Main Criteria: Forward Education
Secondary Criteria: Delaware Standards and Instruction
Subjects: Mathematics, Science, Technology Education
Grades: 11, 12, Key Stage 4

Forward Education

Autonomous Electric Vehicles of the Future

Delaware Standards and Instruction
Mathematics
Grade **11** - Adopted: **2010**

STANDARD / STRAND	DE.CC.9-12.MP.	Mathematical Practices
STRAND / INDICATOR	CC.9-12.MP-1.	Make sense of problems and persevere in solving them.
STRAND / INDICATOR	CC.9-12.MP-2.	Reason abstractly and quantitatively.
STRAND / INDICATOR	CC.9-12.MP-3.	Construct viable arguments and critique the reasoning of others.
STRAND / INDICATOR	CC.9-12.MP-4.	Model with mathematics.
STRAND / INDICATOR	CC.9-12.MP-8.	Look for and express regularity in repeated reasoning.

STANDARD / STRAND	DE.CC.9-12.A.	Algebra
STRAND / INDICATOR	**CC.9-12.A-CED.**	**Creating Equations**
ENDURING UNDERSTANDING		**Create equations that describe numbers or relationships.**
BENCHMARK	CC.9-12.A.CED.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

STANDARD / STRAND	DE.CC.9-12.A.	Algebra
STRAND / INDICATOR	**CC.9-12.A-REI.**	**Reasoning with Equations and Inequalities**
ENDURING UNDERSTANDING		**Understand solving equations as a process of reasoning and explain the reasoning.**
BENCHMARK	CC.9-12.A.REI.1.	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

STANDARD / STRAND	DE.CC.9-12.F.	Functions

STRAND / INDICATOR	**CC.9-12.F-IF.**	**Interpreting Functions**
ENDURING UNDERSTANDING		**Analyze functions using different representations.**
BENCHMARK	**CC.9-12.F.IF.7.**	**Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.**
EXPECTATION	CC.9-12.F.IF.7a.	Graph linear and quadratic functions and show intercepts, maxima, and minima.

STANDARD / STRAND	**DE.CC.9-12.F.**	**Functions**
STRAND / INDICATOR	**CC.9-12.F-LE.**	**Linear and Exponential Models**
ENDURING UNDERSTANDING		**Construct and compare linear and exponential models and solve problems.**
BENCHMARK	**CC.9-12.F.LE.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**
EXPECTATION	CC.9-12.F.LE.1a.	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

STANDARD / STRAND	**DE.CC.9-12.G.**	**Geometry**
STRAND / INDICATOR	**CC.9-12.G-GPE.**	**Expressing Geometric Properties with Equations**
ENDURING UNDERSTANDING		**Use coordinates to prove simple geometric theorems algebraically**
BENCHMARK	CC.9-12.G.GPE.5.	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Delaware Standards and Instruction

Mathematics

Grade **12** - Adopted: **2010**

STANDARD / STRAND	**DE.CC.9-12.MP.**	**Mathematical Practices**
STRAND / INDICATOR	CC.9-12.MP-1.	Make sense of problems and persevere in solving them.
STRAND / INDICATOR	CC.9-12.MP-2.	Reason abstractly and quantitatively.
STRAND / INDICATOR	CC.9-12.MP-3.	Construct viable arguments and critique the reasoning of others.
STRAND / INDICATOR	CC.9-12.MP-4.	Model with mathematics.

STRAND / INDICATOR	CC.9-12.MP-8.	Look for and express regularity in repeated reasoning.

STANDARD / STRAND	**DE.CC.9-12.A.**	**Algebra**
STRAND / INDICATOR	**CC.9-12.A-CED.**	**Creating Equations**
ENDURING UNDERSTANDING		**Create equations that describe numbers or relationships.**

BENCHMARK	CC.9-12.A.CED.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

STANDARD / STRAND	**DE.CC.9-12.A.**	**Algebra**
STRAND / INDICATOR	**CC.9-12.A-REI.**	**Reasoning with Equations and Inequalities**
ENDURING UNDERSTANDING		**Understand solving equations as a process of reasoning and explain the reasoning.**

BENCHMARK	CC.9-12.A.REI.1.	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

STANDARD / STRAND	**DE.CC.9-12.F.**	**Functions**
STRAND / INDICATOR	**CC.9-12.F-IF.**	**Interpreting Functions**
ENDURING UNDERSTANDING		**Analyze functions using different representations.**
BENCHMARK	**CC.9-12.F.IF.7.**	**Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.**

EXPECTATION	CC.9-12.F.IF.7a.	Graph linear and quadratic functions and show intercepts, maxima, and minima.

STANDARD / STRAND	**DE.CC.9-12.F.**	**Functions**
STRAND / INDICATOR	**CC.9-12.F-LE.**	**Linear and Exponential Models**
ENDURING UNDERSTANDING		**Construct and compare linear and exponential models and solve problems.**
BENCHMARK	**CC.9-12.F.LE.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**

EXPECTATION	CC.9-12.F.LE.1a.	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

STANDARD / STRAND	**DE.CC.9-12.G.**	**Geometry**
STRAND / INDICATOR	**CC.9-12.G-GPE.**	**Expressing Geometric Properties with Equations**
ENDURING UNDERSTANDING		**Use coordinates to prove simple geometric theorems algebraically**
BENCHMARK	CC.9-12.G.GPE.5.	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Delaware Standards and Instruction

Science

Grade **11** - Adopted: **2013**

STANDARD / STRAND	**DE.HS-PS.**	**PHYSICAL SCIENCE**
STRAND / INDICATOR	**HS-PS1.**	**Matter and Its Interactions**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-PS1-4.	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

STANDARD / STRAND	**DE.HS-PS.**	**PHYSICAL SCIENCE**
STRAND / INDICATOR	**HS-PS3.**	**Energy**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

STANDARD / STRAND	**DE.HS-PS.**	**PHYSICAL SCIENCE**
STRAND / INDICATOR	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

STANDARD / STRAND	**DE.HS-LS.**	**LIFE SCIENCE**
STRAND / INDICATOR	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**

BENCHMARK	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

STANDARD / STRAND	DE.HS-ESS.	EARTH AND SPACE SCIENCE
STRAND / INDICATOR	HS-ESS2.	Earth's Systems
ENDURING UNDERSTANDING		Students who demonstrate understanding can:
BENCHMARK	HS-ESS2-4.	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

STANDARD / STRAND	DE.HS-ESS.	EARTH AND SPACE SCIENCE
STRAND / INDICATOR	HS-ESS3.	Earth and Human Activity
ENDURING UNDERSTANDING		Students who demonstrate understanding can:
BENCHMARK	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
BENCHMARK	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
BENCHMARK	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
BENCHMARK	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
BENCHMARK	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

STANDARD / STRAND	DE.HS-ETS.	ENGINEERING DESIGN
STRAND / INDICATOR	HS-ETS1.	Engineering Design
ENDURING UNDERSTANDING		Students who demonstrate understanding can:
BENCHMARK	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
BENCHMARK	HS-ETS1-2.	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
BENCHMARK	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

STANDARD / STRAND	DE.CC11-12RS/TS.	Reading Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		**Key Ideas and Details**
ENDURING UNDERSTANDING	CC11-12RS/TS2.	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
ENDURING UNDERSTANDING	CC11-12RS/TS3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

STANDARD / STRAND	DE.CC11-12RS/TS.	Reading Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		**Craft and Structure**
ENDURING UNDERSTANDING	CC11-12RS/TS4.	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
ENDURING UNDERSTANDING	CC11-12RS/TS5.	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

STANDARD / STRAND	DE.CC11-12RS/TS.	Reading Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		**Integration of Knowledge and Ideas**
ENDURING UNDERSTANDING	CC11-12RS/TS9.	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

STANDARD / STRAND	DE.CC11-12RS/TS.	Reading Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		**Range of Reading and Level of Text Complexity**
ENDURING UNDERSTANDING	CC11-12RS/TS10.	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.

