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

COURSE TITLE
General Physics III with Lab

GENERAL COURSE INFORMATION

Dept.: PHYS&	Course Num: 116	(Formerly:)
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)
The third course in a three-quarter algebra-based sequence. A balance of conceptual understanding and problem-solving ability is emphasized; laboratory and lecture are integrated in the sequence. In this third quarter the topics studied will include electricity, magnetism, electromagnetic induction and waves, quantum physics, atomic physics, and nuclear physics. Biological applications of physics will be studied whenever possible.

PREREQUISITES
Completion of PHYS& 115 with 2.0 or higher.

TEXTBOOK GUIDELINES
An algebra-based physics textbook (usually called *College Physics*), such as those by Douglas Giancoli, Hugh Young, Nicholas Giordano, or Knight, Jones, and Field.

COURSE LEARNING OUTCOMES
Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:
1. Apply algebra and right-angle trigonometry to the solution of problems involving electricity, magnetism, electromagnetic induction and waves, quantum physics, atomic physics, and nuclear physics.
2. Apply conceptual reasoning to analyze situations involving the material studied in this course.
3. Present well-reasoned solutions of problems at a level appropriate for the course.
4. Present experimental results in clearly written laboratory reports.
5. Use technology such as calculators and computer spreadsheets to perform calculations, analyze data, and present data in graphical form at levels appropriate for the course.

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

COURSE CONTENT OUTLINE
1. Electric Charge and Electric Field

- Charges and forces
- Coulomb's law
- The electric field
- Applications of the electric field

2. Electric Potential
   - Electric potential energy and electric potential
   - Sources of electric potential
   - Conservation of energy
   - Calculation of electric potential
   - Capacitors, dielectrics, and electric field energy
3. Current and Resistance
   - Introduction to current
   - Batteries and EMF
   - Ohm's law and resistors
   - Energy and power in circuits
   - Circuit elements and diagrams
   - Kirchhoff's laws
   - Series and parallel circuits
   - Measuring voltage and current
4. Magnetic Fields and Forces
   - Magnetism and the magnetic field
   - Magnetic field of a current
   - Moving charges and currents in magnetic fields
   - Torques on dipoles
5. Electromagnetic Induction and Waves
   - Induced current
   - Motional emf
   - Magnetic flux and Faraday's law
   - Induced fields and electromagnetic waves
   - Properties of electromagnetic waves and the electromagnetic spectrum
6. Quantum Physics
   - X-rays and diffraction
   - The photoelectric effect and Einstein's photon hypothesis
   - Matter waves
   - Quantization of energy
   - The uncertainty principle
7. Atoms and Molecules
   - Spectroscopy
   - The quantum-mechanical hydrogen atom
   - Multi-electron atoms
   - Excited states and spectra
   - Molecules
   - Lasers and other applications of quantum mechanics
8. Nuclear physics
   - Nuclear structure and stability
   - Forces and energy in nuclei
   - Radioactivity
   - Nuclear decay and half-lives
   - Medical applications

Quarks and leptons

DEPARTMENTAL GUIDELINES *(optional)*
EVALUATION METHODS/GRADING PROCEDURES: Exams and Quizzes 50-60% Homework 20-30% Laboratory Reports 20%
PLANNED TEACHING METHODS/LEARNING STRATEGIES: Lecture In-class active learning Small group work Laboratory observation, measurement, and Experimentation
PO5 should be assessed: Students will be able to solve problems by gathering, interpreting, combining and/or applying information from multiple sources.

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DIVISION CHAIR APPROVAL **DATE**