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

Forward Education

Autonomous Electric Vehicles of the Future

Louisiana Academic Standards
Mathematics
Grade **11** - Adopted: **2016/Updated 2017**

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

STRAND	**A1.**	**Algebra I (A1)**
TITLE	**A1:A-CED.**	**Creating Equations**
PERFORMANCE EXPECTATION	**A1:A-CED.A.**	**Create equations that describe numbers or relationships.**
INDICATOR	A1:A-CED.A.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

STRAND	**A1.**	**Algebra I (A1)**
TITLE	**A1:A-REI.**	**Reasoning with Equations and Inequalities**
PERFORMANCE EXPECTATION	**A1:A-REI.A.**	**Understand solving equations as a process of reasoning and explain the reasoning.**
INDICATOR	A1:A-REI.A.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.

STRAND	**A1.**	**Algebra I (A1)**
TITLE	**A1:F-IF.**	**Interpreting Functions**
PERFORMANCE EXPECTATION	**A1:F-IF.C.**	**Analyze functions using different representations.**
INDICATOR	**A1:F-IF.C.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	A1:F-IF.C.7.a.	Graph linear and quadratic functions and show intercepts, maxima, and minima.
STRAND	**A1.**	**Algebra I (A1)**
TITLE	**A1:F-LE.**	**Linear, Quadratic, and Exponential Models**
PERFORMANCE EXPECTATION	**A1:F-LE.A.**	**Construct and compare linear, quadratic, and exponential models and solve problems.**
INDICATOR	**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.	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
STRAND	**GM.**	**Geometry (GM)**
TITLE	**GM:G-GPE.**	**Expressing Geometric Properties with Equations**
PERFORMANCE EXPECTATION	**GM:G-GPE.B.**	**Use coordinates to prove simple geometric theorems algebraically.**
INDICATOR	GM:G-GPE.B.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).
STRAND	**A2.**	**Algebra II (A2)**
TITLE	**A2:A-REI.**	**Reasoning with Equations and Inequalities**
PERFORMANCE EXPECTATION	**A2:A-REI.A.**	**Understand solving equations as a process of reasoning and explain the reasoning.**
INDICATOR	A2:A-REI.A.1.	Explain each step in solving an 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.

Louisiana Academic Standards

Mathematics

Grade **12** - Adopted: **2016/Updated 2017**

STRAND		**Standards for Mathematical Practice**
TITLE	MP.1.	Make sense of problems and persevere in solving them.
TITLE	MP.2.	Reason abstractly and quantitatively.
TITLE	MP.3.	Construct viable arguments and critique the reasoning of others.
TITLE	MP.4.	Model with mathematics.
TITLE	MP.8.	Look for and express regularity in repeated reasoning.
STRAND	**A1.**	**Algebra I (A1)**

TITLE	**A1:A-CED.**	**Creating Equations**
PERFORMANCE EXPECTATION	**A1:A-CED.A.**	**Create equations that describe numbers or relationships.**
INDICATOR	A1:A-CED.A.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

STRAND	**A1.**	**Algebra I (A1)**
TITLE	**A1:A-REI.**	**Reasoning with Equations and Inequalities**
PERFORMANCE EXPECTATION	**A1:A-REI.A.**	**Understand solving equations as a process of reasoning and explain the reasoning.**
INDICATOR	A1:A-REI.A.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.

STRAND	**A1.**	**Algebra I (A1)**
TITLE	**A1:F-IF.**	**Interpreting Functions**
PERFORMANCE EXPECTATION	**A1:F-IF.C.**	**Analyze functions using different representations.**
INDICATOR	**A1:F-IF.C.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	A1:F-IF.C.7.a.	Graph linear and quadratic functions and show intercepts, maxima, and minima.

STRAND	**A1.**	**Algebra I (A1)**
TITLE	**A1:F-LE.**	**Linear, Quadratic, and Exponential Models**
PERFORMANCE EXPECTATION	**A1:F-LE.A.**	**Construct and compare linear, quadratic, and exponential models and solve problems.**
INDICATOR	**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.	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

STRAND	**GM.**	**Geometry (GM)**
TITLE	**GM:G-GPE.**	**Expressing Geometric Properties with Equations**
PERFORMANCE EXPECTATION	**GM:G-GPE.B.**	**Use coordinates to prove simple geometric theorems algebraically.**
INDICATOR	GM:G-GPE.B.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).

STRAND	**A2.**	**Algebra II (A2)**

TITLE	**A2:A-REI.**	**Reasoning with Equations and Inequalities**
PERFORMANCE EXPECTATION	**A2:A-REI.A.**	**Understand solving equations as a process of reasoning and explain the reasoning.**
INDICATOR	A2:A-REI.A.1.	Explain each step in solving an 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.

Louisiana Academic Standards

Science

Grade **11** - Adopted: **2017**

STRAND	**LA.SC.C.**	**Chemistry**
TITLE	**HS-PS1.**	**MATTER AND ITS INTERACTIONS**
PERFORMANCE EXPECTATION	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.