STANDARD / STRAND	DE.CC11-12WH/S/TS.	Writing Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		**Text Types and Purposes**
ENDURING UNDERSTANDING	**CC11-12WH/S/TS2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**

BENCHMARK	CC11-12WH/S/TS2d.	Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

STANDARD / STRAND	**DE.CC11-12WH/S/TS.**	**Writing Standards for Literacy in Science and Technical Subjects 6-12**
STRAND / INDICATOR		**Production and Distribution of Writing**
ENDURING UNDERSTANDING	CC11-12WH/S/TS4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
ENDURING UNDERSTANDING	CC11-12WH/S/TS6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Delaware Standards and Instruction

Science

Grade **12** - Adopted: **2013**

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ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
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Grade **12** - Adopted: **2010**

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STRAND / INDICATOR		**Integration of Knowledge and Ideas**
ENDURING UNDERSTANDING	CC11-12RS/TS9.	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

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STANDARD / STRAND	**DE.CC11-12WH/S/TS.**	**Writing Standards for Literacy in Science and Technical Subjects 6-12**
STRAND / INDICATOR		**Production and Distribution of Writing**
ENDURING UNDERSTANDING	CC11-12WH/S/TS4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
ENDURING UNDERSTANDING	CC11-12WH/S/TS6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Delaware Standards and Instruction

Technology Education

Grade **11** - Adopted: **2018**

STANDARD / STRAND		**Computer Science Content Standards**
STRAND / INDICATOR	**CSTA.3B.**	**Level 3B (Ages 17-18)**
ENDURING UNDERSTANDING	**3B-AP.**	**Algorithms & Programming**
BENCHMARK		**Algorithms**
EXPECTATION	3B-AP-09.	Implement an artificial intelligence algorithm to play a game against a human opponent or solve a problem. (P5.3)
EXPECTATION	3B-AP-10.	Use and adapt classic algorithms to solve computational problems. (P4.2)

STANDARD / STRAND		**Computer Science Content Standards**
STRAND / INDICATOR	**CSTA.3B.**	**Level 3B (Ages 17-18)**
ENDURING UNDERSTANDING	**3B-AP.**	**Algorithms & Programming**
BENCHMARK		**Modularity**
EXPECTATION	3B-AP-14.	Construct solutions to problems using student-created components, such as procedures, modules and/or objects. (P5.2)

STANDARD / STRAND		Computer Science Content Standards
STRAND / INDICATOR	CSTA.3 B.	Level 3B (Ages 17-18)
ENDURING UNDERSTANDING	3B-AP.	Algorithms & Programming
BENCHMARK		Program Development
EXPECTATION	3B-AP-17.	Plan and develop programs for broad audiences using a software life cycle process. (P5.1)

Delaware Standards and Instruction

Technology Education

Grade **12** - Adopted: **2018**

STANDARD / STRAND		Computer Science Content Standards
STRAND / INDICATOR	CSTA.3 B.	Level 3B (Ages 17-18)
ENDURING UNDERSTANDING	3B-AP.	Algorithms & Programming
BENCHMARK		Algorithms
EXPECTATION	3B-AP-09.	Implement an artificial intelligence algorithm to play a game against a human opponent or solve a problem. (P5.3)
EXPECTATION	3B-AP-10.	Use and adapt classic algorithms to solve computational problems. (P4.2)

STANDARD / STRAND		Computer Science Content Standards
STRAND / INDICATOR	CSTA.3 B.	Level 3B (Ages 17-18)
ENDURING UNDERSTANDING	3B-AP.	Algorithms & Programming
BENCHMARK		Modularity
EXPECTATION	3B-AP-14.	Construct solutions to problems using student-created components, such as procedures, modules and/or objects. (P5.2)

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ENDURING UNDERSTANDING	3B-AP.	Algorithms & Programming
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EXPECTATION	3B-AP-17.	Plan and develop programs for broad audiences using a software life cycle process. (P5.1)