



Engineering Technology - Grade 8

Course Information

Grade(s):	8
Discipline/Course:	Technology Education
Course Title:	Engineering Technology
Prerequisite(s):	None
Course Description: <i>Program of Studies</i>	This course is a basic introduction to engineering. Utilizing the Universal Systems Model, students will engage in the construction of models incorporating simple machines and apply STEAM concepts to test and evaluate the outcome. Vertical alignment of the middle school technology education program prepares students for advanced approaches to STEM careers at the high school level.
Course Essential Questions:	<ul style="list-style-type: none"> ● How can we choose the best tools to use for a particular task or to solve a problem? ● What steps can we take to solve a complex problem that seems to have many solutions? ● How can we work together to solve problems? ● How does knowledge from other content areas (math, science, the arts), help us solve problems?
Course Enduring Understandings:	<ul style="list-style-type: none"> ● Making is an inherent part of technology and engineering design. ● Technology and engineering design is a fundamental human activity requiring a range of skills. ● Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.
Duration/ Credit:	10 weeks / 0 Credit(s) (Middle School Course)
Course Materials/Resources:	<ul style="list-style-type: none"> ● Computer Access ● Tools and Consumables
FPS Course Academic Expectation(s):	<ul style="list-style-type: none"> ● SE - Synthesizing and Evaluating ● CC - Creating and Constructing

Year at a Glance (Units)	<ul style="list-style-type: none">● Introduction to Engineering (1 week)● Engineering Design Challenge 1 (4 weeks)● Engineering Design Challenge 2 (4 weeks)
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Unit Number and Title:	Unit 1 – Introduction to Engineering Technology
Duration:	1 week
Resource(s):	Computer access
Unit Overview:	Introduction to the Universal Systems Model
Learning Goals	
Standard(s):	ITEEA (International Technology and Engineering Educators Association) Standards for Technological and Engineering Literacy (STEL) STEL-2M. Differentiate between inputs, processes, outputs, and feedback in technological systems. STEL-2N. Illustrate how systems thinking involves considering relationships between every part, as well as how the system interacts with the environment in which it is used
Essential Question(s):	<ul style="list-style-type: none"> • What steps can we take to solve a complex problem that seems to have many solutions? • How can we work together to solve problems? • How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?
Enduring Understanding(s):	<ul style="list-style-type: none"> • Making is an inherent part of technology and engineering design. • Technology and engineering design is a fundamental human activity requiring a range of skills. • Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts
Learning Goal(s): <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> • The elements of the Universal Systems Model • The importance of iteration in engineering • The difference between criteria and specifications <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none"> • Apply the Universal Systems Model to a project plan

Unit Number and Title:	Unit 2 – Engineering Design Challenge 1
Duration:	4 weeks
Resource(s):	<ul style="list-style-type: none"> • Computer access • Tools and consumables
Unit Overview:	Using the Universal Systems Models, students are provided with hands-on experience to solve a simple problem by designing, building, and testing a physical model that meets defined specifications and criteria. Students will develop a detailed project plan that will allow them to prototype, collaborate with others, and utilize various manufacturing tools/materials in response to the design challenge.
Learning Goals	
Standard(s):	<p>ITEEA (International Technology and Engineering Educators Association) Standards for Technological and Engineering Literacy (STEL)</p> <p>STEL-1J. Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.</p> <p>STEL-1M. Apply creative problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.</p> <p>STEL-2M. Differentiate between inputs, processes, outputs, and feedback in technological systems.</p> <p>STEL-2N. Illustrate how systems thinking involves considering relationships between every part, as well as how the system interacts with the environment in which it is used</p> <p>STEL-3G. Explain how knowledge gained from other content areas affects the development of technological products and systems</p> <p>STEL-7Q. Apply the technology and engineering design process.</p> <p>STEL-7T. Assess design quality based upon established principles and elements of design.</p> <p>STEL-7U. Evaluate the strengths and weaknesses of different design solutions.</p>
Essential Question(s):	<ul style="list-style-type: none"> • How can we choose the best tools to use for a particular task or to solve a problem? • What steps can we take to solve a complex problem that seems to have many solutions?

	<ul style="list-style-type: none"> • How can we work together to solve problems? • How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?
Enduring Understanding(s):	<ul style="list-style-type: none"> • Making is an inherent part of technology and engineering design. • Technology and engineering design is a fundamental human activity requiring a range of skills. • Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.
Learning Goal(s): <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> • The technology and engineering design process is a way to iteratively solve design challenges. <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none"> • Research, design, and construct a model based on an engineering design challenge. • Use CADD software to produce orthographic and isometric plans of their designs. • Design within provided criteria and constraints and make appropriate trade-offs for optimization. • Revisit steps in the design process to avoid fixation on a single solution. • Evaluate design solutions based on design principles, constraints and criteria.

Unit Number and Title:	Unit 3 – Engineering Design Challenge
Duration:	4 weeks
Resource(s):	<ul style="list-style-type: none"> • Computer access • Tools and consumables
Unit Overview:	<p>Using the Universal Systems Models, students are provided with hands-on experience to solve a simple problem by designing, building, and testing a physical model that meets defined specifications and criteria. Students will develop a detailed project plan that will allow them to prototype, collaborate with others, and utilize various manufacturing tools/materials in response to the design challenge.</p> <p>NOTE: 2nd challenge will focus on a different type of simple machine.</p>
Learning Goals	
Standard(s):	<p>ITEEA (International Technology and Engineering Educators Association) Standards for Technological and Engineering Literacy (STEL)</p> <p>STEL-1J. Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.</p> <p>STEL-1M. Apply creative problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.</p> <p>STEL-2M. Differentiate between inputs, processes, outputs, and feedback in technological systems.</p> <p>STEL-2N. Illustrate how systems thinking involves considering relationships between every part, as well as how the system interacts with the environment in which it is used</p> <p>STEL-3G. Explain how knowledge gained from other content areas affects the development of technological products and systems</p> <p>STEL-7Q. Apply the technology and engineering design process.</p> <p>STEL-7T. Assess design quality based upon established principles and elements of design.</p> <p>STEL-7U. Evaluate the strengths and weaknesses of different design solutions.</p>
Essential Question(s):	<ul style="list-style-type: none"> • How can we choose the best tools to use for a particular task or to solve a problem? • What steps can we take to solve a complex problem that seems to have many solutions?

	<ul style="list-style-type: none"> • How can we work together to solve problems? • How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?
Enduring Understanding(s):	<ul style="list-style-type: none"> • Making is an inherent part of technology and engineering design. • Technology and engineering design is a fundamental human activity requiring a range of skills. • Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.
Learning Goal(s): <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> • The technology and engineering design process is a way to iteratively solve design challenges. <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none"> • Research, design and construct a model based on an engineering design challenge. • Use CADD software to produce orthographic and isometric plans of their designs. • Design within provided criteria and constraints and make appropriate trade-offs for optimization. • Revisit steps in the design process to avoid fixation on a single solution. • Evaluate design solutions based on design principles, constraints and criteria.