Common Course Outline for: PHYS 1202 Physics 2 with Biomedical Applications

A. Course Description

1. Number of credits: 4
2. Lecture hours per week: 3
3. Lab hours per week: *2*
4. Prerequisites: PHYS 1201 (C or higher) and MATH 1400 (C or higher) or 1510 (C or higher)
5. Co-requisites: None
6. MnTC Goals: 3 Natural Science

This course is a continuation of PHYS 1201. This course uses the basic concepts of calculus such as the derivative and simple integration. The course covers topics from waves, electricity, simple DC circuits, magnetism, atomic structure and spectra, and the physics of medical imaging. This course relates fundamental concepts of physics to biomedical applications; it meets requirements for students majoring in the biological sciences and is appropriate for students who plan to enter the health professions.

B. **Date last revised:** April 2017

C. Outline of Major Content Areas:

Magnetic fields, atomic structure and spectra, and nuclear physics. Applications will be drawn from biomedical fields and may include DNA structure and replication, the electrocardiogram, electrical conduction in the human nervous system, the human eye and corrective lenses, imaging technologies such as thermography, CT, PET, and MRI, radiation safety and nuclear medicine.

D. Course Learning Outcomes

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 basic 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.
   e. Recognizing the importance of physics to the health sciences.
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

Assessment methods are at the discretion of the instructor and may include written and/or oral reports, homework, other projects, quizzes, exams, and a final exam.

Special Information: This course is recommended for life science majors, but *not* recommended for pre-engineering or other physical science majors.