

Blackhawk School District

CURRICULUM

Course Title:	Applied Engineering and Technology
Course Number:	1012
Grade Level(s):	10-12
Periods Per Week:	5
Length of Course:	1 year
Credits:	1
Faculty Author(s):	Brandon Smith
Date:	January 2010

COURSE DESCRIPTION:

Applied Engineering and Technology is an advanced exploration of previous studies from either: How Stuff Works and/or Intro to Mechanical Engineering. This course will focus on problem solving activities which will require the students to use creativity and critical thinking skills. Students will exercise these skills by building projects that solve a given problem. Through trial and error, students will design, test, evaluate and then re-design their projects to better solve the given challenge. Projects include (but are not limited to): Small Engine Disassembly, CO2 Powered Flight Endurance, Rube Goldberg Challenge, Solid Fuel Rocket design and implementation, and Transportation Challenge. **In order to be eligible, students must have a minimum of a “C” in How Stuff Works and/or Intro to Mechanical Engineering.**

COURSE OUTLINE	OBJECTIVES (PA standard)	PROPOSED TIME / ACTUAL TIME	RESOURCES	LESSON REFLECTION (for future revisions)
<p>Class Rules and Syllabus</p> <p>PA Safety Lessons</p> <p>Equipment Demonstrations</p> <p>PA Safety Quizzes</p> <p>Technical Design Process</p> <p>3-view and Isometric Sketching</p> <p>Drafting Tools and 3-view Drawing and design</p> <p>Lighter-Than-Air Flight</p> <p>Hot Air Balloons</p> <p>Condor Flight Challenge</p> <p>Solid Fuel Staged Rocket design</p> <p>Boat Hull Design and Implementation</p> <p>Small Engine Studies</p> <p>Small Engine Demonstrations, Disassembly, and Reassembly</p> <p>Transportation Challenge</p> <p>Rube Goldberg Design Challenge and device implementation</p> <p>Robotics – Software applications</p>	<p>3.2.12.B1. Analyze the principles of rotational motion to solve problems relating to angular momentum and torque.</p> <p>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.</p> <p>3.2.P.B3. Analyze the factors that influence convection, conduction, and radiation between objects or regions that are at different temperatures.</p> <p>3.2.P.B4. Develop qualitative and quantitative understanding of current, voltage, resistance, and the connections among them.</p> <p>3.2.12.B6. CONSTANCY/CHANGE Compare and contrast motions of objects using forces and conservation laws.</p> <p>3.4.10.A1. Illustrate how the development of technologies is often driven by profit and an economic market.</p> <p>3.4.10.A2. Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.</p> <p>3.4.12.A3. Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).</p> <p>3.4.10.B2. Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.</p> <p>3.4.12.B1. Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.</p> <p>3.4.10.B4. Recognize that Technological development has been evolutionary, the result of a series of refinements to a basic invention.</p> <p>3.4.10.C1. Apply the components of the technological design process.</p>	<p>2 Days</p> <p>8 Days</p> <p>7 Days</p> <p>10 Days</p> <p>12 Days</p> <p>15 Days</p> <p>12 Days</p> <p>12 Days</p> <p>20 Days</p> <p>15 Days</p> <p>24 Days</p> <p>6 Days</p>	<p>Overhead Projector</p> <p>Small Engine Tools</p> <p>Hand Tools</p> <p>Power Tools</p> <p>Lego Mindstorms Robotic Kits</p> <p>Condor Plane Launcher</p> <p>Solid Fuel Rocket Launcher</p> <p>Briggs and Stratton Engines (12)</p> <p>PA Dept. of Ed. Safety Packets and quizzes</p> <p>Energy Technology Textbook</p> <p>Energy, Power, and Transportation Technology Textbook</p> <p>Instructor Designed Handouts</p> <p>Activity Materials and Supplies</p> <p>Assorted Hardware Assorted Plastics</p>	

<p>Robotics – Practicing scenarios/situation from resource CD</p> <p>Robotics – Development of problem solving robot. Problem based on student research and Development</p> <p>Robotics – Teacher challenges – Students receive “On the spot” problems which require them to compete as team members.</p>	<p>3.4.12.C2. Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.C3. Apply the concept that many technological problems require a multi-disciplinary approach.</p> <p>3.4.10.D1. Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.</p> <p>3.4.12.D2. Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.E3. Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.</p> <p>3.4.12.E5. Explain how the design of intelligent and non-intelligent transportation systems depends on many processes and innovative techniques.</p> <p>3.4.12.E6. Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.</p>	<p>10 Days</p> <p>20 Days</p> <p>5 Days</p>	<p>Assorted Woods Assorted Styrofoam Adhesives Fasteners Etc.</p>	
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