Blackhawk School District

CURRICULUM

Course Title:	**Mechanical Engineering**
Course Number:	**1011**
Grade Level(s):	**9-12**
Periods Per Week:	**5**
Length of Course:	**1 semester**
Credits:	**.5**
Faculty Author(s):	**Brandon Smith**
Date:	**January 2010**

COURSE DESCRIPTION:

Mechanical Engineering is an extension of the How Stuff Works course and is highly focused on projects. Like the How Stuff Works course, students learn problem-solving skills needed to produce projects and models that are functional and efficient. Upon completion of this course students will have attained engineering skills that will be useful in applied science, engineering and physics courses. Studies and projects include (but are not limited to): Small Engine Troubleshooting and Maintenance, Flight Endurance, Pneumatic/Hydraulic Design and modeling, Boat Hull design, and Robotic System Control. **Mechanical Engineering is a prerequisite for Applied Engineering and Technology.**

COURSE OUTLINE	OBJECTIVES (PA standard)	PROPOSED TIME / ACTUAL TIME	RESOURCES	LESSON REFLECTION (for future revisions)
Class Rules and Syllabus **PA Safety Lessons** **Equipment Demonstrations** **PA Safety Quizzes** **Technical Design Process** **3-view and Isometric Sketching** **Flight Endurance Unit** **Right Flyer Project (tsa regs.)** **Small Engine Maintenance:** • **Safety** • **Maintenance** **Engine Maintenance Lab** **Brought in from home or teacher** **Fluid Power Studies** **Hydraulic/Pneumatic Robot design and implementation** **Introduction to Robotics:** • **Guided Production** • **Guided Programming** • **Student chosen Robotic Challenge**	3.2.P.B1. Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration. Use force and mass to explain translational motion or simple harmonic motion of objects. Relate torque and rotational inertia to explain rotational motion. 3.2.12.B2. Demonstrate how the law of conservation of momentum and conservation of energy provide alternate approaches to predict and describe the motion of objects. 3.2.P.B3. Analyze the factors that influence convection, conduction, and radiation between objects or regions that are at different temperatures. 3.2.P.B4. Develop qualitative and quantitative understanding of current, voltage, resistance, and the connections among them. 3.2.12.B6. CONSTANCY/CHANGE Compare and contrast motions of objects using forces and conservation laws. 3.4.10.A1. Illustrate how the development of technologies is often driven by profit and an economic market. 3.4.10.A2. Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems. 3.4.12.A3. Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM). 3.4.10.B2. Demonstrate how humans devise technologies to reduce the negative consequences of other technologies. 3.4.10.B1. Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative	2 Days 8 Days 2 Days 6 Days 10 Days 3 Days 7 Days 5 Days 10 Days 10 Days 3 Days 4 Days 10 Days	Overhead Projector Lego Mindstorms Robotic Kits Small Engine Tools Small Engine Parts Hand Tools Power Tools PA Dept. of Ed. Safety Packets and quizzes Energy Technology Textbook Energy, Power, and Transportation Technology Textbook Instructor Designed Handouts Activity Materials and Supplies Assorted Hardware Assorted Plastics Assorted Woods Assorted Styrofoam Adhesives Fasteners Etc.	

	effects. 3.4.10.B4. Recognize that Technological development has been evolutionary, the result of a series of refinements to a basic invention. 3.4.10.C1. Apply the components of the technological design process. 3.4.10.C2. Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. 3.4.12.C3. Apply the concept that many technological problems require a multi-disciplinary approach. 3.4.10.D1. Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. 3.4.10.D2. Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. 3.4.12.E2. Compare and contrast the technologies of biotechnology, conservation, bio-fuels, and ecosystems as they relate to managing Earth's resources effectively. 3.4.12.E3. Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation. 3.4.12.E5. Explain how the design of intelligent and non-intelligent transportation systems depends on many processes and innovative techniques. 3.4.12.E6. Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.			