Course Outline for: PHYS 1121 Physics 1 for Scientists and Engineers

A. Course Description:

1. Number of credits: 5
2. Lecture hours per week: 4
   Lab hours per week: 2
3. Prerequisites: MATH 1510 (C- or better) or concurrent registration with an override
   Eligible for MATH 1520
   MATH 1510 (C- or better, valid for 5 years); OR
   Placement Level of MATH 1520:
   AP Calculus AB test score of 3-5
   AP Calculus AB sub score of 3-5 with Calculus BC test score of 1-2
   AP Calculus BC test score of 3
4. Corequisites: None
5. MnTC Goals: Goal #3 Natural Science

This is the first semester of a two-semester sequence of calculus-based introductory physics. This course uses calculus. Topics include kinematics, dynamics, rotational motion, gravitation, conservation laws of momentum and energy, thermal physics, and periodic motion. Optional topics include fluids and thermodynamics. This course meets requirements for students majoring in engineering, mathematics, computer science, or the sciences.

B. Date last reviewed/updated: October 2023

C. Outline of Major Content Areas:

1. Kinematics.
2. Dynamics.
3. Rotational motion.
4. Gravitation.
5. Conservation laws of momentum and energy.
6. Thermal physics, and periodic motion.
7. Optional topics include fluids and thermodynamics.

D. Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

1. Demonstrate an understanding of scientific theories and principles by: (2abc, 3a)
   a. Stating and applying the fundamental laws and concepts relating to the course topics.
   b. Identifying which physical laws and principles are appropriate for the solution of physics problems relating to human applications.

c. Using the appropriate physical laws and principles and differential calculus concepts and techniques to develop the mathematical expressions required to solve physics problems; solving those mathematical expressions.
d. Using the terminology of physics correctly.

2. Formulate and test hypotheses by: (2abc, 3b)
   a. Performing laboratory, simulation, or field experiments.
   b. Collecting data and analyzing it statistically and graphically.
   c. Identifying sources of error and uncertainty.
   d. Estimating the magnitude of error and uncertainty in data.
   e. Using appropriate software to perform experiments and analyze data.
3. Communicate experimental findings, analysis, and interpretations by: (2abc, 3c)
   a. Presenting laboratory results orally.
   b. Orally explaining analysis and interpretations of laboratory results and relating the results to physics concepts and theories.
   c. Presenting written reports that interpret laboratory results and relate them to physics concepts and theories.

E. Methods for Assessing Student Learning:

Methods for assessment may include, but are not limited to, the following:

1. Written and/or oral reports
2. Homework
3. Projects
4. Quizzes
5. Exams
6. Final Exam

F. Special Information:

None