

TECHNOLOGY, ENGINEERING, & MANUFACTURING 6

CURRICULUM/CONTENT AREA

Applied Technology and Engineering

COURSE LENGTH

45 days

GRADE LEVEL

6th

DATE LAST REVIEWED

2022

PREREQUISITE(s) *if applicable*

None

BOARD APPROVAL DATE

11/15/2022

PRIMARY RESOURCE *if applicable*

DESIRED RESULTS

COURSE DESCRIPTION AND PURPOSE

This course asks students to create, design, build, and discover! Students are introduced to and use a design thinking process to solve problems. Students use industry standard 3D modeling software to create virtual images of their designs. Students use industry standard 2D modeling software to create custom designs. Students will bring the design process full circle when they build or create the projects they have designed. The course exposes students to a design-thinking approach to problem solving, a skill that is embedded within all middle school elective offerings.

ENDURING UNDERSTANDINGS

Students will understand that...

Creativity, innovation, and critical thinking are essential for success in a technologically advanced world.

ESSENTIAL QUESTIONS

Students will keep considering...

Why is creativity and innovation important? How is creativity and innovation used in [name of career pathway]?

How do teams efficiently and effectively solve problems in an increasingly complex world?

What strategies and processes can I use to become a more effective creator, thinker, and problem solver?

<p>The ability to communicate and collaborate with people with diverse backgrounds and perspectives is key to participation in a global economic society.</p>	<p>Why is communication and collaboration important? How do positive work behaviors and personal qualities impact communication and collaboration?</p> <p>What is effective teamwork? What strategies can I use/teams use to work better together? How can perspectives and experiences of a diverse group develop innovative solutions to a given problem?</p>
<p>Career and technical education provides pathways to high-demand, high-wage career opportunities, and personal fulfillment.</p>	<p>Why is career and life readiness important? What jobs and careers are available to meet individual and societal needs locally, regionally, and nationally?</p> <p>How might technical knowledge and skills influence one's employability and advancement opportunities within various work settings?</p> <p>What are employability skills? How do I prepare myself for a career that is in demand now and in 5, 10, or 20 years from now?</p>

PRIORITY CAREER & TECHNICAL STANDARDS

Students will be skilled at...

Creativity, Critical Thinking, Communication and Collaboration

4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.

- a: I develop effective resolutions for a given problem, decision or opportunity using available information.
- b: I develop and implement a resolution for a new situation using personal knowledge and experience.

Career Development

CD4: Students will identify and apply employability skills.

- a: I identify and demonstrate positive work behaviors and personal qualities needed to be employable.
- c: I identify and exhibit traits for retaining employment.
- d: I develop positive relationships with others.

Information, Media, Technology

IMT1: Students will access, interpret and evaluate information from a variety of sources in order to inform and support premises, arguments, decisions, ideas and initiatives.

- a: I choose appropriate sources of data and information for a given purpose.
- b: I determine the relevance, validity, and timeliness of data and information.
- c: I select relevant information necessary for making decisions and solving problems
- d: I apply data and information to communicate ideas and create new opportunities.

PRIORITY CONTENT STANDARDS

Students will know...

Standard: BB1: Students will analyze the core concepts of technology.

Standard: ENG1: Students will analyze and demonstrate the attributes of design.

Standard: ENG3: Students will demonstrate and analyze the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.

Standard: MNF1: Students will be able to select and use manufacturing technologies.

