Main Criteria: Forward Education
Secondary Criteria: Tennessee Academic Standards
Subjects: Mathematics, Science, Technology Education
Grades: 11, 12, Key Stage 4

Forward Education

Autonomous Electric Vehicles of the Future

Tennessee Academic Standards
Mathematics
Grade **11** - Adopted: **2021**

STRAND / STANDARD / COURSE		Standards for Mathematical Practice
CONCEPTUAL STRAND / GUIDING QUESTION	1	Make sense of problems and persevere in solving them.
CONCEPTUAL STRAND / GUIDING QUESTION	2	Reason abstractly and quantitatively.
CONCEPTUAL STRAND / GUIDING QUESTION	3	Construct viable arguments and critique the reasoning of others.
CONCEPTUAL STRAND / GUIDING QUESTION	4	Model with mathematics.
CONCEPTUAL STRAND / GUIDING QUESTION	8	Look for and express regularity in repeated reasoning.

STRAND / STANDARD / COURSE		**Algebra I | A1**
CONCEPTUAL STRAND / GUIDING QUESTION	**A1.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**A1.A.CED.A.**	**Create equations that describe numbers or relationships.**
LEARNING EXPECTATION	A1.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

STRAND / STANDARD / COURSE		**Algebra I | A1**

CONCEPTUAL STRAND / GUIDING QUESTION	**A1.F.LE.**	**Functions – Linear and Exponential Models (F.LE)**
GUIDING QUESTION / LEARNING EXPECTATION	**A1.F.LE.A.**	**Construct and compare linear and exponential models and solve problems.**
LEARNING EXPECTATION	**A1.F.LE.A.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**
INDICATOR	A1.F.LE.A.1.a.	Know that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

STRAND / STANDARD / COURSE		**Algebra II | A2**
CONCEPTUAL STRAND / GUIDING QUESTION	**A2.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**A2.A.CED.A.**	**Create equations that describe numbers or relationships.**
LEARNING EXPECTATION	A2.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

STRAND / STANDARD / COURSE		**Integrated Math I | M1**
CONCEPTUAL STRAND / GUIDING QUESTION	**M1.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**M1.A.CED.A.**	**Create equations that describe numbers or relationships**
LEARNING EXPECTATION	M1.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

STRAND / STANDARD / COURSE		**Integrated Math I | M1**
CONCEPTUAL STRAND / GUIDING QUESTION	**M1.F.LE.**	**Functions – Linear and Exponential Models (F.LE)**
GUIDING QUESTION / LEARNING EXPECTATION	**M1.F.LE.A.**	**Construct and compare linear and exponential models and solve problems.**
LEARNING EXPECTATION	**M1.F.LE.A.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**

INDICATOR	M1.F.LE.A.1.a.	Know that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

STRAND / STANDARD / COURSE		**Integrated Math II | M2**
CONCEPTUAL STRAND / GUIDING QUESTION	**M2.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**M2.A.CED.A.**	**Create equations that describe numbers or relationships.**
LEARNING EXPECTATION	M2.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

STRAND / STANDARD / COURSE		**Integrated Math III | M3**
CONCEPTUAL STRAND / GUIDING QUESTION	**M3.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**M3.A.CED.A.**	**Create equations that describe numbers or relationships.**
LEARNING EXPECTATION	M3.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

Grade **11** - Adopted: **2022**

STRAND / STANDARD / COURSE		**Calculus | C**
CONCEPTUAL STRAND / GUIDING QUESTION	**C.D.AD.**	**Derivatives – Computing and Applying Derivatives (D.AD)**
GUIDING QUESTION / LEARNING EXPECTATION	**C.D.AD.C.**	**Apply derivatives to solve problems.**
LEARNING EXPECTATION	C.D.AD.C.16.	Solve optimization problems to find a desired maximum or minimum value.

Tennessee Academic Standards

Mathematics

Grade **12** - Adopted: **2021**

STRAND / STANDARD / COURSE		**Standards for Mathematical Practice**

CONCEPTUAL STRAND / GUIDING QUESTION	1	Make sense of problems and persevere in solving them.
CONCEPTUAL STRAND / GUIDING QUESTION	2	Reason abstractly and quantitatively.
CONCEPTUAL STRAND / GUIDING QUESTION	3	Construct viable arguments and critique the reasoning of others.
CONCEPTUAL STRAND / GUIDING QUESTION	4	Model with mathematics.
CONCEPTUAL STRAND / GUIDING QUESTION	8	Look for and express regularity in repeated reasoning.

