eDynamicLearning
CAREER & ELECTIVE COURSES

Course Title: Middle School STEM

State: MI
State Course Title: Middle School STEM
State Standards: Michigan Integrated Technology Competencies for Students
Date of Standards: 2017

Percentage of Course Aligned: 89%

Standards	Course Title (a or b), if applicable, e.g. Game Design 1a	Unit Name(s)	Lesson(s) Numbers	How Standard is Taught	How Standard is Assessed	Standard Rating (Fully Met / Partially Met / Not Met)
1. Empowered Learner: Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, informed by the learning sciences. Students:						
a. Articulate and set personal learning goals, develop strategies leveraging technology to achieve them, and reflect on the learning process itself to improve learning outcomes.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Section The Design Process describes the iterative process that creators use to make a step-by-step plan to solve problems.	Critical Thinking Question 4	Fully met
b. Build networks and customize their learning environments in ways that support the learning process.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Section Step 2: Imagine discusses the process of using collaborative brainstorming to improve designs and add to the list of possible solutions. This can happen in an open forum, where a group gets together and provides feedback on project ideas.	Critical Thinking Question 1	Fully met
c. Use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.	Middle School STEM	Unit 1: What is STEM?	Lesson 4	Section In the Meantime…. Discusses exploring some available CTSO groups and taking on a role. The groups can provide ideas for problems to solve, and they also offer opportunities to lead a project, keep track of schedules, or share individual research with their group.	Critical Thinking Question 5	Fully met
d. Understand the fundamental concepts of technology operations, demonstrate the ability to choose, use, and troubleshoot current technologies, and are able to transfer their knowledge to explore emerging technologies.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Section Imagine describes the step of the Design Process where the creator chooses whether to invent a new product or innovate to modify an existing product. This involves testing a number of solutions that might work to solve the problem.	Critical Thinking Question 5	Fully met
2. Digital Citizen: Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical. Students:						
a. Cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.	Middle School STEM					Not met
b. Engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online or when using networked devices.	Middle School STEM	Unit 3: STEM and Society	Activity 1	Student chooses an issue to discuss that addresses an ethical issue, creates a presentation, and communicates information to educate workers in a technological company.	Student submits a presentation following the assigned format that will have the potential to convince others about the issue.	Fully met
c. Demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.	Middle School STEM					Not met
d. Manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.	Middle School STEM					Not met
3.Knowledge Constructor: Students critically curate a variety of resourcesusing digital tools to construct knowledge, producecreative artifacts and make meaningful learningexperiences for themselves and others. Students:						
a. Plan and employ effective research strategiesto locate information and other resources fortheir intellectual or creative pursuits.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Section Step 1: Ask and Research explains the process of defining a problem and how to go about conducting the necessary research for the project.	Critical Thinking Question 2	Fully met
b. Evaluate the accuracy, perspective, credibility,and relevance of information, media, data orother resources.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 3	Lesson addresses the topics of Picking the Right Resources, by asking the questions "What tools will I need?" and "How do I use these tools?"	Discussion 1	Fully met
c. Curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.	Middle School STEM	Units 1-6	Lessons 1-6	Through the course, two activities in each lesson assign projects to students, and students build a portfolio of the products of these projects, which are the artifacts of the work they do in the course.	Lessons 1-6, Activities 1 and 2 for each lesson assignments.	Fully met
d. Build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.	Middle School STEM	Unit 2: Launching a STEM Project	Activity 1	Student will choose a topic to explore, evaluating the range of designs used to solve the problem. While searching designs, they choose at least 3 different designs to help understand the design process.	Students submit the topic, thoughts on criteria, constraints, background knowledge and data, reflection piece.	Fully met

4.Innovative Designer: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions. Students:						
a. Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, or solving authentic problems.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Section The Design Process describes the iterative process that creators use to create step-by-step plans for solving problems.	Critical Thinking Question 1	Fully met
b. Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Step 1: Ask and Research is where looking over the problem and defining criteria and constraints happens.	Critical Thinking Question 4	Fully met
c. Develop, test, and refine prototypes as part of a cyclical design process.	Middle School STEM	Unit 2: Launching t STEM Project	Lesson 1	Section Step 3: Create describes the idea of creating a prototype to test ideas. Prototypes allow testing designs for functionality, materials and other factors	Critical Thinking Question 2	Fully met
d. Exhibit a tolerance for ambiguity, perseverance, and the capacity to work with open-ended problems.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Step 2: Imagine is the step where multiple solutions to one problem are considered, before deciding that any one solution will work. Multiple solutions can be visualized by creating drawings, diagrams, 3D models, clay models, LEGO models or any mode that helps visualize possible solutions.	Discussion 2	Fully met
5.Computational Thinker: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. Students:						
a. Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.	Middle School STEM	Unit 6: Computing with STEM	Lesson 4	Section Communication addresses the problem of creating an Internet of Things for household items. This problem involves creating a system linking household items. The lesson explains how to think about and plan the problem.	Lesson 4 Knowledge Check Question 4	Fully met
b. Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.	Middle School STEM	Unit 6: Computing with STEM	Lesson 4	The process of preparing data to be sent over computer systems is explained; when data is sent between computers, it must be converted to binary code inside the computer, using part of the sending device called the encoder. When the message reaches the destination, it is picked up by a receiver and a decoder converts the message to a readable form.	Critical Thinking Question 3	Fully met
c. Break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.	Middle School STEM	Unit 4: STEM Systems	Lesson 1	The STEM System explains a system where each piece is connected to the next. The system can be used for a number of fields, since STEM involves science, technology, engineering, and math used across many fields. Students are asked to consider a system they use and what are the pieces that make up that system.	Critical Thinking Question 1	Fully met
d. Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.	Middle School STEM	Unit 4: STEM Systems	Lesson 2	System Inputs section describes the process of essential things entering a system from the outside, which allow the system to work. An example is air coming into the respiratory system of humans. Inputs also trigger a system to function.	Critical Thinking Question 2	Fully met
6.Creative Communicator: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals. Students:						
a. Choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.	Middle School STEM	Unit 2: Launching a STEM Project	Activity 1	Student will choose a topic to explore in order to determine its design process. It will be a topic with many similar designs or products. They choose 3 or more design processes, and analyze them using the assigned criteria.	Students submit the topic, thoughts on criteria, constraints, background knowledge and data, reflection piece.	Fully met
b. Create original works or responsibly repurpose or remix digital resources into new creations.	Middle School STEM	Unit 4: STEM Systems	Activity 1	Students will create a transportation system using Tinkercad. They will consider questions like if changes are made in one part of the system, what happens to other parts.	Students will create a link to their project and invite people to participate in commenting on the project.	Fully met
c. Communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.	Middle School STEM	Unit 2: Launching a STEM Project	Activity 2	Student creates a 3D design using Tinkercad, for a tiny house.	Student submits the list of criteria and constraints, a sketch or description of possible solutions, a 3D design of the solution, an evaluation of the design, and a note about possible modifications.	Fully met

d. Publish or present content that customizes the message and medium for their intended audiences.	Middle School STEM	Unit 4: STEM Systems	Activity 1	Students create a transportation system in Tinkercad and invite people to participate in a review of the system.	Students will use the Copy Link functionality in Tinkercad to allow people to view and make changes to the design.	Fully met
7.Global Collaborator: Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally. **Students:**						
a. Use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.	Middle School STEM	Unit 4: STEM Systems	Activity 1	Students create a transportation system in Tinker cad and invite people to participate in a review of the system.	Students will use the Copy Link functionality in Tinkercad to allow people to view and make changes to the design.	Fully met
b. Use collaborative technologies to work with others, including peers, experts, or community members, to examine issues and problems from multiple viewpoints.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	During the Imagine step, in order to develop multiple ideas, collaborative brainstorming is a technique that can result in a variety of amazing ideas. A group gets back together and presents their ideas in an open forum, where a group presents their ideas publicly.	Critical Thinking Question 3	Fully met
c. Contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.	Middle School STEM	Unit 1: What is STEM?	Lesson 4	Section In the Meantime describes the experience of joining a group in school or community to gain experiences and skills. Some examples are Skills USA, DECA, FFA, and the Technology Student Union.	Critical Thinking Question 5	Fully met
d. Explore local and global issues and use collaborative technologies to work with others to investigate solutions.	Middle School STEM	Unit 3: STEM and Society	Activity 1	Students will research ethical issues around technology and choose one important topic to explore and create a presentation.	Students will present their findings to their coworkers, presenting in a format that will appeal to all people at the company.	Fully met

eDynamicLearning
CAREER & ELECTIVE COURSES

Course Title: Middle School STEM

State: National

Standards: ISTE Standards

Date of Standards: 2019

Percentage of Course Aligned: 100%

Standards	Course Title (a or b), if applicable, e.g. Game Design 1a	Unit Name(s)	Lesson(s) Numbers	How Standard is Taught	How Standard is Assessed	Comments	Standard Rating (Fully Met / Partially Met / Not Met)
1.1. Empowered Learner - Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences. Students:							
1.1.a. articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.	Middle School STEM	Unit 6: Computing with STEM	Lesson 4	Students evaluate their experience in the course and use the information to shape future performance	Activity 2		Fully Met
1.1.b. build networks and customize their learning environments in ways that support the learning process.	Middle School STEM	Unit 5: STEM Electronics	Lesson 4	Students use systems to support their learning experience	Activity 2	This standard is met several places in the course	Fully Met
1.1.c. use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.	Middle School STEM	Unit 5: STEM Electronics	Lesson 4	Students use technology to seek feedback and improve performance	Activity 2	This standard is met several places in the course	Fully Met
1.1.d. understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.	Middle School STEM	Unit 5: STEM Electronics	Lesson 4	Students understand concepts of technology and explore emerging technologies	Activity 1	This standard is met several places in the course	Fully Met
1.2. Digital Citizen - Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical. Students:							
1.2.a. cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.	Middle School STEM	Unit 3: STEM and Society	Lesson 3	Students consider the social implications of technology	Critical Thinking 1		Fully Met
1.2.b. engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.	Middle School STEM	Unit 1: What Is STEM?	Lesson 4	Students learn to role of STEM and how to make connections in their communities	Critical Thinking 5		Fully Met
1.2.c. demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.	Middle School STEM	Unit 5: STEM Electronics	Lesson 4	Students recognize the ways in which regulation is part of working with STEM	Critical Thinking 3		Fully Met
1.2.d. manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.	Middle School STEM	Unit 1: What Is STEM?	Lesson 4	Students explore how STEM careers manage data	Critical Thinking 4		Fully Met
1.3. Knowledge Constructor - Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others. Students:							
1.3.a. plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 2	Students demonstrate how to locate and use accurate sources for research	Activity 1		Fully Met
1.3.b. evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 2	Students demonstrate how to locate and use accurate sources for research	Activity 1	This standard is met several places in the course	Fully Met
1.3.c. curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 2	Students demonstrate how to locate and use accurate sources for research	Activity 1	This standard is met several places in the course	Fully Met
1.3.d. build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 2	Students demonstrate how to locate and use accurate sources for research	Activity 1	This standard is met several places in the course	Fully Met
1.4. Innovative Designer - Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions. Students:							
1.4.a. know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 2	Students learn and use the design process to solve problems	Activity 1		Fully Met
1.4.b. select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 2	Students use digital tools in the design process	Activity 2		Fully Met
1.4.c. develop, test and refine prototypes as part of a cyclical design process.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 2	Students use the design process to create a model	Activity 2		Fully Met
1.4.d. exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 4	Students recognize the value of working through challenges	Critical Thinking 4		Fully Met
1.5. Computational Thinker - Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. Students:							
1.5.a. formulate problem definitions suited for technology assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions	Middle School STEM	Unit 4: STEM Systems	Lesson 3	Students explore and examine interrelationships in STEM	Activity 1	This standard is met several places in the course	Fully Met
1.5.b. collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.	Middle School STEM	Unit 4: STEM Systems	Lesson 3	Students collect data and use digital tools to display it	Activity 1	This standard is met several places in the course	Fully Met
1.5.c. break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.	Middle School STEM	Unit 4: STEM Systems	Lesson 3	Student illustrate multiple steps in problem solving	Activity 1	This standard is met several places in the course	Fully Met
1.5.d. understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.	Middle School STEM	Unit 4: STEM Systems	Lesson 4	Students recognize the role of automation and the processes it generates	Discussion Question 2	This standard is met several places in the course	Fully Met
1.6. Creative Communicator - Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals. Students:							
1.6.a. choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.	Middle School STEM	Unit 5: STEM Electronics	Lesson 3	Students use software to build models and complete tasks	Activity 1		Fully Met
1.6.b. create original works or responsibly repurpose or remix digital resources into new creations.	Middle School STEM	Unit 5: STEM Electronics	Lesson 3	Students use software to build models and complete tasks	Activity 1		Fully Met
1.6.c. communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.	Middle School STEM	Unit 5: STEM Electronics	Lesson 3	Students use software to build models and complete tasks	Activity 1		Fully Met
1.6.d. publish or present content that customizes the message and medium for their intended audiences.	Middle School STEM	Unit 5: STEM Electronics	Lesson 3	Students use software to build models and complete tasks	Activity 1		Fully Met
1.7. Global Collaborator - Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally. Students:							
1.7.a. use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 3	Students discuss the value of collaboration	Critical Thinking 3		Fully Met

1.7.b. use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 3	Students examine the role of collaboration and experts in STEM	Activity 1		Fully Met
1.7.c. contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.	Middle School STEM	Unit 2:Launching a STEM Project	Lesson 3	Students discuss the value of collaboration	Critical Thinking 3		Fully Met
1.7.d. explore local and global issues and use collaborative technologies to work with others to investigate solutions.	Middle School STEM	Unit 6: Computing with STEM	Lesson 4	Students explore the role of STEM in solving problems and the global impact of its applications	Critical Thinking 2	This standard is met several places in the course	Fully Met

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CAREER & ELECTIVE COURSES

Course Title: Middle School STEM

State: National
Course Title: Middle School Engineering Design, Middle School Physical Science and Middle School Life Science
Standards: Next Generation Science Standards
Date of Standards: 2017

Percentage of Course Aligned: 71%

Standards	Unit Name(s)	Lesson(s) Numbers	How Standard is Taught	How Standard is Assessed	Comments	Standard Rating (Fully Met / Partially Met / Not Met)
Middle School Engineering Design						
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.	Unit 2: Launching a STEM Project	Activity 2	In this activity, students take into account criteria, constraints and potential impact to create a design for a tiny home.	Activity 2		Fully Met
	Unit 4: STEM Systems	Activity 2	In this activity, students research and develop potential solutions to install a system in their tiny home, taking into account criteria, constraints and relevant scientific principles.	Activity 2		Fully Met
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	Unit 2: Launching a STEM Project	Discussion 2	After learning how to evaluate competing design solutions, students apply their knowledge to evaluate competing headphone designs.	Discussion 2		
	Unit 6: Computing with STEM	Discussion 2	Students evaluate the design of a diabetic insulin pump system.	Discussion 2		Fully Met
MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	Unit 2: Launching a STEM Project	Activity 1	In this activity, students select a design topic and research, evaluate and compare data related to different design solutions to identify best characteristics.	Activity 1		Fully Met
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.	Unit 4: STEM Systems	Activity 1	In this activity, students develop a model for a transportation system including infrastructure, then get feedback on their model in order to optimize the design.	Activity 1		
	Unit 2: Launching a STEM Project	Activity 2	Students evaluate the model for their tiny home, understanding how to improve it to better meet criteria and constraints for optimal design.	Activity 2		
	Unit 6: Computing with STEM	Activity 1	In this activity, students develop a model for a doorbell system in Tinkercad.	Activity 1		Fully Met
Middle School Physical Science						
MS.Structure and Properties of Matter						
MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.	Unit 2:Launching a STEM Project	Lesson 2	Students use the design process to create a model	Activity 2		Fully Met
MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	Unit 3: STEM and Society	Lesson 2	Understanding how plastic is produced and using the case of plastic to exemplify the waste problem in STEM	Critical Thinking #2		Fully Met
MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	Unit 5: STEM Electronics	Lesson 1	Using models to understand energy, including thermal energy, and energy transfer	Discussion 1		Fully Met
MS.Chemical Reactions						
MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	Unit 5: STEM Electronics	Critical Thinking #1	Determining whether a fire needs to be extinguished with physical or chemical means	Critical Thinking #1		Fully Met
MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	Unit 5: STEM Electronics	Lesson 1	Using models to understand energy, including thermal energy, and energy transfer	Discussion 1		Fully Met
MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.*						Not Met
MS.Forces and Interactions						
MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.*	Unit 4: STEM Systems	Activity 1	Students develop a problem solution for a transportation issue using Tinkercad.	Activity 1		Fully Met
MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	Unit 5: STEM Electronics	Discussion 2	Designing a power system to move an object	Discussion 2		Fully Met
MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.	Unit 5: STEM Electronics	Lesson 2	Analyzing data related to voltage, current and resistance in electric circuits	Activity 1		Fully Met
MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	Unit 5: STEM Electronics	Lesson 1	Defining gravitational energy and understanding how it relates to the mass and distance of objects	Discussion 1		Fully Met
MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	Unit 5: STEM Electronics	Lesson 1	Understanding how objects that are not in contact can exert forces on one another	Critical Thinking #5		Fully Met
MS.Energy						
MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.	Unit 4: STEM Systems	Lesson 3	Students collect data and use digital tools to display it	Activity 1	This standard is met several places in the course	Fully Met

MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	Unit 5: STEM Electronics	Critical Thinking #2	Students define energy and describe its effects.	Critical Thinking #2		Fully Met
MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*	Unit 3: STEM and Society	Lesson 4	Analyzing green architecture that maximizes or minimizes thermal energy transfer with the environment	Critical Thinking #4		Fully Met
MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.						Not Met
MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	Unit 5: STEM Electronics	Lesson 1	Understanding the forms of energy and how energy transfers	Critical Thinking #2, Discussion 1		Fully Met
MS.Waves and Electromagnetic Radiation						
MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.	Unit 5: STEM Electronics	Lesson 1	Viewing a model of waves and understanding how waves transfer energy	Critical Thinking #2, Discussion 1		Fully Met
MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.						Not Met
MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	Unit 6: Computing with STEM	Lesson 4	Explaining how a communication system works using transmission of signals	Critical Thinking #3		Fully Met
Middle School Life Sciences						
MS.Structure, Function, and Information Processing						
MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.						Not Met
MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.						Not Met
MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.	Unit 4: STEM Systems	Lesson 1	Recognizing the form, function, interdependence and importance of the systems of the body	Critical Thinking #1		Fully Met
MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	Unit 4: STEM Systems	Lesson 1	Recognizing the form, function, interdependence and importance of the systems of the body	Critical Thinking #1		Fully Met
MS.Matter and Energy in Organisms and Ecosystems						
MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.						Not Met
MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.	Unit 4: STEM Systems	Lesson 2	Relating systems to input and output, including the respiratory system	Critical Thinking #1		Fully Met
MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	Unit 4: STEM Systems	Lesson 1	Analyzing what makes a system and understanding system thinking, applying system understanding to real-life examples	Critical Thinking #1		Fully Met
MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	Unit 4: STEM Systems	Lesson 1	Analyzing what makes a system and understanding system thinking, applying system understanding to real-life examples	Critical Thinking #1		Fully Met
MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	Unit 3: STEM and Society	Lesson 1	Understanding how the STEM processes of carbon mining and tree planting drones can impact ecosystems	Critical Thinking #1		Fully Met
MS.Interdependent Relationships in Ecosystems						
MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.						Not Met
	Unit 1: What is STEM?	Discussion 2	Students explain how biotechnology uses principles of biological science to design solutions to problems.	Discussion 2		
MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*	Unit 3: STEM and Society	Critical Thinking #2	Students evaluate the technologies companies are designing to mitigate impacts of plastic waste on the environment.	Critical Thinking #2		Fully Met
MS.Growth, Development, and Reproduction of Organisms						
MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.						Not Met
MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	Unit 1: What is STEM?	Lesson 2	Understanding how the genetic engineering of plants through CRISPR technology influences their growth	Critical Thinking #1		Fully Met
MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.	Unit 3: STEM and Society	Lesson 1	Understanding how changes to genes can cause beneficial effects such as the addition of beta carotene to rice through genetic modification	Activity 1		Fully Met
MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.						Not Met
MS-LS4-5. Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.	Unit 3: STEM and Society	Lesson 1, Activity 1	Synthesizing information about technologies related to genetic engineering and analyzing the ethics associated with human influence on the traits of organisms	Critical Thinking #1, Activity 1, Discussion 2		Fully Met
MS.Natural Selection and Adaptations						
MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.						Not Met
MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.						Not Met
MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.						Not Met
MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.						Not Met
MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.						Not Met

eDynamic Learning Course Title: MS STEM

State Course Title: MS STEM

State Standards: CASEL

Date of Standards: 2020

Standards	Course Title (a or b), if applicable, e.g. Game Design 1a	Unit Name(s)	Lesson(s) Numbers	How Standard is Taught	Comments
SELF-AWARENESS: The abilities to understand one's own emotions, thoughts, and values and how they influence behavior across contexts.					
	MS STEM	Unit 1: What is STEM	Lesson 4	Examining needed skills for a variety of career options within STEM	
	MS STEM	Unit 1: What is STEM	Discussion	Students pinpoint a STEM career that they are most interested in and well-suited for and discuss their reasoning	
	MS STEM	Unit 3: STEM and Society	Activity 2	Students write a reflective piece on what they have learned in the course and how it will influence their behaviors going forward	
SELF-MANAGEMENT: The abilities to manage one's emotions, thoughts, and behaviors effectively in different situations and to achieve goals and aspirations.					
	MS STEM	Unit 1: What is STEM	Lesson 1	Exploring the basis of STEM which is problem solving, and discussing the process of problem solving to achieve goals	
	MS STEM	Unit 1: What is STEM	Critical Thinking	Students discuss the benefits and options available within career and technical student organizations	
	MS STEM	Unit 2: Launching a STEM Project	Lesson 4	Understanding how to meet objectives with a project through key professional skills	
SOCIAL AWARENESS: The abilities to understand the perspectives of and empathize with others, including those from diverse backgrounds, cultures, & contexts.					
	MS STEM	Unit 2: Launching a STEM Project	Critical Thinking	Students explore best practices for working with others collaboratively to achieve goals	
	MS STEM	Unit 3: STEM and Society	Lesson 3	Examining ways that technology through STEM impacts society through ethics, environmental issues and more	
	MS STEM	Unit 4: STEM Systems	Critical Thinking	Students write about ways to effectively explain systems to a younger person by applying social awareness	
RELATIONSHIP SKILLS: The abilities to establish and maintain healthy and supportive relationships and to effectively navigate settings with diverse individuals and groups					
	MS STEM	Unit 1: What is STEM	Lesson 3	Understanding methods of collaboration and communication as used in medicine	
	MS STEM	Unit 2: Launching a STEM Project	Discussion	Students assess a collaborative situation in which there is a difference of opinion and navigate how to best come to a solution through compromise	
	MS STEM	Unit 2: Launching a STEM Project	Critical Thinking	Students explore best practices for working with others collaboratively to achieve goals	
RESPONSIBLE DECISION-MAKING: The abilities to make caring and constructive choices about personal behavior and social interactions across diverse situations.					
	MS STEM	Unit 2: Launching a STEM Project	Lesson 4	Assessing the decision-making process within STEM endeavors	
	MS STEM	Unit 3: STEM and Society	Lesson 1	Exploring how STEM can spark change through responsible decision making and innovation	
	MS STEM	Unit 3: STEM and Society	Activity 1	Students present information on moral judgment in ethical decision making	

