Course Prefix and Number: <u>PHY 100</u>   Credits: <u>4</u>

Course Title: <u>Elements of Physics</u>

Course Description:

Covers basic concepts of physics, including Newtonian mechanics, properties of matter, heat transfer, waves, fundamental behavior of gases, optics, ionizing radiation, and fundamentals of electricity and magnetism. The assignments in the course require college-level reading fluency, coherent written communication, application of arithmetic, exponents, and algebraic skills such as solving for an unknown variable in an equation, and finding the slope and intercept from the equation of a line. This is a Passport and UCGS transfer course. Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week. 4 credits

General Course Purpose:

PHY 100 improves the scientific and quantitative literacy of students through the study and application of a wide range of physical concepts. The course focuses on the conceptual descriptions of physical phenomena instead of mathematical rigor.

Course Prerequisites and Co-requisites:

None

Student Learning Outcomes:
Upon completing the course, the student will be able to

- Scientific Reasoning
  - Apply the methods of scientific reasoning as related to physics that will be useful in their chosen occupational field and/or personal lives
- Laboratory Methods
  - Become acquainted with measurement and laboratory research methods
- Applications
  - Become acquainted with the applications of today's science and technology
- Quantitative Analysis
  - Apply problem-solving methods to physical situations
- Communication
  - Explain and interpret scientific reasoning, demonstrate listening skills, and the appropriate verbal and non-verbal responses in different contexts such as interpersonal relations and group discussions
- Units
  - Identify units (AES and SI) associated with physical quantities
  - Convert non-base units to base units (e.g. minutes to seconds)
- Scientific Method
  - Identify steps in the scientific method
  - Apply the scientific method in physical experiments
- Kinematics
  - Identify, differentiate among, and perform calculations using distance, time, speed, displacement, velocity, and acceleration

- o Identify and differentiate between scalar and vector quantities
- o Describe different types of motion in one and two dimensions, and the conditions for which they occur
- o Identify and perform calculations using centripetal acceleration
- Newton's Laws
  - o Describe a force and how it affects the motion of an object
  - o Identify various types of forces in physical situations
  - o Define Newton's laws of motion and apply them to physical situations
- Gravitation
  - o Describe Newton's law of universal gravitation and how it depends on mass and distance
  - o Apply Newton's law of universal gravitation to circular orbits
  - o Describe a gravitational field and how it related to the gravitational force
- Work and Energy
  - o Define work and describe how it relates to forces
  - o Define kinetic energy and potential energy and describe how they relate to work
  - o Differentiate among the different types of potential energies and kinetic energy
  - o Identify conditions in which mechanical energy is conserved
  - o Apply conservation of mechanical energy to physical situations
  - o Define power and describe how it relates to work and energy
  - o Apply the definition of power to physical situations
- Momentum
  - o Define momentum and describe how it relates to Newton's second law
  - o Identify conditions in which momentum is conserved
  - o Apply conservation of momentum to physical situations
  - o Describe and differentiate between elastic and inelastic collisions

- Define the binding energy of an isotope and describe how it relates to mass
- Apply the concept of binding energy to fission and fusion processes

Major Topics to Be Included:

- Units
- Scientific Method
- Kinematics
- Newton's Laws
- Gravitation
- Work and Energy
- Momentum
- Rotational Motion
- Physics of Matter
- Heat
- Waves
- Electricity and Electric Circuits
- Electromagnetism
- Optics
- Atomic Physics
- Nuclear Physics

Effective Date/Updated: August 22, 2023