Course Outline for: PHYS 1201 Physics 1 with Biomedical Applications

A. Course Description:

1. Number of credits: 4
2. Lecture hours per week: 3
   Lab hours per week: 2
3. Prerequisites: MATH 1400 (C or higher) or MATH 1510 (C or higher)
4. Corequisites: None
5. MnTC Goals: Goal #3 - Natural Sciences

An inherent foundation of physics supports the biomedical sciences. Explore physics and its connection to health and biology in the first semester of a two-semester sequence in introductory physics, with a laboratory component. Topics include kinematics, dynamics, torque, energy, fluids, and thermal physics. Problems are solved using the basic concepts of calculus such as the derivative and simple integration. Fundamental concepts of physics are related to biomedical applications of special interest to students majoring in the biological sciences and those who plan to enter the health professions.

B. Date last reviewed/updated: February 2025

C. Outline of Major Content Areas:

1. Kinematics
2. Dynamics
3. Rotation
4. Conservation of Energy
5. Conservation of Momentum
6. Fluids
7. Thermal Physics

Applications will be drawn from biomedical fields and may include forces in joints and muscles, human motion, blood flow, and thermal properties of gases.

D. Course Learning Outcomes:

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

1. Apply the fundamental laws relating to the course topics. (Goal 3a, 2a)
2. Identify which physical laws are appropriate for the solution of physics problems relating to human applications. (Goal 3a, 2c)
3. Solve calculus-based physics problems using the appropriate physical laws. (Goal 3a, 2a)
4. Explain the importance of physics to health sciences using physics terminology. (Goal 3a)
5. Test formulated hypotheses for experiments based on analyzed data and uncertainties. (Goal 3b, 2c)

6. Communicate experimental laboratory findings with regards to physics concepts both orally and in writing. (Goal 3c)

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