

Teacher: CORE ROBOTICS
 Course: ROBOTICS

Year: 2012-13
 Month: All Months

Assessment	Review of Pro/ENGINEER Concepts ~		Dashboard, file system, basic setup. Project inclusive of all of the features covered in CAD.				
	Essential Questions	Content	Skills	Assessments	Lessons	Learning Benchmarks	Standards
	How are products designed? What is Computer Aided Design?	Creating and manipulating file structure in Pro/ENGINEER.					
Semester	Robotic Systems ~ The beginnings of robotics as modeled through Lego construction.						
	Essential Questions	Content	Skills	Assessments	Lessons	Learning Benchmarks	Standards
	How do you build a robot? What is a system? How do engineers collect data? What is genetic engineering? How is the Engineering Design Process used to fabricate a product? How is the Engineering Design Process used	Structures; Lego Construction techniques Computer/Robotic Programming; Robolab Software -programing Lego Models. Adding power to robotics.	Construct robotic models that will solve various design solutions and design challenges. Identify solutions and construct models that are structurally sound. Create simple computer programs	Strong Structures 9/8/2012 Straight Line Challenge 9/9/2012 Backup Challenge 9/12/2012 90 Degree Turn Robot 9/14/2012	Structures Motorizing Mechanisms Programming with Robolab	Students will construct robots capable of solving a variety of design challenges. Students will construct simple computer programs that will instruct robots to perform simple operations.	STE.17.01.01- Identify and explain the steps of the engineering design process, i.e., identify the problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the

to fabricate a product? How is the Engineering Design Process used to fabricate a product? How is the Engineering Design Process used to fabricate a product?		that address specific performance tasks and download to robot.				solution(s), and redesign. STE.17.07.03- Explain the process and the programming of robotic action utilizing three axes.
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The Engineering Process ~ What is the process of developing an idea and bringing it to production?

Essential Questions	Content	Skills	Assessments	Lessons	Learning Benchmarks	Standards
Why are structure and design an important part of the engineering process? What are the theories of operation and design of electric motors? How has the computer provided man with greater control over motorized systems? How are simple	Model Construction; Construct models that are able to withstand forces without breaking. Programming Processes; Accuracy of computer driven robotics, programming of microprocessors.	Use the concepts of engineering design to construct robotics structures capable of withstanding impact. Design a computer program that will drive a vehicle to perform a specific task.	Structures 10/1/2012 Robot Design/Performance Challenges 10/1/2012	Building Strong Structures The Design Process.	Create a design that will meet a specific design criteria and address a design problem. Construct a model of the design	STE.17.01.01- Identify and explain the steps of the engineering design process, i.e., identify the problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.

machines combined to form complex machines?

Input/Sensors ~ How do robots respond to input from their environment?

Essential Questions	Content	Skills	Assessments	Lessons	Learning Benchmarks	Standards
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Computer Manufacturing Operations

Essential Questions	Content	Skills	Assessments	Lessons	Learning Benchmarks	Standards
How has the computer changed the manufacturing process. What is Rapid Prototyping and how has it changed the engineering process?	<p>Concepts of CNC manufacturing and rapid prototyping.</p> <p>The computer is utilized in the manufacture of products.</p>	<p>Design a simple project using Pro/ENGINEER software.</p> <p>Export the Pro/ENGINEER model to Mastercam and generate the needed toolpaths for operations on the Benchman milling machine.</p> <p>Properly calibrate the Benchman milling machine, load stock and machine part.</p>	<p>Pro/ENGINEER Model 10/1/2012</p> <p>Mastercam Tool Path and Machining 11/1/2012</p>		<p>Pro/ENGINEER machining operations</p> <p>Students will design a simple model using Pro/ENGINEER software, export to Mastercam for post processing and machine a part using the Benchman CNC milling machine.</p>	<p>STE.17.07.01- Explain the manufacturing processes of casting and molding, forming, separating, conditioning, assembling, and finishing.</p> <p>STE.17.07.02- Differentiate the selection of tools and procedures used in the safe production of products in the manufacturing process, e.g., hand tools, power tools, computer-aided manufacturing, three-dimensional</p>

							modeling.
D e c e m b e r	Electronics						
	Essential Questions	Content	Skills	Assessments	Lessons	Learning Benchmarks	Standards
	<p>How are robotics utilized to improve life in modern society?</p> <p>How are machines and devices created as a design before being built?</p> <p>What Is Computer Aided Design and what Is Its role In the development of Robotics?</p>	<p>Electronics; Engineering and building basic electronic circuits.</p> <p>Wiring and soldering</p> <p>Drawing schematics diagrams of electronic circuits.</p>	<p>Identify resistor, capacitor, diode, motor, and other electronic components that are used in the construction of electronic circuits.</p> <p>Identify, construct, and test simple electronic circuits.</p>	<p>Simple circuit construction.</p> <p>12/1/2012</p> <p>Basic Robot</p> <p>12/1/2012</p>		<p>Construct a robotic mechanism that is capable of moving under its own power and has the ability to react to its environment through the use of on board sensors.</p>	<p>STE.17.01.01- Identify and explain the steps of the engineering design process, i.e., identify the problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.</p> <p>STE.17.05.01- Describe the different instruments that can be used to measure voltage, e.g., voltmeter, multimeter.</p> <p>STE.17.05.02- Identify and explain the components of a circuit including a source,</p>

							<p>conductor, load, and controllers (controllers are switches, relays, diodes, transistors, integrated circuits).</p> <p>STE.17.05.03- Explain the relationship between resistance, voltage, and current (Ohm's Law).</p> <p>STE.17.05.04- Determine the voltages and currents in a series circuit and a parallel circuit.</p> <p>STE.17.05.05- Explain how to measure voltage, resistance, and current in electrical systems.</p> <p>STE.17.05.06- Describe the differences between Alternating Current (AC) and Direct Current (DC).</p>
J a n u a	Advanced CAD concepts ~ Extending into more advanced functions of CAD.						
	Essential Questions	Content	Skills	Assessments	Lessons	Learning Benchmarks	Standards
	What are	Mechanical	Open	Integrating		Construct a	STE.17.01.01-

r y	<p>the principles of speed, torque, rotary and linear motion, and how are they utilized in robotic systems?</p> <p>How are robotic mechanisms able to respond and react to the environment?</p>	<p>Advantage - Gearing, belting, use of eccentrics in mechanical systems.</p> <p>Advanced design techniques incorporating Pro/ENGINEER software.</p> <p>Providing feedback to robotics through the use of Electronic sensors.</p>	<p>Pro/ENGINEER program and complete a basic design project.</p> <p>Combine gears in the construction of a mechanical system for the purpose of changing speed and torque.</p> <p>Constructing mechanical systems that incorporate a belt drive system.</p> <p>Use eccentrics to convert rotary to linear motion.</p>	<p>Electronics with Lego Robotics 1/1/2013</p> <p>Gearing for Speed and Torque 1/1/2013</p> <p>Rotary to Linear Motion 1/1/2013</p>		<p>model incorporating gear and belt systems that will meet specific design criteria for changes in speed and torque.</p> <p>Construct a model capable of climbing over obstacles and navigating hazardous terrain.</p> <p>Identify an eccentric system and demonstrate how it is used to convert rotary to linear motion.</p>	<p>Identify and explain the steps of the engineering design process, i.e., identify the problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.</p> <p>STE.17.07.03- Explain the process and the programming of robotic action utilizing three axes.</p>
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