UNIT: 1 Introduction to the Woodshop		
STAGE 1: Desired Unit Results What will students understand as a result of the unit?		STAGE 2: Assessment Evidence By what criteria will performances of understanding be assessed? Through what authentic performance tasks will students demonstrate the desired unit results?
ESSENTIAL QUESTION (s) What thought-provoking questions will foster inquiry, understanding, and transfer of learning?		Success Criteria with Standards The criteria for evaluating performance on standards is constant.
Why is communication and collaboration important?		CTE standards-based Rubric: Throughout the course, students and teachers use the rubric for communication of success criteria, reflection, goal setting, and feedback. In their portfolio/evidence journal, students will reflect on the essential questions through a quick write, constructed response.
Why is communication and collaboration important? How do positive work behaviors and personal qualities impact communication and collaboration?		
What strategies and processes can I use to become a more effective creator, thinker, and problem solver?		
What are employability skills? How do I prepare myself for a career that is in demand now and in 5, 10, or 20 years from now?		
PRIORITY CAREER & TECHNICAL STANDARDS & Learning Targets		Performance Tasks Options/ Assessment Strategies by Standard Students may be given options to show their learning in varied ways.
Creativity, Critical Thinking, Communication and Collaboration		
4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.		
a: I develop effective resolutions for a given problem, decision or opportunity using available information.	4C2.a.7.m: I can identify problems that became worse due to poorly thought out or poorly informed solutions 4C2.a.10.m: I can explain the process for choosing an action or making a decision.	Students will identify problems or deficiencies in their projects compared to sample projects. When possible, students will be given the opportunity to correct problems associated with their projects.
b: I develop and implement a resolution for a new situation using personal knowledge and experience.	4C2.b.4.m: I can analyze a problem to determine how it relates to existing knowledge.	
Career Development		
CD4: Students will identify and apply employability skills.		
a: I identify and demonstrate positive work behaviors and personal qualities needed to be employable.	CD4.a.4.m: I can demonstrate flexibility and willingness to learn new knowledge and skills.	Students will actively engage in safe and proper use of tools, equipment and machines to complete a woodworking project. Students will treat each other and the instructor with respect and always act appropriately in the shop environment so as to not cause an accident. In their portfolio/evidence journal, students will describe positive work behaviors that lead to successful design process through a quick write, constructed response.
c: I identify and exhibit traits for retaining employment.	CD4.c.2.m: I can demonstrate the behavior and etiquette appropriate to interactions with adults.	
d: I develop positive relationships with others.	CD4.d.3.m: I can interact with others in a respectful and non-judgmental manner.	
PRIORITY CONTENT STANDARDS & Learning Targets		Performance Tasks Options/ Assessment Strategies by Standard Students may be given options to show their learning in varied ways.
Standard: BB1: Students will analyze the core concepts of technology.	I can use appropriate tools to measure and layout a piece of material (e.g., length, width, thickness, angles, etc.) within tolerances.	Students will construct a woodworking project. Throughout the process, students will encounter problems which will require them to communicate with others and develop solutions to the problems. Students will use tools, machines and equipment to complete a woodworking project or projects.
	BB1.b.3.m: I can describe how resources are the things needed to complete a task	

UNIT 2: 2D Design

STAGE 1: Desired Unit Results		STAGE 2: Assessment Evidence
What will students understand as a result of the unit?		By what criteria will performances of understanding be assessed? Through what authentic performance tasks will students demonstrate the desired unit results?
ESSENTIAL QUESTION (s)		Success Criteria with Standards
What thought-provoking questions will foster inquiry, understanding, and transfer of learning?		The criteria for evaluating performance on standards is constant.
Why is creativity and innovation important? How is creativity and innovation used in graphic design and manufacturing?		CTE standards-based Rubric: Throughout the course, students and teachers use the rubric for communication of success criteria, reflection, goal setting, and feedback. In their portfolio/evidence journal, students will reflect on the essential questions through a quick write, constructed response.
What strategies and processes can I use to become a more effective creator, thinker, and problem solver?		
Why is communication and collaboration important? How do positive work behaviors and personal qualities impact communication and collaboration?		
How might technical knowledge and skills influence one's employability and advancement opportunities within various work settings?		
PRIORITY CAREER & TECHNICAL STANDARDS & Learning Targets		Performance Tasks Options/ Assessment Strategies by Standard
Creativity, Critical Thinking, Communication and Collaboration 4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.		
a: I develop effective resolutions for a given problem, decision or opportunity using available information.	4C2.a.6.m: I can develop multiple resolutions for a given problem, decision or opportunity. 4C2.a.7.m: I can identify problems that became worse due to poorly thought out or poorly informed solutions	Students will create two dimensional designs using a variety of technologies. These designs could include hand sketching / drawing, heat transfer designs and sticker / logo designs.
Career Development CD4: Students will identify and apply employability skills.		
a: I identify and demonstrate positive work behaviors and personal qualities needed to be employable.	CD4.a.4.m: I can demonstrate flexibility and willingness to learn new knowledge and skills. CD4.a.5.m: I can identify positive work qualities typically desired in each of the career cluster's pathways. CD4.c.2.m: I can demonstrate the behavior and etiquette appropriate to interactions with adults.	Students will actively participate and engage in creating virtual and physical two dimensional designs. Students will apply previous knowledge of sketching and drawing from art classes as well as other previous 2 dimensional work they may have done. Discussions of attitude, work ethic and respecting coworkers is all part of being an effective member of the work force. Timeliness and deadlines are also part of real life and everyone's work environment, whether it is in manufacturing, in an office setting or even if you are self-employed. In their portfolio/evidence journal, students will describe positive work behaviors that lead to successful design process and employability through a quick write, constructed response.
c: I identify and exhibit traits for retaining employment.	CD4.d.3.m: I can interact with others in a respectful and non-judgmental manner.	
d: I develop positive relationships with others.	CD4.d.4.m: I can use cooperative behavior in helping peers accomplish goals and tasks.	
Information, Media, Technology IMT1: Students will access, interpret and evaluate information from a variety of sources in order to inform and support premises, arguments, decisions, ideas and initiatives.		
a: I choose appropriate sources of data and information for a given purpose.	IMT1.b.5.m: I can demonstrate ability to gather information from electronic and non-electronic sources.	

