

Endeavor **STEM Career Exploration**

U.S. Standards Alignment Guide

Lesson 1: Designing the Ultimate Prototype

Learning Objectives:

Students will be able to...

- Solve a virtual engineering problem from a set of constraints
- Explain the basic process for additive 3D printing
- Identify the steps of the design process and explain how it is utilized by designers and engineers
- Differentiate between synthetic materials and explain why one might be preferable to another
- Identify STEM careers that utilize engineering-related skills and identify one or more that might be of interest.

Set	Standard
CCTC (Common Career Technical Core)	<ul style="list-style-type: none"> • ST 4.1: Describe the relationship between the STEM Career Cluster and society. • ST 5.1: Research and match career opportunities based upon their fit with personal career goals. • ST 5.2: Match personal interests and aptitudes to careers when researching opportunities within the pathways. • ST 5.4: Engage in STEM experiences where an individual can identify personal interests and expectations for career and personal development. • ST-ET 3.1: Use knowledge, techniques, skills and modern tools necessary for engineering practice. • ST-ET 3.2: Describe the elements of good engineering practice (e.g., understanding customer needs, planning requirements analysis, using appropriate engineering tools, prototyping, testing, evaluating and verifying). • ST-ET 3.4: Illustrate the ability to characterize a plan and identify the necessary engineering tools that will produce a technical solution when given a problem statement. • ST-ET 5.1: Apply the design process using appropriate modeling and prototyping, testing, verification and implementation techniques. • ST-ET 5.2: Demonstrate the ability to evaluate a design or product and improve the design using testing, modeling and research.

Set	Standard
Next Generation Science Standards	<ul style="list-style-type: none"> Practice 1: Asking questions (for science) and defining problems (for engineering) Practice 6: Constructing explanations (for science) and designing solutions (for engineering) MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
Common Core State Standards	<ul style="list-style-type: none"> MP1: Make sense of problems and persevere in solving them.

Lesson 2: Connecting the Home of the Future

Learning Objectives:

Students will be able to...

- Define the Internet of Things and describe its potential impact on day-to-day lives
- Identify appropriate visual data formats (scatter plot, line graph, bar graph, etc.) for specific data sets
- Understand the steps necessary to create a secure password
- Identify STEM careers that utilize data literacy-related skills and identify one or more that might be of interest.

Set	Standard
CCTC (Common Career Technical Core)	<ul style="list-style-type: none"> S ST 2.1: Use IT tools to manipulate data and create reports, plans, processes or projects from data provided. ST 2.4: Apply statistical tools that verify the reliability or validity of the data used or collected in the plan, project, process, or problem. ST 4.1: Describe the relationship between the STEM Career Cluster and society. ST 5.1: Research and match career opportunities based upon their fit with personal career goals. ST 5.2: Match personal interests and aptitudes to careers when researching opportunities within the pathways. ST 5.4: Engage in STEM experiences where an individual can identify personal interests and expectations for career and personal development.

Set	Standard
CCTC (Common Career Technical Core)	<ul style="list-style-type: none"> ST-ET 2.1: Select and use information technology tools to collect, analyze, synthesize and display data to solve problems. ST-SM 2.4: Predict the outcomes based on data collected in a project or experiment.
Next Generation Science Standards	<ul style="list-style-type: none"> Practice 2: Developing and using models Practice 4: Analyzing and interpreting data Practice 8: Obtaining, evaluating, and communicating information
Common Core State Standards	<ul style="list-style-type: none"> MP1: Make sense of problems and persevere in solving them. MP5: Use appropriate tools strategically MP6: Attend to precision MP7: Look for and make use of structure

Lesson 3: Building the Perfect Playlist

Learning Objectives:

Students will be able to...

- Explain how recommendation engines utilize different types of data to predict user preferences
- Distinguish between content and collaborative filtering
- Identify how data might be utilized for recommendation engines
- Identify STEM careers that utilize data literacy-related skills and identify one or more that might be of interest

Set	Standard
CCTC (Common Career Technical Core)	<ul style="list-style-type: none"> ST 2.1: Use IT tools to manipulate data and create reports, plans, processes or projects from data provided. ST 4.1: Describe the relationship between the STEM Career Cluster and society. ST 5.1: Research and match career opportunities based upon their fit with personal career goals. ST 5.2: Match personal interests and aptitudes to careers when researching opportunities within the pathways. ST 5.4: Engage in STEM experiences where an individual can identify personal interests and expectations for career and personal development. ST-ET 2.1: Select and use information technology tools to collect, analyze, synthesize and display data to solve problems.

Set	Standard
CCTC (Common Career Technical Core)	<ul style="list-style-type: none"> ST-SM 2.8: Draw a conclusion when confronted with data or observations that focus on the observed plans, processes, or projects at hand. ST-SM 2.10: Research a topic, collect data, analyze the data and draw conclusions from the results.
Next Generation Science Standards	<ul style="list-style-type: none"> Practice 4: Analyzing and interpreting data Practice 8: Obtaining, evaluating, and communicating information
Common Core State Standards	<ul style="list-style-type: none"> MP1: Make sense of problems and persevere in solving them. MP5: Use appropriate tools strategically MP6: Attend to precision MP7: Look for and make use of structure.

