COURSE DESCRIPTION

Credits: 4
Lecture Hours/Week: 3
Lab Hours/Week: 2
OJT Hours/Week: *

Prerequisites:
This course requires any of these three prerequisites
   MATH 1425 - Precalculus
   MATH 1426 - Calculus I
   ATCC Calculus-Level Placement

Corequisites: None

MnTC Goals: Goal 03 - Natural Science

This course is the first of a comprehensive two-semester sequence in introductory physics. The topics of
kinematics, vectors, rotational motion, gravity, energy, and oscillatory motion are introduced at the level of
calculus. The course presents these topics as a foundation for further studies in science while at the same
time developing problem-solving skills that will be useful for students in practically any endeavor they
choose to undertake.

B. COURSE EFFECTIVE DATES: 03/29/2021 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Kinematics vectors one-dimensional motion two-dimensional motion
2. Circular motion uniform non-uniform
3. Momentum impulse and momentum conservation of momentum collisions
4. Newton's Laws of Motion inertia forces and acceleration interactions between objects
5. Rotational motion rotational kinematics torque angular momentum rotational energy
6. Work and energy definition of work, kinetic energy potential energy conservation of energy
7. Universal gravitation orbits gravitational energy escape velocity
8. Oscillations simple harmonic oscillator simple pendulum damping forces driving forces the use of
   mathematics

D. LEARNING OUTCOMES (General)

1. Analyze one- and two-dimensional motion of objects using vectors, trigonometry, and calculus.
2. Apply Newton's Laws of Motion to situations and problems involving forces.
3. Analyze circular and rotational motion in terms of forces and kinematic variables.
4. Solve problems involving collisions using the vector properties of momentum and momentum
   conservation.
5. Analyze oscillatory motion using calculus techniques.
E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal 03 - Natural Science

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, students' laboratory experience in the collection of data, its 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.
4. Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted