

Main Criteria: Forward Education
Secondary Criteria: Alaska Content and Performance Standards
Subjects: Mathematics, Science, Technology Education
Grades: 11, 12, Key Stage 4

Forward Education

Autonomous Electric Vehicles of the Future

Alaska Content and Performance Standards

Mathematics

Grade 11 - Adopted: 2012

PERFORMANCE / CONTENT STANDARD	AK.MP.	Mathematical Practices
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GRADE LEVEL EXPECTATION / STRAND	MP.1.	Make sense of problems and persevere in solving them.
GRADE LEVEL EXPECTATION / STRAND	MP.2.	Reason abstractly and quantitatively.
GRADE LEVEL EXPECTATION / STRAND	MP.3.	Construct viable arguments and critique the reasoning of others.
GRADE LEVEL EXPECTATION / STRAND	MP.4.	Model with mathematics.
GRADE LEVEL EXPECTATION / STRAND	MP.8.	Look for and express regularity in repeated reasoning.

PERFORMANCE / CONTENT STANDARD	AK.HS.A.	Algebra
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GRADE LEVEL EXPECTATION / STRAND	A-CED.	Creating Equations and Inequalities
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GOAL		Create equations and inequalities that describe numbers or relationships.
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INDICATOR	A-CED.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
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PERFORMANCE / CONTENT STANDARD	AK.HS.F.	Functions
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GRADE LEVEL EXPECTATION / STRAND	F-IF.	Interpreting Functions
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GOAL		Analyze functions using different representations.
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INDICATOR	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.
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INDICATOR	F-IF.7.a.	Graph linear and quadratic functions and show intercepts, maxima, and minima.
PERFORMANCE / CONTENT STANDARD	AK.HS.F.	Functions
GRADE LEVEL EXPECTATION / STRAND	F-LE.	Linear, Quadratic, and Exponential Models
GOAL		Construct and compare linear, quadratic, and exponential models and solve problems
INDICATOR	F-LE.1.	Distinguish between situations that can be modeled with linear functions and with exponential functions.

INDICATOR F-LE.1.a. Show that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

PERFORMANCE / CONTENT STANDARD	AK.HS.G.	Geometry
GRADE LEVEL EXPECTATION / STRAND	G-GPE.	Expressing Geometric Properties with Equations
GOAL		Use coordinates to prove simple geometric theorems algebraically.

INDICATOR 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).

**Alaska Content and Performance Standards
Mathematics
Grade 12 - Adopted: 2012**

PERFORMANCE / CONTENT STANDARD	AK.MP.	Mathematical Practices
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GRADE LEVEL EXPECTATION / STRAND MP.1. Make sense of problems and persevere in solving them.

GRADE LEVEL EXPECTATION / STRAND MP.2. Reason abstractly and quantitatively.

GRADE LEVEL EXPECTATION / STRAND MP.3. Construct viable arguments and critique the reasoning of others.

GRADE LEVEL EXPECTATION / STRAND MP.4. Model with mathematics.

GRADE LEVEL EXPECTATION / STRAND MP.8. Look for and express regularity in repeated reasoning.

PERFORMANCE / CONTENT STANDARD	AK.HS.A.	Algebra
GRADE LEVEL EXPECTATION / STRAND	A-CED.	Creating Equations and Inequalities
GOAL		Create equations and inequalities that describe numbers or relationships.

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

PERFORMANCE / CONTENT STANDARD	AK.HS.F.	Functions
GRADE LEVEL EXPECTATION / STRAND	F-IF.	Interpreting Functions
GOAL		Analyze functions using different representations.

INDICATOR 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.

INDICATOR F-IF.7.a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

PERFORMANCE / CONTENT STANDARD	AK.HS.F.	Functions
GRADE LEVEL EXPECTATION / STRAND	F-LE.	Linear, Quadratic, and Exponential Models
GOAL		Construct and compare linear, quadratic, and exponential models and solve problems

INDICATOR F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.

INDICATOR F-LE.1.a. Show that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

PERFORMANCE / CONTENT STANDARD	AK.HS.G.	Geometry
GRADE LEVEL EXPECTATION / STRAND	G-GPE.	Expressing Geometric Properties with Equations
GOAL		Use coordinates to prove simple geometric theorems algebraically.

INDICATOR 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).

Alaska Content and Performance Standards

Science

Grade 11 - Adopted: 2019

PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL PHYSICAL SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Chemical Reactions

GOAL	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.
PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL PHYSICAL SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Energy
GOAL	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.
PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL PHYSICAL SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Waves and Electromagnetic Radiation
GOAL	HS-PS4-2.	Evaluate questions about the advantages and disadvantages of using digital transmission and storage of information with respect to that of forms other than digital, including analog.
PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL LIFE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Interdependent Relationships in Ecosystems
GOAL	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Weather and Climate
GOAL	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.
PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Human Sustainability
GOAL	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.
GOAL	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

GOAL	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
GOAL	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
GOAL	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.

PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Engineering Design

GOAL	HS-ETS1-1.	Analyze major global challenges to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
GOAL	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.
GOAL	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Alaska Content and Performance Standards
Science
Grade 12 - Adopted: 2019

PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL PHYSICAL SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Chemical Reactions

GOAL	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.
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PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL PHYSICAL SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Energy

GOAL	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.
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PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL PHYSICAL SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Waves and Electromagnetic Radiation

GOAL	HS-PS4-2.	Evaluate questions about the advantages and disadvantages of using digital transmission and storage of information with respect to that of forms other than digital, including analog.
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PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL LIFE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Interdependent Relationships in Ecosystems

GOAL	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
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PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Weather and Climate

GOAL	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.
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PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Human Sustainability

GOAL	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.
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GOAL	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
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GOAL	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
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GOAL	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
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GOAL	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.
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PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		Engineering Design

GOAL	HS-ETS1-1.	Analyze major global challenges to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
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GOAL	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.
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GOAL	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
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**Alaska Content and Performance Standards
Technology Education
Grade 11 - Adopted: 2019**

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Entry Level Employment Competence
GOAL		Algorithms and Programming
INDICATOR		Algorithms
INDICATOR	L1.AP.A.0 1.	Use algorithms (e.g., sequencing, selection, iteration, recursion, etc.) to create a prototype to provide a possible solution for a common problem.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Entry Level Employment Competence
GOAL		Algorithms and Programming
INDICATOR		Control
INDICATOR	L1.AP.C. 02.	Develop an event-based program that will solve a practical problem, or allow self-expression.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Post-Secondary Education
GOAL		Algorithms and Programming
INDICATOR		Algorithms
INDICATOR	L2.AP.A.0 2.	Develop an artificial intelligence algorithm to play a game against a human opponent or solve a common problem.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Post-Secondary Education
GOAL		Algorithms and Programming

INDICATOR		Program Development
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INDICATOR L2.AP.PD .02. Using the software life cycle process, create software that will provide solutions for a variety of users.

PERFORMANCE / CONTENT STANDARD		Alaska Digital Literacy Standards
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GRADE LEVEL EXPECTATION / STRAND		Innovative Design
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GOAL 6-12.ID.1. Students engage in a design process and employ it to generate ideas, create innovative products or solve authentic problems.

GOAL 6-12.ID.3. Students engage in a design process to develop, test and revise prototypes, embracing the cyclical process of trial and error and understanding problems or setbacks as potential opportunities for improvement.

GOAL 6-12.ID.4. Students demonstrate an ability to persevere and handle greater ambiguity as they work to solve open-ended problems.

PERFORMANCE / CONTENT STANDARD		Alaska Digital Literacy Standards
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GRADE LEVEL EXPECTATION / STRAND		Computational Thinking
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GOAL 6-12.CT.1. Students practice defining problems to solve by computing for data analysis, modeling or algorithmic thinking.

GOAL 6-12.CT.3. Students break problems into component parts, identify key pieces and use that information to problem solve.

GOAL 6-12.CT.4. Students demonstrate an understanding of how automation works and use algorithmic thinking to design and automate solutions.

**Alaska Content and Performance Standards
Technology Education
Grade 12 - Adopted: 2019**

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
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GRADE LEVEL EXPECTATION / STRAND		Entry Level Employment Competence
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GOAL		Algorithms and Programming
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INDICATOR		Algorithms
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INDICATOR L1.AP.A.0 1. Use algorithms (e.g., sequencing, selection, iteration, recursion, etc.) to create a prototype to provide a possible solution for a common problem.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
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GRADE LEVEL EXPECTATION / STRAND		Entry Level Employment Competence
GOAL		Algorithms and Programming
INDICATOR		Control

INDICATOR L1.AP.C.02. Develop an event-based program that will solve a practical problem, or allow self-expression.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Post-Secondary Education
GOAL		Algorithms and Programming
INDICATOR		Algorithms

INDICATOR L2.AP.A.02. Develop an artificial intelligence algorithm to play a game against a human opponent or solve a common problem.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Post-Secondary Education
GOAL		Algorithms and Programming
INDICATOR		Program Development

INDICATOR L2.AP.PD.02. Using the software life cycle process, create software that will provide solutions for a variety of users.

PERFORMANCE / CONTENT STANDARD		Alaska Digital Literacy Standards
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