Lesson 4: Medical Machines

Learning Objectives:

Students will be able to...

- Explain the process by which a physician gathers and uses data to treat a patient
- Understand how aspects of a physical exam contribute to accurate assessment of patient's condition
- Identify three types of imaging, how they work, and their purposes
- Identify STEM careers in the medical field and how they may be of interest

Set	Standard
Next Generation Science Standards	<ul style="list-style-type: none"> MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Lesson 5: Data Champions

Learning Objectives:

Students will be able to...

- Define dependent and independent variables
- Using historical data, predict sales based on data
- Observe patterns and associations in bivariate data to evaluate player performance
- Determine the data to collect in order to analyze and draw conclusions on which players to recruit

Set	Standard
CCTC (Common Career Technical Core)	<ul style="list-style-type: none"> • ST-ET 2.1: Select and use information technology tools to collect, analyze, synthesize and display data to solve problems • ST-SM 2.4: Predict the outcomes based on data collected in a project or experiment • ST-SM 2.9: Analyze change as a result of data differences and changing environmental values • ST-SM 2.10: Research a topic, collect data, analyze the data and draw conclusions from the results • ST-SM 2.11: Use qualitative and quantitative skills to conduct a simple scientific survey; use the data to draw a conclusion based on the analysis
Next Generation Science Standards	<ul style="list-style-type: none"> • Practice 4: Analyzing and interpreting data
Common Core State Standards	<ul style="list-style-type: none"> • MP7: Look for and make use of structure • CCSS.MATH.CONTENT.6.EE.C.9: Represent and analyze quantitative relationships between dependent and independent variables • CCSS.MATH.CONTENT.7.SP.C: Investigate chance processes and develop, use, and evaluate probability models* • CCSS.MATH.CONTENT.8.SP.A: Investigate patterns of association in bivariate data*

Lesson 6: Game Development Studio

Set	Standard
CCTC (Common Career Technical Core)	<ul style="list-style-type: none"> IT-PRG:2: Demonstrate the use of industry-standard strategies and project planning to meet customer specifications. IT-PRG:4: Demonstrate the effective use of software development tools to develop software applications. IT-PRG:5: Apply an appropriate software development process to design a software application. IT-PRG:6: Program a computer application using the appropriate programming language. [programming languages] IT-PRG:7: Demonstrate software testing procedures to ensure quality products. [testing] IT-PRG:8: Perform quality assurance tasks as part of the software development cycle. IT-3: Demonstrate the use of cross-functional teams in achieving IT project goals
Next Generation Science Standards	<ul style="list-style-type: none"> MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
Code.org/CSTA standards	<ul style="list-style-type: none"> M2-NI-04: Model the role of protocols in transmitting data across networks and the Internet. [set protocol] 2-NI-05: Explain how physical and digital security measures protect electronic information. [protocol] 2-AP-15: Seek and incorporate feedback from team members and users to refine a solution that meets user needs. 2-AP-17: Systematically test and refine programs using a range of test cases. [design solutions] 2-AP-18: Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. 2-AP-19: Document programs in order to make them easier to follow, test, and debug. [GDD] 2-IC-21: Discuss issues of bias and accessibility in the design of existing technologies. [Color blind user] 2-IC-22: Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact. 2-IC-23: Describe tradeoffs between allowing information to be public and keeping information private and secure. [protocol]

Lesson 7: Transportation Central

Learning Objectives:

Students will be able to...

- Understand STEM concepts through simulated experience of modern manufacturing, with a focus on transportation, distribution and logistics
- Relate basic STEM concepts to distribution processes
- Connect to the diverse opportunities and paths for careers in the manufacturing industry
- Use STEM concepts to determine what careers in manufacturing might be of interest

Set	Standard
<p>CCTC (Common Career Technical Core)</p>	<ul style="list-style-type: none"> • Manufacturing Career Cluster™ 4. Describe career opportunities and means to achieve those opportunities in each of the • Manufacturing Career Pathways 6. Demonstrate workplace knowledge and skills common to manufacturing • Logistics & Inventory Control Career Pathway (MN-LOG) 4. Manage inventory using logistics and control processes and procedures. • Transportation Operations Career Pathway: TD-OPS 1. Develop and evaluate transportation plans to move people and/or goods to meet customer requirements. • Transportation, Distribution & Logistics Career Cluster™ TD 1. Describe the nature and scope of the Transportation, Distribution & Logistics Career Cluster™ and the role of transportation, distribution and logistics in society and the economy. 2. Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems. 3. Describe the key operational activities required of successful transportation, distribution and logistics facilities. 6. Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.

My Field Guide

Learning Objectives:

Students will be able to...

- Identify STEM careers of interest
- Identify next steps for careers of interest

Set	Standard
CCTC (Common Career Technical Core)	<ul style="list-style-type: none">• ST 5.1: Research and match career opportunities based upon their fit with personal career goals.• ST 5.2: Match personal interests and aptitudes to careers when researching opportunities within the pathways.• ST-ET 2.1: Select and use information technology tools to collect, analyze, synthesize and display data to solve problems.• ST-ET 2.1: Select and use information technology tools to collect, analyze, synthesize and display data to solve problems.