**MASTER COURSE OUTLINE**
Prepared By: Jim Hamm Date: September 2017

**COURSE TITLE**
Physics for Non-Science Majors with Lab

**GENERAL COURSE INFORMATION**

| | | |
|---|---|---|
| Dept.: PHYS& | Course Num: 110 | (Formerly: PHYS&100, 101) |
| CIP Code: 40.0801 | Intent Code: 11 | Program Code: |
| Credits: 5 | | |
| Total Contact Hrs Per Qtr.: 66 | | |
| Lecture Hrs: 44 | Lab Hrs: 22 | Other Hrs: 0 |
| Distribution Designation: Lab Science LS | | |

**COURSE DESCRIPTION** (as it will appear in the catalog)
This course is a general survey course for the non-science major. The course helps develop an awareness of the physical concepts which govern our everyday experiences. Topics will include most of the following, depending on class preparation and interest: describing motion, Newton's laws of motion and gravitation, energy and conservation laws, states of matter and its behavior, thermodynamics, waves, electricity and magnetism, optics, atomic and nuclear physics, special relativity. Conceptual reasoning is stressed, and mathematics is kept to the level of elementary algebra. Laboratories emphasize concepts learned in lecture, and graphing and data handling techniques are learned. This course is offered primarily to meet the Associate in Arts and Science laboratory science requirement.

**PREREQUISITES**
MATH 098, or placement into a higher level mathematics course

**TEXTBOOK GUIDELINES**
Conceptual physics textbook such as *Inquiry into Physics*, by Ostdiek and Bord

**COURSE LEARNING OUTCOMES**
*Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:*

1. Identify the fundamental laws of physics in those areas we study, and describe how these laws are manifested in natural events.
2. State qualitative descriptions of velocity, acceleration, force, momentum, work, and energy, and calculate these quantities for simple physical situations.
3. Use mathematics at the level of elementary algebra to describe and analyze physical situations.
4. Use the concepts of momentum and energy conservation to analyze physical situations.
5. Use the atomic model of matter to explain such phenomena as pressure, expansion, buoyancy, and thermodynamic effects.
6. Describe the quantum-mechanical model of the atom, and use it to describe the current model for the emission and absorption of light.
7. Describe the atomic nucleus and radioactive decay processes.

8. Describe in a qualitative way the theory of special relativity. Use elementary algebra and graphs to determine relativistic effects on time, length, momentum, and energy.
9. Make, analyze, and interpret graphs of experimental data.

**INSTITUTIONAL OUTCOMES**

IO2 Quantitative Reasoning: Students will be able to reason mathematically.

**COURSE CONTENT OUTLINE**

1. Mechanics
    - Describing motion: speed, velocity, and acceleration
    - Newton's laws of motion
    - Gravitation: projectile and satellite motion, tides, weight, acceleration due to gravity
    - Momentum and its conservation
    - Work, types of energy, and energy conservation
    - Rotational motion
2. Physics of Matter
    - States of matter
    - Density
    - Atoms
    - Pressure
    - Bernoulli's principle
    - Archimedes' principle
    - Temperature, heat, and thermal expansion
    - Heat transfer
    - Changes of phase
    - First and second laws of thermodynamics
3. Waves
    - Types of waves
    - Characteristics of waves
    - Propagation of waves
    - Sound waves
    - Characteristics of sound
    - Perception of sound
4. Electricity and Magnetism
    - Electric charge, Coulomb's law, and electric fields
    - Electric currents, circuits, and Ohm's law
    - Power and energy in electric circuits
    - Magnetism
    - Interactions between electricity and magnetism
    - Electromagnetic waves
    - Thermal radiation
5. Optics
    - Properties of light waves
    - Reflection, refraction, diffraction, interference, and polarization
    - Properties of mirrors, lenses, and refracting surfaces
    - Optical properties of the eye, and correction of vision problems
    - Dispersion
    - Atmospheric optical effects
6. Atoms and Nuclei

History of 20th century physics
Light emission and absorption, light quanta
The quantum-mechanical atom
Quantum-mechanical application
The atomic nucleus
Nuclear particles and radioactive decay
Radioactive half-life

7. Special Relativity
Time dilation and length contraction
Relativistic energy and momentum

**DEPARTMENTAL GUIDELINES** *(optional)*

Exams and Quizzes 50-60%

PO5 should be assessed: Students will be able to solve problems by gathering, interpreting, combining and/or applying information from multiple sources.

_____ _____

**DIVISION CHAIR APPROVAL** **DATE**