STRAND / STANDARD / COURSE		**Algebra I | A1**
CONCEPTUAL STRAND / GUIDING QUESTION	**A1.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**A1.A.CED.A.**	**Create equations that describe numbers or relationships.**
LEARNING EXPECTATION	A1.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

STRAND / STANDARD / COURSE		**Algebra I | A1**
CONCEPTUAL STRAND / GUIDING QUESTION	**A1.F.LE.**	**Functions – Linear and Exponential Models (F.LE)**
GUIDING QUESTION / LEARNING EXPECTATION	**A1.F.LE.A.**	**Construct and compare linear and exponential models and solve problems.**
LEARNING EXPECTATION	**A1.F.LE.A.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**
INDICATOR	A1.F.LE.A.1.a.	Know that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

STRAND / STANDARD / COURSE		**Algebra II | A2**
CONCEPTUAL STRAND / GUIDING QUESTION	**A2.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**A2.A.CED.A.**	**Create equations that describe numbers or relationships.**
LEARNING EXPECTATION	A2.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

STRAND / STANDARD / COURSE		**Integrated Math I | M1**
CONCEPTUAL STRAND / GUIDING QUESTION	**M1.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**M1.A.CED.A.**	**Create equations that describe numbers or relationships**
LEARNING EXPECTATION	M1.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

STRAND / STANDARD / COURSE		**Integrated Math I | M1**
CONCEPTUAL STRAND / GUIDING QUESTION	**M1.F.LE.**	**Functions – Linear and Exponential Models (F.LE)**
GUIDING QUESTION / LEARNING EXPECTATION	**M1.F.LE.A.**	**Construct and compare linear and exponential models and solve problems.**
LEARNING EXPECTATION	**M1.F.LE.A.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**
INDICATOR	M1.F.LE.A.1.a.	Know that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

STRAND / STANDARD / COURSE		**Integrated Math II | M2**
CONCEPTUAL STRAND / GUIDING QUESTION	**M2.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**M2.A.CED.A.**	**Create equations that describe numbers or relationships.**

LEARNING EXPECTATION	M2.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

STRAND / STANDARD / COURSE		**Integrated Math III | M3**
CONCEPTUAL STRAND / GUIDING QUESTION	**M3.A.CED.**	**Algebra – Creating Equations (A.CED)**
GUIDING QUESTION / LEARNING EXPECTATION	**M3.A.CED.A.**	**Create equations that describe numbers or relationships.**

LEARNING EXPECTATION	M3.A.CED.A.2.	Create equations in two variables to represent relationships between quantities and use them to solve problems in a real-world context. Graph equations with two variables on coordinate axes with labels and scales, and use the graphs to make predictions.

Grade **12** - Adopted: **2022**

STRAND / STANDARD / COURSE		**Calculus | C**
CONCEPTUAL STRAND / GUIDING QUESTION	**C.D.AD.**	**Derivatives – Computing and Applying Derivatives (D.AD)**
GUIDING QUESTION / LEARNING EXPECTATION	**C.D.AD.C.**	**Apply derivatives to solve problems.**

LEARNING EXPECTATION	C.D.AD.C.16.	Solve optimization problems to find a desired maximum or minimum value.

Tennessee Academic Standards

Science

Grade **11** - Adopted: **2016**

STRAND / STANDARD / COURSE	**TN.BIOI.**	**Biology I (BIO1)**
CONCEPTUAL STRAND / GUIDING QUESTION	**BIO1.LS.**	**Life Sciences (LS)**
GUIDING QUESTION / LEARNING EXPECTATION	**BIO1.LS3**	**Ecosystems: Interactions, Energy, and Dynamics**

LEARNING EXPECTATION	BIO1.LS2.2.	Create a model tracking carbon atoms between inorganic and organic molecules in an ecosystem. Explain human impacts on climate based on this model.