	IMT1.b.6.m: I can analyze various sources of data and information for relevance, validity and timeliness.	Students will utilize online resources available through Canvas to access information on how to create 2 dimensional designs. Students will also learn sketching techniques and use manipulatives to demonstrate knowledge and ability of 2 dimensional work.
	IMT1.c.3.m: I can evaluate the relevance and reliability of various sources of information.	
c: I select relevant information necessary for making decisions and solving problems	IMT1.d.4.m: I can incorporate information from multiple sources to communicate a new idea or support an argument.	
d: I apply data and information to communicate ideas and create new opportunities.	IMT1.d.5.m: I can apply a system for tracking and accessing data and information from multiple sources.	

PRIORITY CONTENT STANDARDS & Learning Targets	Performance Tasks Options/ Assessment Strategies by Standard
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Standard: BB1: Students will analyze the core concepts of technology.	I can use appropriate tools to measure and layout a piece of material (e.g., length, width, thickness, angles, circles, arcs and volume) within tolerances.	Students will create designs and select the best design to manufacture a logo or sticker design within specifications.
Standard: ENG1: Students will analyze and demonstrate the attributes of design.	I understand requirements for a design are made up of criteria and constraints.	
Standard: ENG3: Students will demonstrate and analyze the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	I can demonstrate how invention and experimentation can solve problems.	Students will use parts of the design thinking process to develop the best idea to prototype. Students will work within given criteria and constraints to keep their designs within tolerances.
Standard: ICT1: Students will analyze, select and use information and communication technologies.	I can demonstrate how the use of symbols, measurements and drawings promotes clear communication by providing a common language to express ideas.	Students will use programs like Graphtec Studio to create designs that communicate ideas.
Standard: MNF1: Students will be able to select and use manufacturing technologies.	I can use tools, materials and machines safely.	Students will assist in using the vinyl cutter to prototype their designs.
	I can comprehend and engage in communication methods to convey ideas, concepts and requirements to other individuals and teams.	Students will be able to discuss what their designs represent and how they created their prototypes.

Stage 3: Learning Activities
A brief summary of the key learning activities- How will students build knowledge & develop skills? How will learning be relevant, accessible, and engaging? How will the learning unfold in a natural flow?

GUIDING UNIT QUESTIONS	STRATEGIES/ACTIVITIES	RESOURCES/MATERIALS
Using Costas Level of Thinking, what questions will hook and hold students so that they develop a deep understanding of the desired results? The guiding questions are more topic-specific to the particular unit. They guide the exploration of the essential questions and rigor of the standards. This may include questions that guide project based/ problem based learning	What learning strategies and experiences will authentically engage students so that they gain understanding the desired results? This includes strategies and activities that help learners acquire targeted knowledge and skills, make meaning of important ideas, and transfer their learning to new situations. Consider how the learning will be tailored and flexible to address the interests and learning styles of all students.	This includes an applicable textbooks, software, industry recognized certification software/tools, subscriptions (such asPLTW), etc.
1.How do we use the design process to solve a problem?	explicit instruction in L.A.U.N.C.H. cycle (design thinking)	Autodesk inventor, Graphtec Studio, Retina Engrave
2.How do measurement tools assist you in analyzing real world problems?		
3.Why is the safe use of tools and machines important? Is there ever a time when safety would not be the primary concern?		

ENTER UNIT TITLE HERE		
STAGE 1: Desired Unit Results What will students understand as a result of the unit?		STAGE 2: Assessment Evidence By what criteria will performances of understanding be assessed? Through what authentic performance tasks will students demonstrate the desired unit results?
ESSENTIAL QUESTION (s) What thought-provoking questions will foster inquiry, understanding, and transfer of learning?		Success Criteria with Standards The criteria for evaluating performance on standards is constant.
Why is communication and collaboration important? How do positive work behaviors and personal qualities impact communication and collaboration?		CTE standards-based Rubric: Throughout the course, students and teachers use the rubric for communication of success criteria, reflection, goal setting, and feedback.
How do teams efficiently and effectively solve problems in an increasingly complex world?		
What is effective teamwork? What strategies can I use/teams use to work better together? How can perspectives and experiences of a diverse group develop innovative solutions to a given problem?		In their portfolio/evidence journal, students will reflect on the essential questions through a quick write, constructed response.
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PRIORITY CAREER & TECHNICAL STANDARDS & Learning Targets		Performance Tasks Options/ Assessment Strategies by Standard Students may be given options to show their learning in varied ways.
Creativity, Critical Thinking, Communication and Collaboration		
4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.		
a: I develop effective resolutions for a given problem, decision or opportunity using available information.	4C2.a.6.m: I can develop multiple resolutions for a given problem, decision or opportunity.	By using the design thinking process, students will work collaboratively in teams to design, construct, test, modify and retest a solution to a given problem. The focus of this activity is to have students modify and retest solutions to improve the performance of their original designs. Student teams will explain what modifications they made to their original designs, what their anticipated results should be, and then finally, what their actual results are. In their portfolio/evidence journal, students will reflect on the design process through a quick write, constructed response.
	4C2.a.7.m: I can identify problems that became worse due to poorly thought out or poorly informed solutions	
	C2.a.9.m: I can explain how different resolutions may be appropriate under different circumstances.	
	4C2.a.10.m: I can explain the process for choosing an action or making a decision.	
	4C2.b.3.m: I can analyze problems to determine what past experiences might be related and relevant.	
b: I develop and implement a resolution for a new situation using personal knowledge and experience.	4C2.b.4.m: I can analyze a problem to determine how it relates to existing knowledge.	
Career Development		
CD4: Students will identify and apply employability skills.		
a: I identify and demonstrate positive work behaviors and personal qualities needed to be employable.	CD4.a.3.m: I can demonstrate selfdiscipline, self-worth, positive attitude and integrity.	Students will work cooperatively in teams to design, construct, test, modify and retest a solution to a given problem. Students will communicate with their peers and adults in a respectful manner that encourages teamwork success.
	CD4.a.4.m: I can demonstrate flexibility and willingness to learn new knowledge and skills.	
	CD4.a.5.m: I can identify positive workqualities typically desired in each of the career cluster’s pathways.	In their portfolio/evidence journal, students will describe positive work behaviors that lead to successful design process through a quick write, constructed response.
c: I identify and exhibit traits for retaining employment.	CD4.c.2.m: I can demonstrate the behavior and etiquette appropriate to interactions with adults.	

	CD4.c.3.m: I can distinguish between appropriate behaviors in a social vs. professional setting.
d: I develop positive relationships with others.	CD4.d.3.m: I can interact with others in a respectful and non-judgmental manner.
	CD4.d.4.m: I can use cooperative behavior in helping peers accomplish goals and tasks.

