PHY 152
COLLEGE PHYSICS II

COURSE DESCRIPTION:

Prerequisites: PHY 151
Corequisites: None

This course uses algebra- and trigonometry-based mathematical models to introduce the fundamental concepts that describe the physical world. Topics include electrostatic forces, electric fields, electric potentials, direct-current circuits, magnetostatic forces, magnetic fields, electromagnetic induction, alternating-current circuits, and light. Upon completion, students should be able to demonstrate an understanding of the principles involved and display analytical problem-solving ability for the topics covered. Laboratory experiments, along with some computer-based labs and tutorials, consolidate the basic principles discussed in lectures. *This course has been approved to satisfy the Comprehensive Articulation Agreement for the 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 demonstrate basic knowledge in the following:

a. Electromagnetic waves.
b. Geometrical optics.
c. Wave optics.
d. Applied optics.
e. Electric charge.
f. Electric field.
g. Electric energy.
h. Electric circuits.
i. Electromagnetism.
j. Applied electricity.
k. Relativity.
l. Electrons and photons.

OUTLINE OF INSTRUCTION:

I. Electromagnetic waves
   A. Electric oscillations and resonance
   B. Radiation
   C. Description and production of em waves
   D. Sources of waves

II. Geometrical optics
   A. Huygen's principle
   B. Reflection
   C. Refraction
   D. Thin lenses
   E. Ray tracing

F. Objects and images
G. Mirrors

III. Wave optics
A. Theories of light
B. Interference
C. The grating
D. Single-slit diffraction
E. Michelson interferometer
F. Polarization of light

IV. Applied optics
A. The camera
B. The human eye
C. The magnifier
D. The microscope
E. Resolving power
F. The telescope
G. The spectroscope

V. Electric charge
A. Electric and magnetic forces
B. Conductors and insulators
C. Coulomb's law
D. Electrolysis

VI. Electric field
A. Concept of electric field
B. Lines of force
C. Potential difference
D. Equipotential surfaces
E. Capacitance

VII. Electric energy
A. Electromotive force
B. Resistors and Ohm's law
C. Conventional current
D. Electric power

VIII. Electric circuits
A. Kirchhoff's laws
B. Terminal voltage of a cell
C. Parallel and series resistance
D. Parallel and series EMF's
E. Ammeters and voltmeter
F. Capacitors in circuits

IX. Electromagnetism
A. Magnetic field
B. Force on charge and current segment

C. Current loops
D. Ampere's law
E. Magnets and poles
F. Induced EMF and magnetic flux

X. Applied electricity
A. Motors and generators
B. Transformers
C. Inductive and capacitive impedance
D. Thermoelectricity
E. Solid-state devices

XI. Relativity
A. Galilean relativity
B. Einsteinian relativity
C. Space and time dilation
D. Mass increase
E. Mass and energy

XII. Electrons and photons
A. The charge and mass of an electron
B. The photoelectric effect
C. The dual nature of light and matter
D. The uncertainty principle

REQUIRED TEXTBOOK AND MATERIALS:

Giambattista, A., Richardson, B. M., & Richardson, R. C., Physics. 2nd ed. Boston, McGraw Hill Higher Education, 2010.

Programmable scientific calculator

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.