eDynamicLearning
CAREER & ELECTIVE COURSES

Course Title: Middle School STEM

State: International
Course Title: Middle School STEM
Standards: International STEM Standards (STEL)
Date of Standards: 2021

Percentage of Course Aligned: 100%

Standards	Course Title (a or b), if applicable, e.g. Game Design 1a	Unit Name(s)	Lesson(s) Numbers	How Standard is Taught	How Standard is Assessed	Standard Rating (Fully Met / Partially Met / Not Met)
STEL 1 Nature and Characteristics of Technology and Engineering						
1J. Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.	Middle School STEM	Unit 1, What is STEM?	Lesson 1	Introduction defines stem as the integration of four topics in a single subject, combining them to make a new thing. The four are science, technology, engineering and mathematics. The power of the 4 allows solving old and new problems alike.	Lesson 4 Knowledge Check Question 2	Fully met
1K. Compare and contrast the contributions of science, engineering, mathematics, and technology in the development of technological systems.	Middle School STEM	Unit 1, What is STEM?	Lesson 1	STEM Parts section explains the contributions of each of the components of STEM--science, technology, math, and engineering.	Lesson 4 Knowledge Check Question 1	Fully met
1L. Explain how technology and engineering are closely linked to creativity, which can result in both intended and unintended innovations.	Middle School STEM	Unit 1, What is STEM?	Lesson 4	Section STEM Skills describes STEM as recognizing the importance of tools to solve problems and using the principles of pattern recognition, collaboration, communication, critical thinking ant cyclical design to do this.	Critical Thinking Question 1	Fully met
1M. Apply creative problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.	Middle School STEM	Unit 1, What is STEM?	Lesson 4	STEM Skills section provides examples of multiple seemingly non-STEM problems that can be solved using STEM. They all involve improving devices or processes.	Critical Thinking Question 3	Fully met
STEL 2 Core Concepts of Technology and Engineering						
2M. Differentiate between inputs, processes, outputs, and feedback in technological systems.	Middle School STEM	Unit 4: STEM Systems	Lesson 2	Sections Systems Inputs and Systems Outputs describes these two concepts.	Critical Thinking Question 1	Fully met
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.	Middle School STEM	Unit 4: STEM Systems	Lesson 2	Section Subsystems explains that they are not all standalone collections of inputs, processes, outputs, but the outputs of one system may be the inputs of the next system. The example of a car is used to illustrate how all the parts need to work together.	Lesson 4 Knowledge Check Question 2	Fully met
2O. Create an open-loop system that has no feedback path and requires human intervention.	Middle School STEM	Unit 6: Computing with STEM	Lesson 2	Lesson describes an open-loop system, which is a system that completes the process without any form of evaluation.	Critical Thinking Question 5	Fully met
2P. Create a closed-loop system that has a feedback path and requires no human intervention.	Middle School STEM	Unit 6: Computing with STEM	Lesson 2	Section Closed-Loop Systems describes systems that look at feedback and can change their process to reach a desired outcome. It also discusses when a closed-loop system is preferable.	Lesson 4 Knowledge Check Question 2	Fully met
2Q. Predict outcomes of a future product or system at the beginning of the design process.	Middle School STEM	Unit 4: STEM Systems	Lesson 1	The STEM System section discusses how knowledge from other fields is used to develop technological innovations and allow predictions about how they work; examples are studying bird flight to develop aircraft.	Critical Thinking Question 5	Fully met
2R. Compare how different technologies involve different sets of processes.	Middle School STEM	Unit 4: STEM Systems	Lesson 1	The STEM System section discusses that STEM is a system in itself. Each innovation opens doors for new ideas and creations. For example, the development of smaller computer chips meant that smaller devices could be created, and this led to the smaller devices being able to solve problems that larger innovations could not.	Critical Thinking Question 1	Fully met
2S. Defend decisions related to a design problem.	Middle School STEM	Unit 4: STEM Systems	Activity 1	Students create a project in Tinkercad, including the last step where the student responds to comments about the design.	Students creates a link to their project including listing criticisms of the model and their responses.	Fully met
STEL 3 Integration of Knowledge, Technologies, and Practices						
3E. Analyze how different technological systems often interact with economic, environmental, and social systems.	Middle School STEM	Unit 3: STEM and Society	Lesson 1	Section STEM for Change discusses some of the biggest problems our society currently faces and STEM-related solutions to some of these problems, like carbon mining, tree-planting drones, and gene editing.	Critical Thinking Question 1	Fully met
3F. Apply a product, system or process developed for one setting to another setting.	Middle School STEM	Unit 3: STEM and Society	Lesson 4	Lesson addresses how architecture is using materials that were developed for other uses for building permanent structures; examples are plastics in building materials and finding ways to use carbon fiber, while expensive, in a way that will work effectively in building construction.	Critical Thinking Question 3	Fully met
3G. Explain how knowledge gained from other content areas affects the development of technological products and systems.	Middle School STEM	Unit 2: Launching a STEM Project	Activity 2	Students work through a design for a tiny house. They will develop criteria for the tiny home, for example that it needs a kitchen. It will be located in a desert so will be designed to withstand heat. Principles of building will need to be adapted to the demands of doing it for a small space that needs many of the same amenities.	Using Tinkercad, students will submit a word processed document answering the list of questions posed in the Activity.	Fully met
STEL 4 Impacts of Technology						
4K. Examine the ways that technology can have both positive and negative effects at the same time.	Middle School STEM	Unit 3: STEM and Society	Lesson 3	Section Electric Cars discusses the reasons for and advantages of moving to electric cars, but since we haven't solved the problem that has risen from the need to develop the batteries needed, as well as the issue of what to do with the waste, it's not entirely a positive development.	Critical Thinking Question 1	Fully met

