PHY 110
CONCEPTUAL PHYSICS

COURSE DESCRIPTION:

Prerequisites: MAT 060 aor DMA 010, 020, 030 or satisfactory score on placement test
Corequisite: PHY 110A (Conceptual Physics Lab)

This course provides a conceptually-based exposure to the fundamental principles and processes of the physical world. Topics include basic concepts of motion, forces, energy, heat, electricity, magnetism, and the structure of matter and the universe. Upon completion, students should be able to describe examples and applications of the principles studied. Laboratory experiments and computer-based exercises enhance and consolidate the understanding of basic physical principles and applications. *This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in natural sciences/mathematics.* Course Hours Per Week: Class, 3. Lab, 2. Semester Hours Credit, 4.

LEARNING OUTCOMES:

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

a. Demonstrate knowledge of physical principles.
b. Describe examples of and applications of physical principles.
c. Demonstrate use of physical principles through lab experiments.

OUTLINE OF INSTRUCTION:

I. Measurement
   A. Scientific measurements.
   B. The scientific method and physical world.
   C. Techniques of measurement
   D. Significant digits, accuracy and precision

II. Mechanics
   A. Newton's first law of motion – Inertia
   B. Linear motion
   C. Velocity
   D. Acceleration
   E. Newton's second law of motion – Acceleration
   F. Newton's third law of motion – action and reaction
   G. Friction
   H. Momentum and rotational motion
   I. Gravity and weight
   J. Projectile motion and orbits

III. Properties of matter

A. Atomic structure
B. Molecules
C. States of matter
D. Properties of gases, liquids and solids
E. Archimede's principle
F. Surface tension
G. Pressure
H. Gas laws
I. Density and specific gravity

IV. Heat
A. Temperature
B. Heat
C. Thermal expansion
D. Conduction
E. Radiation
F. Thermodynamics
G. First and second laws of thermodynamics
H. Entropy
I. Heat engines

V. Sound
A. Vibrations and waves
B. Nature of sound
C. Properties of sound waves

VI. Electricity and magnetism
A. Static electricity
B. Electric fields
C. Electric current
D. Magnetism
E. Magnetic poles and fields.
F. Electromagnetic induction
G. Generators and motors
H. Alternating-current electricity
I. Transformer and power transmission

VII. Light
A. Properties of electromagnetic waves
B. Colors of the visible spectrum
C. Reflection
D. Refraction
E. Diffraction
F. Interference
G. Emission of light (incandescence, fluorescence and phosphorescence)

H. Quanta of light: concept of light's duality.

VIII. Atomic and Nuclear Physics
- A. Models of the atom
- B. Quantum mechanics
- C. X-rays and radioactivity
- D. Isotopes
- E. Nuclear fission and fussion
- F. Special Theory of relativity
- G. Gravitation and relativity
- H. Cosmology and Physics: types of universes.

REQUIRED TEXTBOOK:

Hewitt, P. G. Conceptual Physics Fundamentals. San Francisco: Pearson Education, Inc., publishing as Addison Wesley, 2008.

SUGGESTED REFERENCES, PERIODICALS, AND VISUAL AIDS:

Numerous supplementary texts, programmed materials, and audiovisual packages are available in the Educational Resources Center. These materials may be utilized to reinforce the lecture and lab material or to provide material for independent study by the student.

STATEMENT OF STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 919-536-7207, ext. 1413 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1209.