OUTCOMES BASED LEARNING MATRIX

Course: General Physics I(PHYS161) Department: Physical Science Revised: Fall 2007

At the end of the course, students will be able to: **Students will participate in:** **Faculty will evaluate:**

COURSE OUTCOMES	OUTCOME ACTIVITIES	ASSESSMENT TOOLS
Introduction: - describe the scientific method. - convert between units in various systems using algebraic cancellation of units. - skillfully use common laboratory instruments to measure length, mass, and time.	- lectures, discussions, and demonstrations. (CT, QS, OC) - reading the textbook, including sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS) - Measurement Lab (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R, OC) - Lab reports (W, QS, CT)
Motion in One Dimension: - define and describe displacement, velocity and acceleration. - interpret graphs of displacement, velocity or acceleration vs. time and use the graph to qualitatively relate the quantity to the other two. -develop an understanding of the derivative of a polynomial and trig functions and their application to	- lectures, discussions and demonstrations. (CT, QS, OC) - reading the textbook, including sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS) - Graphical Analysis of Accelerated Motion Lab and Acceleration Due To Gravity Lab. (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R, OC) - Lab reports (W, QS, CT)

motion. - solve motion problems using equations of motion.		
Vector Analysis: - find the components of a vector. - add vectors graphically. - add vectors mathematically using components. - interpret the product of a vector and a scalar, as well as vector subtraction.	- lectures, discussions and demonstrations. (CT, QS, OC) - reading the textbook, including sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS) - Vector Lab. (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R, OC) - Lab reports (W, QS, CT)
Motion in Two Dimensions: - develop equations of motion for motion in a plane. - analyze motion in a plane using components, including projectile motion and circular motion. - solve projectile motion and other two-dimensional problems using equations of motion	- lectures, discussions and demonstrations. (CT, QS, OC) - reading the textbook, including sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS) - Projectile Motion Lab (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R, OC) - Lab reports (W, QS, CT)
Newton's Laws: - to analyze common situations with Newton's First and Third Laws - predict the acceleration of several kinds of motion using vector components and Newton's Second	- lectures, discussions and demonstrations. (CT, QS, OC) - reading the textbook, including sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS)	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R, OC) - Lab reports (W, QS, CT)

Law. These include connected-body (continued on next page)	- Newton's Second Law on the Air Track Labs (CT, R, QS, TS) (continued on next page)	
(continued from previous page) and inclined plane problems and problems with friction. - analyze the forces on a body in translational equilibrium	(continued from previous page) - Forces In Equilibrium Lab (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	(see previous page)
Work and Energy: -calculate work done by a variety of forces. -develop a basic understanding of integral calculus and its application to work and potential energy problems. -use the vector dot product to determine the work done by a force. - use the Work-Energy Theorem to solve motion problems. - identify which types of energy are present in a given situation, and decide if conditions in a problem indicate that energy is conserved. - apply the concept of power to solve problems involving the rate of work being done or the rate of energy transformation.	- lectures, discussions and demonstrations. (CT, QS, OC) - reading the textbook, including sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS) - Conservation of Energy Lab (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R, OC) - Lab reports (W, QS, CT)
Impulse and Momentum: - calculate impulse and momentum. - use impulse and momentum to	- lectures, discussions and demonstrations. (CT, QS, OC) - reading the textbook, including	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R,

solve problems involving interactions between objects (e.g., collisions). This includes elastic and perfectly inelastic collisions. -use calculus in rocketry applications.	sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS) - Ballistic Pendulum Lab. (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	OC) - Lab reports (W, QS, CT)
Rotational Motion: - describe the variables of rotational motion -- angular displacement, velocity and acceleration using basic and calculus expressions . - recognize the analogy between rotational motion and linear motion through the use of a different coordinate system. -Define and determine the moment of inertia of discrete and geometric masses using generalized equations and integration. - analyze and solve rotational motion problems using the rotational forms of equations of motion, Newton's Laws, Conservation of Energy, and Conservation of Angular Momentum. -solve angular momentum problems	- lectures, discussions and demonstrations. (CT, QS, OC) - reading the textbook, including sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS) - Centripetal Force Lab, Moment of Inertia Lab. (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R, OC) - Lab reports (W, QS, CT)

using the vector cross product.		
General: - when solving a problem, determine which approach is the appropriate one (Newton's Laws, Conservation of Energy, Conservation of Momentum; linear or rotational cases). - master techniques of algebra, trigonometry and calculus necessary to do the analyses listed above.	- lectures, discussions and demonstrations. (CT, QS, OC) - reading the textbook, including sample problems. (CT, R, QS) - solving assigned problems. (CT, R, QS) - experiments during lab sessions. (CT, R, QS, TS) - organizing and documenting information in lab reports. (CT, W, QS)	- Tests with emphasis on solving problems (CT, W, QS, R) - Lab performance (CT, QS, TS, R, OC) - Lab reports (W, QS, CT)