



***CTE Standards Unpacking
Introduction to Technology Education***

Course: Introduction to Technology Education

Course Description: Technology is a significant part of society. Most careers call for some type of technology skills, knowledge, and abilities. Technology education brings deeper meaning to core content concepts while introducing students to various technologies, technical skills, critical thinking processes, and hands-on experiences. Students will increase their technological literacy, problem solving, and creative/critical thinking skills. Within this course the following topics of study will be addressed: nature of technology, technology and society, design process, energy and power, manufacturing, construction, transportation, communication, professionalism, health, safety and the environment.

Career Cluster: STEM

Prerequisites: None

Program of Study Application: This is a STEM Cluster Course in the STEM Engineering Pathway. It is recommended that the course be preceded by a series of foundation courses and a cluster course(s) in STEM, and followed by a more specialized pathway course such as Industrial and Bioprocess Engineering, Mechanical Drafting & Design, Architectural Drafting, and/or Robotics.

<i>INDICATOR #ITE 1: Analyze the scope and nature of technology</i>		
<i>SUB-INDICATOR 1.1 (Webb Level: 1-4):</i> Examine the relationship between technology and other areas of study.		
<i>SUB-INDICATOR 1.2 (Webb Level: 1-4):</i> Understand the effects of technology on the natural environment.		
<i>SUB-INDICATOR 1.3 (Webb Level: 1-4):</i> Examine the relationship between the cultural, social, economic, and political effects of technology on society.		
Knowledge (Factual): Scope and nature of technology. Technology on the natural environment. Relationship between the cultural, social, economic, and political effects of technology on society	Understand (Conceptual): Technology has changed other areas of study. Technology affects the natural environment. Society is affected by technology.	Skills (Application): Evaluate the impact of multiple technologies. Describe how technology has impacted life and or society. Assess the relationship between technology and/or energy source and pollution production. Investigate an invention

		and its impact on society.
--	--	----------------------------

Benchmarks

Students will be assessed on their *ability* to:

- Evaluate the impact of technological advances and/or innovation on History.
- Assess the relationship between technology and/or energy source and pollution production.
- Design a technological invention that would have a positive cultural, social, economic or political benefit.

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	Sample Performance Task Aligned to the Academic Standard(s):
<p>6.ET.CT.1.1 Summarize the role of technology in a community, society, and careers.</p> <p>7.ET.OC.1.2 Determine which innovations in technology have produced the greatest impact on society.</p> <p>7.ET.CC.1.1 Demonstrate ways that communication technologies interrelate.</p>	<p>Research and evaluate the relationship between a law, policy or best practice involving technology and its impact on culture, society, economics and/or political issues.</p>

INDICATOR #ITE 2: Apply the system-thinking model (the feedback loop) to technology

SUB-INDICATOR 2.1 (Webb Level: 1-4): Apply the design process to engineering design process.

Knowledge (Factual):	Understand (Conceptual):	Skills (Application):
<p>Engineering design process.</p>	<p>Designing will connect to engineering prototype.</p>	<p>Construct a product based upon specification and build a prototype.</p> <p>Apply the design process to engineering design process.</p>

Benchmarks

Students will be assessed on their *ability* to:

- Propose improvement to the design of a simple technological product based on performance data.
- Draw, label and define the components of the system-thinking model.

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):

9-12.ET.CI.1.1 Investigate and apply simulations with real-world situations.

Sample Performance Task Aligned to the Academic Standard(s):

Create a set of inquiry and teambuilding labs.

INDICATOR #ITE 3: Solve problems using innovation, research, experimentation and design

SUB-INDICATOR 3.1 (Webb Level: 1-4): Use research and experimentation methods to solve problems.

SUB-INDICATOR 3.2 (Webb Level: 1-4): Use innovative and/or troubleshooting methods to solve problems.

Knowledge (Factual):

Solve problems by using data and information.

Examine a problem and find an appropriate solution using innovative and/or troubleshooting methods.

Understand (Conceptual):

Information and data gathered can solve problems.

Repair system with proper tools and/or systems.

Skills (Application):

Compare and contrast a functional and non-functional problem solving system.

Utilize data to find possible solutions to a problem.

Troubleshoot a system

		that is malfunctioning and use tools and/or systems to repair it.
<p>Benchmarks</p> <ul style="list-style-type: none"> • Design a research method and conduct research to collect and analyze data. • Analyze a problem and implement a troubleshooting method using a given set of materials. 		
<p><i>Academic Connections</i></p>		
<p>ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):</p> <p>Interpreting Functions F-IF</p> <p>Trigonometric Functions F-T</p> <p>MS-PS4-3 Obtain, evaluate and communicate information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. (SEP: 8; DCI: PS4.C; CCC: Structure, Technology).</p> <p>HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* (SEP: 8; DCI: PS1.A, PS2.B; CCC: Structure/Function)</p>	<p>Sample Performance Task Aligned to the Academic Standard(s):</p> <p>Hands-on Activities for Innovative Problem Solving* http://web.stanford.edu/group/ree/archives/archive07/usa/notes/2004-897_Final.pdf</p> <p>Games That Promote Problem-Solving Skills https://www.stenhouse.com/sites/default/files/public/legacy/pdfs/8247ch10.pdf</p>	

