Planned Course: Physics I Unit: Rotational Equilibrium	Course Number: S403 Grade Level: 11-12	Department: Science	
Estimated Time: 6 weeks	Level/Track:	Date Approved: 8/24/09	
PA Academic Standards	**Core Concepts (in question format)** • **Skills/Knowledge**	**Activities/Strategies/Study Skills (identify some activities as remedial or enrichment activities)**	**Assessments (include types and topics)**
3.1.12 Unifying Themes A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems. B. Apply concepts of models as a method to predict and understand science and technology. C. Assess and apply patterns in science and technology. D. Analyze scale as a way of relating concepts and ideas to one another by some measure. 3.2.12 Inquiry and Design A. Evaluate the nature of scientific and technological knowledge. B. Evaluate experimental information for appropriateness and adherence to relevant science processes. C. Apply the elements of scientific inquiry to solve multi step problems. D. Analyze and use the technological design process to solve problems. 3.4.12 Physical Science,	►What is the difference between a point mass and an extended object? • Discuss that points cannot rotate. Extended objects must have length. • Describe and discuss examples of point masses and extended objects. ►What is the difference between Force and Torque? • Discuss that force causes objects to move differently while torque causes their rotation to change. • Discuss the effect of net force and torque for different extended objects. ►How is Torque calculated? • Describe Torque as force acting perpendicular to a lever arm. • Calculate torque using its formula	• Study text • Take notes on additional explanations from lectures • Do homework problems from text and worksheets • Take notes on explanations from lectures. • Engage in discussions of momentum and its use in defining motion. • Demonstrate problem solving techniques at the blackboard. • Do computer research on momentum. • Answer homework questions from text and/or worksheets. (Ch 11 pgs 206 thru 211) • Use scientific method while performing laboratory experiments. • In first lab study rotational Equilibrium • Study text Chapter(s) 11 "Rotational Equilibrium" • Perform laboratory experiments dealing with: Equilibrium both translational and rotational	• Completion of homework. • Discussion of homework assignments. • Class participation in discussions of topics surrounding everyday events illustrating the assignments. • Written reports of laboratory exercises. • Class participation • Written Chapter test • Written pop quiz(s) • Written reports of laboratory exercises • Teacher observation of performance in LAB environment. • Computer modeling of problems using IP

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Chemistry and Physics B. Apply and analyze energy sources and conversions and their relationship to heat and temperature. C. Apply the principles of motion and force. 3.7.12 Technological Devices A. Apply advanced tools, materials and techniques to answer complex questions. B. Evaluate appropriate instruments and apparatus to accurately measure materials and processes. C. Evaluate computer operations and concepts as to their effectiveness to solve specific problems.	$\tau = F.d\sin(\Theta)$. ►How does lever arm affect the torque on an object? • Describe the application of force to a lever as being necessarily perpendicular to the lever arm. • Describe how length of a lever arm magnifies the force applied to cause torque. ► What is center of mass? • Describe center of mass as the theoretical location of all of an objects mass. • Discuss how all free rotation will occur using the center of mass as a center point. ►What is moment of inertia? • Draw a parallel between inertia in translational motion and moment of inertia in rotational motion		

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	• make calculations for moment of inertia on various extended objects. ►What is the second condition of equilibrium? • Define the second condition of equilibrium as that condition where the sum of all torque is zero and therefore no change in rotational condition can exist. Angular acceleration will be zero. • Make calculations of applied torques to check for satisfaction of the 2nd condition of equilibrium. ►How are translational and rotational problems solved? • Discuss the process of calculation the two conditions of equilibrium so that unknown forces and torques can be		

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	calculated. • Discuss how the conditions of equilibrium can be estimated by observing the behavior of the extended objects. • calculate unknown forces and torques using the concept of equilibrium. ►What is rotational Kinetic Energy? • Discuss how rotating objects possess energy just because they are rotating. • make calculations of rotational kinetic energy using $KE_{rotation} = ½I\omega^2$ ►What is a machine? • Describe machines as making tasks easier with a net loss of work. ►What are the six simple machines? • Describe and give		

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	examples of the six simple machines. • Calculate TMA or (IMA) of each machine. ►Describe the three types of levers. • Describe and give examples of the three types of levers. ►Calculate the mechanical advantages and efficiencies of various compound and simple machines. • Perform efficiency, AMA, TMA for single simple machines and compound simple machines.		