STRAND / STANDARD / COURSE	**TN.CHEMII.**	**Chemistry II**
CONCEPTUAL STRAND / GUIDING QUESTION	**CHEM2.PS.**	**Physical Sciences (PS)**

GUIDING QUESTION / LEARNING EXPECTATION	**CHEM2.PS3.**	**Energy**
LEARNING EXPECTATION	CHEM2.PS3.7.	Investigate and explain the energy changes in biological systems (such as the combustion of sugar and photosynthesis) both qualitatively and quantitatively.
LEARNING EXPECTATION	CHEM2.PS3.8.	Research pyrotechnics and use concepts in thermodynamics, stoichiometry, oxidation reduction, and kinetics to design and create a low intensity sparkler.
STRAND / STANDARD / COURSE	**TN.ESS.**	**Earth and Space Science (ESS)**
CONCEPTUAL STRAND / GUIDING QUESTION	**ESS.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**ESS.ESS2.**	**Earth's Systems**
LEARNING EXPECTATION	ESS.ESS2.1.	Given an environmental disaster, analyze its effect upon the geosphere, hydrosphere, atmosphere, and/or biosphere, including sphere-to-sphere interactions. Analysis should conclude with an identification of future research to improve our ability to predict such interactions.
LEARNING EXPECTATION	ESS.ESS2.10.	Construct a model which shows the interactions between processes of the hydrologic cycle and the greenhouse effect.
LEARNING EXPECTATION	ESS.ESS2.16.	Design a mathematical model of Earth's energy budget showing how the electromagnetic radiation from the sun in watts/ m2 is reflected, absorbed, stored, redistributed among the atmosphere, ocean, and land systems, and reradiated back into space. The model should provide a means to predict how changes in greenhouse gases could affect Earth's temperatures.
LEARNING EXPECTATION	ESS.ESS2.17.	Analyze the multiple sources of energy that provide power in the state of Tennessee and compare them to each other and to an alternative energy source. The analysis should include their functional components (such as infrastructure cost, on-going costs, safety, and reliability), and their social, cultural, and environmental impacts (including emissions of greenhouse gases).
LEARNING EXPECTATION	ESS.ESS2.18.	Identify the organisms that are major drivers in the global carbon cycle and trace how greenhouse gases are continually moved through the carbon reservoirs and fluxes represented by the ocean, land, life, and atmosphere.
STRAND / STANDARD / COURSE	**TN.ESS.**	**Earth and Space Science (ESS)**
CONCEPTUAL STRAND / GUIDING QUESTION	**ESS.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**ESS.ESS3.**	**Earth and Human Activity**
LEARNING EXPECTATION	ESS.ESS3.1.	Identify a geographical region or small area where energy and mineral resources are scarce and evaluate competing design solutions for developing, managing, and utilizing these energy and mineral resources based on a cost-benefit analysis.

LEARNING EXPECTATION	ESS.ESS 3.2.	Obtain, evaluate, and communicate information on how natural resource availability, natural hazard occurrences, and climatic changes impact individuals and society.
LEARNING EXPECTATION	ESS.ESS 3.3.	Design, evaluate, or refine a technological solution that reduces impacts of human activities on natural systems.
STRAND / STANDARD / COURSE	**TN.ECO.**	**Ecology (ECO)**
CONCEPTUAL STRAND / GUIDING QUESTION	**ECO.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**ECO.ESS3.**	**Earth and Human Activity**
LEARNING EXPECTATION	ECO.ESS 3.3.	Engage in argument from evidence regarding the impacts of human activity on climate change. Design solutions to address these impacts.
STRAND / STANDARD / COURSE	**TN.EVSC.**	**Environmental Science (EVSC)**
CONCEPTUAL STRAND / GUIDING QUESTION	**EVSC.LS.**	**Life Sciences (LS)**
GUIDING QUESTION / LEARNING EXPECTATION	**EVSC.LS4.**	**Biological Change: Unity and Diversity**
LEARNING EXPECTATION	EVSC.LS 4.3.	Evaluate the impact of habitat fragmentation and destruction, invasive species, overharvesting, pollution, and climate change on biodiversity (genetic, species, and ecosystem).
STRAND / STANDARD / COURSE	**TN.EVSC.**	**Environmental Science (EVSC)**
CONCEPTUAL STRAND / GUIDING QUESTION	**EVSC.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**EVSC.ESS3.**	**Earth and Human Activity**
LEARNING EXPECTATION	EVSC.ESS3.10.	Using scientific data, analyze effectiveness of conservation versus preservation efforts. Obtain and communicate information on organizations involved in protecting natural resources.
LEARNING EXPECTATION	EVSC.ESS3.13.	Analyze and interpret data on the effects of land, water, and air pollution on the environment and on human health. Propose solutions for minimizing pollution from specific sources.
LEARNING EXPECTATION	EVSC.ESS3.17.	Using mathematics and computational thinking, analyze data linking human activity to climate change. Design solutions to address human impacts on climate change.