PRIORITY CONTENT STANDARDS & Learning Targets		Performance Tasks Options/ Assessment Strategies by Standard
		Students may be given options to show their learning in varied ways.
Standard: BB1: Students will analyze the core concepts of technology.	I can use the design thinking process to design, test, and make conclusions about the performance of different materials and their application in the making of structures.	Students will design, construct, test and modify a project to demonstrate their understanding of the design thinking process.
Standard: ENG1: Students will analyze and demonstrate the attributes of design.	I can demonstrate that design that is a creative planning process that leads to useful products and systems.	
Standard: ENG3: Students will demonstrate and analyze the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	I can use design thinking to test, collect data and make conclusions about the performance of different materials and their application in the making of structures.	
Standard: ICT1: Students will analyze, select and use information and communication technologies.	I can analyze how the use of symbols, measurements and drawings promotes clear communication by providing a common language to express ideas.	
Standard: MNF1: Students will be able to select and use manufacturing technologies.	I can practice appropriate problem-solving approaches and critical thinking skills to on-the-job issues and tasks.	

Stage 3: Learning Activities

A brief summary of the key learning activities- How will students build knowledge & develop skills? How will learning be relevant, accessible, and engaging? How will the learning unfold in a natural flow?

GUIDING UNIT QUESTIONS	STRATEGIES/ACTIVITIES	RESOURCES/MATERIALS
Using Costas Level of Thinking, what questions will hook and hold students so that they develop a deep understanding of the desired results? The guiding questions are more topic-specific to the particular unit. They guide the exploration of the essential questions and rigor of the standards. This may include questions that guide project based/ problem based learning	What learning strategies and experiences will authentically engage students so that they gain understanding the desired results? This includes strategies and activities that help learners acquire targeted knowledge and skills, make meaning of important ideas, and transfer their learning to new situations. Consider how the learning will be tailored and flexible to address the interests and learning styles of all students.	This includes an applicable textbooks, software, industry recognized certification software/tools, subscriptions (such asPLTW), etc.
1.How do we use the design process to solve a problem?	explicit instruction in L.A.U.N.C.H. cycle (design thinking)	●Autodesk Inventor/Fusion 360 ●Graphtec Studio ●Makerbot Desktop ●Inkscape ●Vinyl cutter ●Online digital tutorials ●3D printers ●Heat press
2.How do measurement tools assist you in analyzing real world problems?		
3.Why is the safe use of tools and machines important? Is there ever a time when safety would not be the primary concern?		

4.How do measurement tools assist you in analyzing real world problems?		
5.How are technical skills important in communicating ideas?		

Priority Standards	Unit 1	Unit 2	Unit 3
<p>Creativity, Critical Thinking, Communication and Collaboration 4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills. a: I develop effective resolutions for a given problem, decision or opportunity using available information. b: I develop and implement a resolution for a new situation using personal knowledge and experience.</p>	x	x	x
<p>Career Development CD4: Students will identify and apply employability skills. a: I identify and demonstrate positive work behaviors and personal qualities needed to be employable. b: I demonstrate skills related to seeking and applying for employment to find and obtain a desired job. c: I identify and exhibit traits for retaining employment. d: I develop positive relationships with others.</p>	x	x	x
<p>Information, Media, Technology IMT1: Students will access, interpret and evaluate information from a variety of sources in order to inform and support premises, arguments, decisions, ideas and initiatives. a: I choose appropriate sources of data and information for a given purpose. b: I determine the relevance, validity and timeliness of data and information. c: I select relevant information necessary for making decisions and solving problems d: I apply data and information to communicate ideas and create new opportunities.</p>		x	
<p>Standard: BB1: Students will analyze the core concepts of technology.</p>	x	x	x
<p>Standard: ENG1: Students will analyze and demonstrate the attributes of design.</p>	x	x	x
<p>Standard: ENG3: Students will demonstrate and analyze the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.</p>		x	x

Standard: ICT1: Students will analyze, select and use information and communication technologies.		x	x
Standard: MNF1: Students will be able to select and use manufacturing technologies.	x	x	x