STRAND	**LA.SC.C.**	**Chemistry**
TITLE	**HS-PS3.**	**ENERGY**
PERFORMANCE EXPECTATION	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.

STRAND	**LA.SC.ES.**	**Earth Science**
TITLE	**HS-ESS2.**	**EARTH'S SYSTEMS**
PERFORMANCE EXPECTATION	HS-ESS2-4.	Analyze and interpret data to explore how variations in the flow of energy into and out of Earth's systems result in changes in atmosphere and climate.

STRAND	**LA.SC.ES.**	**Earth Science**
TITLE	**HS-ESS3.**	**HUMAN SUSTAINABILITY**
PERFORMANCE EXPECTATION	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.
PERFORMANCE EXPECTATION	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANCE EXPECTATION	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

PERFORMANCE EXPECTATION	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANCE EXPECTATION	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.
STRAND	**LA.SC.ENS.**	**Environmental Science**
TITLE	**HS-EVS1.**	**RESOURCES AND RESOURCE MANAGEMENT**
PERFORMANCE EXPECTATION	HS-EVS1-3.	Analyze and interpret data about the consequences of environmental decisions to determine the risk-benefit values of actions and practices implemented for selected issues.
STRAND	**LA.SC.ENS.**	**Environmental Science**
TITLE	**HS-ESS2.**	**EARTH'S SYSTEMS**
PERFORMANCE EXPECTATION	HS-ESS2-4.	Analyze and interpret data to explore how variations in the flow of energy into and out of Earth's systems result in changes in atmosphere and climate.
STRAND	**LA.SC.ENS.**	**Environmental Science**
TITLE	**HS-ESS3.**	**HUMAN SUSTAINABILITY**
PERFORMANCE EXPECTATION	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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PERFORMANCE EXPECTATION	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.
STRAND	**LA.SC.ENS.**	**Environmental Science**
TITLE	**HS-LS2.**	**ECOSYSTEMS: INTERACTIONS, ENERGY AND DYNAMICS**

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

STRAND	**LA.SC.LS.**	**Life Science**
TITLE	**HS-LS2.**	**ECOSYSTEMS: INTERACTIONS, ENERGY AND DYNAMICS**
PERFORMANCE EXPECTATION	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

STRAND	**LA.SC.PS.**	**Physical Science**
TITLE	**HS-PS3.**	**ENERGY**
PERFORMANCE EXPECTATION	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.

STRAND	**LA.SC.P.**	**Physics**
TITLE	**HS-PS3.**	**ENERGY**
PERFORMANCE EXPECTATION	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.

Louisiana Academic Standards

Science

Grade **12** - Adopted: **2017**

STRAND	**LA.SC.C.**	**Chemistry**
TITLE	**HS-PS1.**	**MATTER AND ITS INTERACTIONS**
PERFORMANCE EXPECTATION	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.

STRAND	**LA.SC.C.**	**Chemistry**
TITLE	**HS-PS3.**	**ENERGY**
PERFORMANCE EXPECTATION	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.

STRAND	**LA.SC.ES.**	**Earth Science**
TITLE	**HS-ESS2.**	**EARTH'S SYSTEMS**
PERFORMANCE EXPECTATION	HS-ESS2-4.	Analyze and interpret data to explore how variations in the flow of energy into and out of Earth's systems result in changes in atmosphere and climate.

STRAND	LA.SC.ES.	Earth Science
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PERFORMANCE EXPECTATION	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
PERFORMANCE EXPECTATION	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
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TITLE	HS-EVS1.	RESOURCES AND RESOURCE MANAGEMENT
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STRAND	**LA.SC.LS.**	**Life Science**
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PERFORMANCE EXPECTATION	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
STRAND	**LA.SC.PS.**	**Physical Science**
TITLE	**HS-PS3.**	**ENERGY**
PERFORMANCE EXPECTATION	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.
STRAND	**LA.SC.P.**	**Physics**
TITLE	**HS-PS3.**	**ENERGY**
PERFORMANCE EXPECTATION	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.

Louisiana Academic Standards

Technology Education

Grade **11** - Adopted: **2008**

STRAND	**LA.ET.**	**Educational Technology**
TITLE		**PreK-12 Educational Technology Content Standards**
PERFORMANCE EXPECTATION	ET.4.	Critical Thinking, Problem Solving, and Decision Making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

STRAND	LA.ET.	Educational Technology
TITLE		Performance Indicators for Grades 9-12
PERFORMANCE EXPECTATION	ET.E.	Identify a complex global issue, develop a systematic plan of investigation, and present a viable solution. (1,2,3,4)

Louisiana Academic Standards
Technology Education
Grade **12** - Adopted: **2008**

STRAND	LA.ET.	Educational Technology
TITLE		PreK-12 Educational Technology Content Standards
PERFORMANCE EXPECTATION	ET.4.	Critical Thinking, Problem Solving, and Decision Making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

STRAND	LA.ET.	Educational Technology
TITLE		Performance Indicators for Grades 9-12
PERFORMANCE EXPECTATION	ET.E.	Identify a complex global issue, develop a systematic plan of investigation, and present a viable solution. (1,2,3,4)