4L. Analyze how the creation and use of technologies consumes renewable and non-renewable resources and creates waste.	Middle School STEM	Unit 3: STEM and Society	Lesson 2	Section Our Plastic Problem discusses the issue that our society has with plastic. When it was invented, plastic was a solution that seemed to solve a lot of problems for society. Now it seems humans can't be without it, but it has caused an enormous pollution problem.	Discussion 2	Fully met
4M. Devise strategies for reducing, reusing, and recycling waste caused from the creation and use of technology.	Middle School STEM	Unit 3: STEM and Society	Lesson 2	The discussion of the problem of plastics is continued in this lesson with a discussion of new innovations to prevent waste from destroying habitats and dealing with the waste we have already created.	Discussion 1	Fully met
4N. Analyze examples of technologies that have changed the way people think, interact, and communicate.	Middle School STEM	Unit 3: STEM and Society	Activity 1	Students work through a case study that relates to an ethical issue. Students choose an ethical issue to focus on and develop a list of issues to present. They choose a technology that relates to the issue. They answer what problems the technology solves and how it is related to the chosen issue. They create a presentation about the material they've developed.	Students submit their presentation to the dropbox.	Fully met
4O. Hypothesize what alternative outcomes (individual, cultural, and/or environmental) might have resulted had a different technological solution been selected.	Middle School STEM	Unit 3: STEM and Society	Lesson 3	New Tech, New Waste covers the recent history with new technologies being invented, bought, used, and then thrown away. This activity has created huge amounts of waste that is called e-waste and for which humans do not have a good solution.	Critical Thinking Question 3	Fully met
STEL 5 Influence of Society on Technological Development						
5F. Analyze how an invention or innovation was influenced by its historical context.	Middle School STEM	Unit 1, What is STEM?	Lesson 2	Agriculture has greatly benefitted from STEM processes. It developed to improve upon hunting and gathering, was needed to provide food through history, and over time STEM principles were used to develop better tools and practices. Structures were needed to bring food and water to the crops.	Critical Thinking Question 2	Fully met
5G. Evaluate trade-offs based on various perspectives as part of a decision process that recognizes the need for careful compromises among competing factors.	Middle School STEM	Unit 1, What is STEM?	Lesson 3	STEM and Health Care presents the many ways that STEM is used in the medical field. STEM has been used to develop vaccines, a process where the need for speed is a factor that must be balanced with the need for safety and following ethical development and distribution plans.	Critical Thinking Question 3	Fully met
STEL 6 History of Technology						
6C. Compare various technologies and how they have contributed to human progress.	Middle School STEM	Unit 4: STEM Systems	Lesson 3	This lesson describes transportation systems and how they have evolved to grow and adapt in our changing world. The four components of transportation systems are modes, infrastructures, networks, and flows.	Critical Thinking Question 2	Fully met
6D. Engage in a research and development process to simulate how inventions and innovations have evolved through systematic tests and refinements.	Middle School STEM	Unit 4: STEM Systems	Activity 1	Students will research, imagine, create, and evaluate a project using Tinkercad. This will be a transportation system.	Students will create a link to their project, sharing it for people to access, and invite people to view and comment.	Fully met
6E. Verify how specialization of function has been at the heart of many technological improvements.	Middle School STEM	Unit 4: STEM Systems	Lesson 1	Section Thinking About the System describes the parts of a system and how they work together to make the whole. A single part of the system can cause the whole system to break down.	Critical Thinking Question 5	Fully met
STEL 7 Design in Technology and Engineering Education						
7P. Illustrate the benefits and opportunities associated with different approaches to design.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Section The Design Process describes the Engineering Design Process, which is iterative, with each step building on the last step and repeating as many times as necessary. Following the design process, principles of S, T and M are applied to each stage.	Critical Thinking Question 4	Fully met
7Q. Apply the technology and engineering design process.	Middle School STEM	Unit 1, What is STEM?	Activity 2	Students are assigned to sign in to the Tinkercad app to learn 3D design, electronics and coding. Students are assigned to learn how to use the program by completing the set of 10 Starters.	Students submit a screen shot of their completed Hide It starter project, demonstrating creative use of technology.	Fully met
7R. Refine design solutions to address criteria and constraints.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Step 1: Ask and Research outlines the process of creating a design, and then looking over the issue and asking yourself about the problems, the criteria and the constraints.	Discussion 1	Fully met
7S. Create solutions to problems by identifying and applying human factors in design.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Section 2, Imagine explains how to imagine solutions, either inventions or innovations, with the emphasis on plural solutions but imagining several ways to solve the problem.	Critical Thinking Question 5	Fully met
7T. Assess design quality based upon established principles and elements of design.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Step 3: Create is the step where design ideas are evaluated, maybe by developing a prototype to confirm that the design will work.	Critical Thinking Question 2	Fully met
7U. Evaluate the strengths and weaknesses of different design solutions.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 1	Step 4: Evaluate involves putting a creation to the test, making sure to review the constraints and objectives identified in Step 1 and test the creation to make sure it meets those.	Critical Thinking Question 1	Fully met
7V. Improve essential skills necessary to successfully design.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 2	Building background knowledge strengthens skills needed to design well. Section Types of Research discusses the steps of the design process in more detail that earlier discussion.	Critical Thinking Question 4	Fully met
STEL 8 Applying, Maintaining, and Assessing Technological Products and Systems	Step 4: Evaluate involves putting a creation to the test, making sure to review the constraints and objectives identified in Step 1 and test the creation to make sure it meets those.					
8H. Research information from various sources to use and maintain technological products or systems.	Middle School STEM	Unit 4: STEM Systems	Activity 2	Students will add a new system to their tiny house design; they will investigate how the chosen system works and how to integrate it into their current tiny house system.	Students submit a description of the tiny house design and the research they conducted to add the new system.	Fully met