STRAND / STANDARD / COURSE	**TN.GEO.**	**Geology (GEO)**
CONCEPTUAL STRAND / GUIDING QUESTION	**GEO.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**GEO.ESS3.**	**Earth and Human Activity**
LEARNING EXPECTATION	GEO.ESS3.1.	Use a topographic map and a geologic map to determine an ideal location for a Tennessee electricity-generating facility to provide solar, wind, nuclear, hydroelectric, or other renewable/nonrenewable power.

STRAND / STANDARD / COURSE	**TN.PSCI.**	**Physical Science (PSCI)**
CONCEPTUAL STRAND / GUIDING QUESTION	**PSCI.PS.**	**Physical Sciences (PS)**
GUIDING QUESTION / LEARNING EXPECTATION	**PSCI.PS1.**	**Matter and Its Interactions**
LEARNING EXPECTATION	PSCI.PS1.4.	Apply scientific principles and evidence to provide explanations about physical and chemical changes.

STRAND / STANDARD / COURSE	**TN.SCRE.**	**Scientific Research (SCRE)**
CONCEPTUAL STRAND / GUIDING QUESTION	**SCRE.ETS.**	**Engineering, Technology, and Applications of Science (ETS)**
GUIDING QUESTION / LEARNING EXPECTATION	**SCRE.ETS2.**	**Links Among Engineering, Technology, Science, and Society**
LEARNING EXPECTATION	SCRE.ETS2.1.	Explore the impact of technology on social, political, or economic systems.
LEARNING EXPECTATION	SCRE.ETS2.2.	Describe the dynamic interplay among engineering, technology, and applied science.
LEARNING EXPECTATION	SCRE.ETS2.3.	Identify the most appropriate scientific instruments and/or computer programs for different experiments and research, and learn to use, care for, and maintain them, gather data, and analyze results.
LEARNING EXPECTATION	SCRE.ETS2.4.	Engage in evidence-based arguments through the scientific method of investigation to understand the effective role that scientific discoveries played in the progression of humankind.

STRAND / STANDARD / COURSE	**TN.BIOI.**	**Biology I (BIO1)**
CONCEPTUAL STRAND / GUIDING QUESTION	**BIO1.LS.**	**Life Sciences (LS)**
GUIDING QUESTION / LEARNING EXPECTATION	**BIO1.LS3**	**Ecosystems: Interactions, Energy, and Dynamics**
LEARNING EXPECTATION	BIO1.LS2.2.	Create a model tracking carbon atoms between inorganic and organic molecules in an ecosystem. Explain human impacts on climate based on this model.

STRAND / STANDARD / COURSE	**TN.CHEMII.**	**Chemistry II**
CONCEPTUAL STRAND / GUIDING QUESTION	**CHEM2.PS.**	**Physical Sciences (PS)**
GUIDING QUESTION / LEARNING EXPECTATION	**CHEM2.PS3.**	**Energy**
LEARNING EXPECTATION	CHEM2.PS3.7.	Investigate and explain the energy changes in biological systems (such as the combustion of sugar and photosynthesis) both qualitatively and quantitatively.
LEARNING EXPECTATION	CHEM2.PS3.8.	Research pyrotechnics and use concepts in thermodynamics, stoichiometry, oxidation reduction, and kinetics to design and create a low intensity sparkler.