INDICATOR #ITE 4: Apply appropriate skill sets to various ranges of

technology		
SUB-INDICATOR 4.1 (Webb Level: 1-4): Understand biotechnologies		
SUB-INDICATOR 4.2 (Webb Level: 1-4): Understand energy and power technologies		
SUB-INDICATOR 4.3 (Webb Level: 1-4): Understand information and communication technologies		
SUB-INDICATOR 4.4 (Webb Level: 1-4): Understand transportation technologies		
SUB-INDICATOR 4.5 (Webb Level: 1-4): Understand manufacturing technologies and materials		
SUB-INDICATOR 4.6 (Webb Level: 1-4): Understand construction technologies		
<p>Knowledge (Factual):</p> <p>Demonstrate an understanding of biotechnology and its applications.</p> <p>Understand the sources and application of power technologies.</p> <p>Demonstrate use of different means of digital communication.</p> <p>Demonstrate understanding of the connection between technology and transportation needs.</p> <p>Explain different types of transportation needed to get an agricultural product from the field to consumer.</p> <p>Evaluate and apply construction methods to</p>	<p>Understand (Conceptual):</p> <p>Apply biotechnology to real world situations.</p> <p>Power technology sources are applicable in household items.</p> <p>Identify the appropriate digital forms of communication and uses.</p> <p>Transportation and technology are used in multiple areas.</p> <p>System processing occurs in manufacturing technologies.</p> <p>Budgets for infrastructure made pre-building project.</p>	<p>Skills (Application):</p> <p>Design and implement an experiment to show differences in growing conditions for fuel crops.</p> <p>Compare and contrast different sources of energy and power.</p> <p>Demonstrate or explain how one source of energy can be used for multiple applications.</p> <p>Determine the appropriate means of communication based on tasks given, e.g., email, text, interpersonal, social media, networking and interaction.</p> <p>Distinguish between reliable and non-reliable digital information.</p> <p>Compare the cost differences between personal and public transportation.</p>

build the necessary infrastructure component(s).		<p>Compare and contrast manufacturing technologies to determine appropriate system for a process.</p> <p>Estimate the amount of material needed to build a structure.</p> <p>List multiple types of construction for infrastructure, e.g., types of construction needed to build a new city.</p>
--	--	--

Benchmarks

Students will be assessed on their *ability* to:

- Conduct an experiment to produce ethanol from food crops.
- Design and construct a solar collector from household items.
- Design a webpage or audiovisual presentation to communicate information.
- Design a transportation plan and cost analysis for storing and delivering a perishable product over an extended time period.
- Construct a simple cost benefit analysis for a given product.
- Given a budget, design and construct a bridge that can hold the most weight, using available materials.

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):

HS-LS1-6 Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon based molecules. (SEP: 6; DCI: LS1.C; CCC: Energy/Matter)

Sample Performance Task Aligned to the Academic Standard(s):

Energy Conversion Lab - Cengage
http://www.cengage.com/resource_uploads/downloads/1111990832_319841.pdf

Create a student traffic pattern to improve the safety of student traffic around the parking lots of the high school.

<p>HS-LS1-7 Use a model of the major inputs and outputs of cellular respiration (aerobic and anaerobic) to exemplify the chemical process in which the bonds of food molecules are broken, the bonds of new compounds are formed, and a net transfer of energy results. (SEP: 2; DCI: LS1.C; CCC: Energy/Matter)</p> <p>HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. (SEP: 5; DCI: PS2.B; CCC: Patterns). 9-10.L.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.</p> <p>11-12.SL.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</p> <p>K-12.G.1 Students will apply geospatial resources, including data sources and geographic tools to generate, interpret, and analyze information.</p>	<p>Assess the effectiveness of using the same materials for different structures.</p>
---	---

<p>INDICATOR #ITE 5: Understand ethics and professionalism in technology</p>		
<p>SUB-INDICATOR 5.1 (Webb Level: 1-4): Investigate and demonstrate understanding of professionalism and ethics in the technological environment.</p>		
<p>Knowledge (Factual): Investigate and demonstrate understanding of professionalism and ethics in the technological environment.</p>	<p>Understand (Conceptual): Ethics in a technological environment.</p>	<p>Skills (Application): Differentiate between possible ethical choices. Role play to model different possible outcomes. Compare and contrast outcomes of different ethical situations in a work environment. Identify different technological work environments and recognize appropriate professional attire.</p>
<p>Benchmarks Students will be assessed on their <i>ability</i> to:</p> <ul style="list-style-type: none"> • Brainstorm potential responses to various workplace ethics violations. • Demonstrate an understanding of ethics issues such as plagiarism, copyright and intellectual property rights in technological environments. 		
<p>Academic Connections</p>		
<p>ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):</p> <p>E 3.2 Demonstrate effective communication in the workplace using appropriate methods. E 4.1 Research employers'</p>	<p>Sample Performance Task Aligned to the Academic Standard(s):</p> <p>Create modules of various ethical issues.</p>	

responsibilities. E1.1 Identify personal qualities and aptitudes. LS 1.1 Examine characteristics, leadership styles, and habits of leaders. LS 3.3 Summarize standards of ethical behavior in leadership situations.	
---	--

INDICATOR #ITE 6: Understand safety and health in technology

SUB-INDICATOR 6.1 (Webb Level: 1-4): Understand implication of health and public safety standards

Knowledge (Factual): Communicate the importance of health and safety standards in technological environment.	Understand (Conceptual): OSHA safety guidelines. Safety procedures and equipment used.	Skills (Application): Demonstrate and understand the importance and use of safety equipment. Evaluate the effectiveness of safety tools available for a given task.
--	---	--

Benchmarks
 Students will be assessed on their *ability* to:

- Analyze potential consequences to self and others of not following health and safety standards.
- Design a plan to improve the safety of a work environment.

Academic Connections



ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	Sample Performance Task Aligned to the Academic Standard(s):
LS 1.4 Define the importance of being a good follower. ITE.6.1. Understand implication of health and public safety standards.	Design a health and safety workshop and instruct youth about the goods and bads.

Additional Resources

Please list any resources (e.g., websites, teaching guides, etc.) that would help teachers as they plan to teach these new standards.