MASTER COURSE OUTLINE
Prepared By: Jim Hamm Date: June 4, 2018

COURSE TITLE
General Physics I with Lab

GENERAL COURSE INFORMATION

Dept.: PHYS&	Course Num: 114	(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 first course in a three-quarter algebra-based sequence for students pursuing degrees in biology, pre-dentistry, pre-medicine, pre-veterinary medicine, engineering technology, zoology, and other fields. This course is also strongly recommended for students who will be taking Engineering Physics but who have not had a prior physics class. Students should check with the requirements of their intended baccalaureate institution when considering this sequence. A balance of conceptual understanding and problem-solving ability is emphasized. This first course will begin with an introduction to units and unit conversion, scalars and vectors, and using right-angle trigonometry for analyzing two-dimensional motion, then continue to the study of mechanics: describing motion, with speed, velocity, and acceleration; application of Newton's laws in one and two dimensions; impulse and momentum conservation; work and energy conservation; rotational motion and torque.

PREREQUISITES
Successful completion of MATH 099, placement in Math 141 or instructor permission.

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. Convert between different units of all types and correctly use significant figures.
2. Perform calculations with scalars and vectors, and use right-angle trigonometry for determining components of vectors.
3. Apply algebra and right-angle trigonometry to the solution of problems involving constant velocity, constant acceleration, projectile motion, Newton's laws, momentum and impulse, energy and work, and rotational motion.
4. Apply conceptual reasoning to analyze situations involving the material studied in this course.
5. Present well-reasoned solutions of problems at a level appropriate for the course.

6. Present experimental results in clearly written laboratory reports.
7. 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. Mathematical Preliminaries
    - Units and unit conversion
    - Scientific notation and its use on calculators
    - Significant figures
    - Right angle trigonometry
    - Introduction to scalars and vectors
2. Studying Motion in One and Two Dimensions
    - Displacement, average and instantaneous velocity
    - Average and instantaneous acceleration
    - Motion with constant acceleration
    - Free fall
    - Velocity and acceleration in a plane
    - Projectile motion
3. Forces and Newton's Laws of Motion
    - Forces and Newton's first law
    - Mass, weight, and Newton's second law
    - Free-body diagrams
    - Newton's third law
    - Equilibrium of a particle
    - Contact forces and friction
    - Elastic forces
4. Circular Motion, Orbits, and Gravity
    - Forces in circular motion
    - Uniform circular motion
    - Forces, velocity, and acceleration in uniform circular motion
    - Apparent forces in circular motion
    - Circular orbits and weightlessness
    - Newton's law of gravitation and orbital motion
5. Momentum
    - Impulse and momentum
    - Conservation of momentum
    - Inelastic collisions
    - Two dimensional collisions
    - Angular momentum
6. Energy and Work
    - Work, energy, and the work-kinetic energy theorem
    - Potential energy
    - Conservation of mechanical energy
    - Energy in collisions
    - Power
7. Rotational Motion

Describing rotational motion: angular velocity and acceleration
Relations between linear and rotational motion
Moment of inertia and rotational kinetic energy
Rolling motion
Torque and angular acceleration

DEPARTMENTAL GUIDELINES *(optional)*
Exams and Quizzes 50-60% Homework 20-30% Laboratory Work 20% 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**