STRAND / STANDARD / COURSE	**TN.ESS.**	**Earth and Space Science (ESS)**
CONCEPTUAL STRAND / GUIDING QUESTION	**ESS.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**ESS.ESS2.**	**Earth's Systems**
LEARNING EXPECTATION	ESS.ESS2.1.	Given an environmental disaster, analyze its effect upon the geosphere, hydrosphere, atmosphere, and/or biosphere, including sphere-to-sphere interactions. Analysis should conclude with an identification of future research to improve our ability to predict such interactions.
LEARNING EXPECTATION	ESS.ESS2.10.	Construct a model which shows the interactions between processes of the hydrologic cycle and the greenhouse effect.
LEARNING EXPECTATION	ESS.ESS2.16.	Design a mathematical model of Earth's energy budget showing how the electromagnetic radiation from the sun in watts/ m2 is reflected, absorbed, stored, redistributed among the atmosphere, ocean, and land systems, and reradiated back into space. The model should provide a means to predict how changes in greenhouse gases could affect Earth's temperatures.

LEARNING EXPECTATION	ESS.ESS 2.17.	Analyze the multiple sources of energy that provide power in the state of Tennessee and compare them to each other and to an alternative energy source. The analysis should include their functional components (such as infrastructure cost, on-going costs, safety, and reliability), and their social, cultural, and environmental impacts (including emissions of greenhouse gases).
LEARNING EXPECTATION	ESS.ESS 2.18.	Identify the organisms that are major drivers in the global carbon cycle and trace how greenhouse gases are continually moved through the carbon reservoirs and fluxes represented by the ocean, land, life, and atmosphere.
STRAND / STANDARD / COURSE	**TN.ESS.**	**Earth and Space Science (ESS)**
CONCEPTUAL STRAND / GUIDING QUESTION	**ESS.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**ESS.ESS3.**	**Earth and Human Activity**
LEARNING EXPECTATION	ESS.ESS 3.1.	Identify a geographical region or small area where energy and mineral resources are scarce and evaluate competing design solutions for developing, managing, and utilizing these energy and mineral resources based on a cost-benefit analysis.
LEARNING EXPECTATION	ESS.ESS 3.2.	Obtain, evaluate, and communicate information on how natural resource availability, natural hazard occurrences, and climatic changes impact individuals and society.
LEARNING EXPECTATION	ESS.ESS 3.3.	Design, evaluate, or refine a technological solution that reduces impacts of human activities on natural systems.
STRAND / STANDARD / COURSE	**TN.ECO.**	**Ecology (ECO)**
CONCEPTUAL STRAND / GUIDING QUESTION	**ECO.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**ECO.ESS3.**	**Earth and Human Activity**
LEARNING EXPECTATION	ECO.ESS 3.3.	Engage in argument from evidence regarding the impacts of human activity on climate change. Design solutions to address these impacts.
STRAND / STANDARD / COURSE	**TN.EVSC.**	**Environmental Science (EVSC)**
CONCEPTUAL STRAND / GUIDING QUESTION	**EVSC.LS.**	**Life Sciences (LS)**
GUIDING QUESTION / LEARNING EXPECTATION	**EVSC.LS4.**	**Biological Change: Unity and Diversity**
LEARNING EXPECTATION	EVSC.LS 4.3.	Evaluate the impact of habitat fragmentation and destruction, invasive species, overharvesting, pollution, and climate change on biodiversity (genetic, species, and ecosystem).