	8I. Use tools, materials, and machines to safely diagnose, adjust, and repair systems.	Middle School STEM	Unit 2: Launching a STEM Project	Lesson 3	Section Tools, Money and People focuses on resources and how the process of developing solutions for one problem can lead to the solution for the next problem.	Critical Thinking Question 1	Fully met
	8J. Use devices to control technological systems.	Middle School STEM	Unit 5: STEM Electronics	Activity 1	Students create a project in Tinkercad, designing a circuit to model and check.	Students answer a series of questions and share the project design as well the answers to the questions.	Fully met
	8K. Design methods to gather data about technological systems.	Middle School STEM	Unit 5: STEM Electronics	Lesson 4	Test Your Prediction section describes the process that a robot technician would use to test systems through a stepwise experimentation process.	Critical Thinking Question 1	Fully met
	8L. Interpret the accuracy of information collected.	Middle School STEM	Unit 5: STEM Electronics	Lesson 4	Section Make a Prediction describes the first step, a theory of a possible cause. Then Test a Prediction involves experimenting and Action, Verify, Document is the fix step, followed by verifying that the system now works and documenting the process.	Critical Thinking Question 5	Fully met
	8M. Use instruments to gather data on the performance of everyday products.	Middle School STEM	Unit 5: STEM Electronics	Lesson 4	Section Finding Problems describes the part of a system that focuses on finding problems. Usually finding the source of a system problem involves an expert trained in these processes.	Critical Thinking Question 1	Fully met