STRAND / STANDARD / COURSE	**TN.EVSC.**	**Environmental Science (EVSC)**
CONCEPTUAL STRAND / GUIDING QUESTION	**EVSC.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**EVSC.ESS3.**	**Earth and Human Activity**
LEARNING EXPECTATION	EVSC.ESS3.10.	Using scientific data, analyze effectiveness of conservation versus preservation efforts. Obtain and communicate information on organizations involved in protecting natural resources.
LEARNING EXPECTATION	EVSC.ESS3.13.	Analyze and interpret data on the effects of land, water, and air pollution on the environment and on human health. Propose solutions for minimizing pollution from specific sources.
LEARNING EXPECTATION	EVSC.ESS3.17.	Using mathematics and computational thinking, analyze data linking human activity to climate change. Design solutions to address human impacts on climate change.
STRAND / STANDARD / COURSE	**TN.GEO.**	**Geology (GEO)**
CONCEPTUAL STRAND / GUIDING QUESTION	**GEO.ESS.**	**Earth and Space Sciences (ESS)**
GUIDING QUESTION / LEARNING EXPECTATION	**GEO.ESS3.**	**Earth and Human Activity**
LEARNING EXPECTATION	GEO.ESS3.1.	Use a topographic map and a geologic map to determine an ideal location for a Tennessee electricity-generating facility to provide solar, wind, nuclear, hydroelectric, or other renewable/nonrenewable power.
STRAND / STANDARD / COURSE	**TN.PSCI.**	**Physical Science (PSCI)**
CONCEPTUAL STRAND / GUIDING QUESTION	**PSCI.PS.**	**Physical Sciences (PS)**
GUIDING QUESTION / LEARNING EXPECTATION	**PSCI.PS1.**	**Matter and Its Interactions**
LEARNING EXPECTATION	PSCI.PS1.4.	Apply scientific principles and evidence to provide explanations about physical and chemical changes.
STRAND / STANDARD / COURSE	**TN.SCRE.**	**Scientific Research (SCRE)**
CONCEPTUAL STRAND / GUIDING QUESTION	**SCRE.ETS.**	**Engineering, Technology, and Applications of Science (ETS)**

GUIDING QUESTION / LEARNING EXPECTATION	**SCRE.ETS2.**	**Links Among Engineering, Technology, Science, and Society**
LEARNING EXPECTATION	SCRE.ETS2.1.	Explore the impact of technology on social, political, or economic systems.
LEARNING EXPECTATION	SCRE.ETS2.2.	Describe the dynamic interplay among engineering, technology, and applied science.
LEARNING EXPECTATION	SCRE.ETS2.3.	Identify the most appropriate scientific instruments and/or computer programs for different experiments and research, and learn to use, care for, and maintain them, gather data, and analyze results.
LEARNING EXPECTATION	SCRE.ETS2.4.	Engage in evidence-based arguments through the scientific method of investigation to understand the effective role that scientific discoveries played in the progression of humankind.

Tennessee Academic Standards

Technology Education

Grade **11** - Adopted: **2022**

STRAND / STANDARD / COURSE		**Tennessee K-12 Computer Science State Standards**
CONCEPTUAL STRAND / GUIDING QUESTION		**High School: Computer Science Standards**
GUIDING QUESTION / LEARNING EXPECTATION	**CS.AT.**	**Algorithmic Thinking**
LEARNING EXPECTATION	CS.AT.3.	Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.
LEARNING EXPECTATION	CS.AT.4.	Use effective communication and accurate computer science terminology to explain problem solving when completing a task.

STRAND / STANDARD / COURSE		**Tennessee K-12 Computer Science State Standards**
CONCEPTUAL STRAND / GUIDING QUESTION		**High School: Computer Science Standards**
GUIDING QUESTION / LEARNING EXPECTATION	**CS.PC.**	**Programming Concepts**
LEARNING EXPECTATION	CS.PC.2.	Develop a plan to manage and assign data values of different types (strings, numeric, character, integer, and date) to a variable

Tennessee Academic Standards

Technology Education

Grade **12** - Adopted: **2022**

STRAND / STANDARD / COURSE		Tennessee K-12 Computer Science State Standards
CONCEPTUAL STRAND / GUIDING QUESTION		**High School: Computer Science Standards**
GUIDING QUESTION / LEARNING EXPECTATION	**CS.AT.**	**Algorithmic Thinking**
LEARNING EXPECTATION	CS.AT.3.	Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.
LEARNING EXPECTATION	CS.AT.4.	Use effective communication and accurate computer science terminology to explain problem solving when completing a task.

STRAND / STANDARD / COURSE		Tennessee K-12 Computer Science State Standards
CONCEPTUAL STRAND / GUIDING QUESTION		**High School: Computer Science Standards**
GUIDING QUESTION / LEARNING EXPECTATION	**CS.PC.**	**Programming Concepts**
LEARNING EXPECTATION	CS.PC.2.	Develop a plan to manage and assign data values of different types (strings, numeric, character, integer, and date) to a variable