Main Criteria: Forward Education
Secondary Criteria: New Hampshire College and Career Ready Standards
Subjects: Mathematics, Science, Technology Education
Grades: 11, 12, Key Stage 4

Forward Education

Autonomous Electric Vehicles of the Future

New Hampshire College and Career Ready Standards
Mathematics
Grade **11** - Adopted: **2010**

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

STRAND / STANDARD	NH.CC.A.	Algebra
STANDARD / GLE	**A-CED.**	**Creating Equations**
GRADE LEVEL EXPECTATION		**Create equations that describe numbers or relationships.**
EXPECTATION	A-CED.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

STRAND / STANDARD	NH.CC.A.	Algebra
STANDARD / GLE	**A-REI.**	**Reasoning with Equations and Inequalities**
GRADE LEVEL EXPECTATION		**Understand solving equations as a process of reasoning and explain the reasoning.**
EXPECTATION	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.

STRAND / STANDARD	NH.CC.F.	Functions
STANDARD / GLE	**F-IF.**	**Interpreting Functions**

GRADE LEVEL EXPECTATION		**Analyze functions using different representations.**
EXPECTATION	**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.

STRAND / STANDARD	**NH.CC.F.**	**Functions**
STANDARD / GLE	**F-LE.**	**Linear and Exponential Models**
GRADE LEVEL EXPECTATION		**Construct and compare linear and exponential models and solve problems.**
EXPECTATION	**F-LE.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**
INDICATOR	F-LE.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 / STANDARD	**NH.CC.G.**	**Geometry**
STANDARD / GLE	**G-GPE.**	**Expressing Geometric Properties with Equations**
GRADE LEVEL EXPECTATION		**Use coordinates to prove simple geometric theorems algebraically**
EXPECTATION	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).

New Hampshire College and Career Ready Standards

Mathematics

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

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

STRAND / STANDARD	**NH.CC.A.**	**Algebra**
STANDARD / GLE	**A-CED.**	**Creating Equations**

GRADE LEVEL EXPECTATION		**Create equations that describe numbers or relationships.**
EXPECTATION	A-CED.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
STRAND / STANDARD	**NH.CC.A.**	**Algebra**
STANDARD / GLE	**A-REI.**	**Reasoning with Equations and Inequalities**
GRADE LEVEL EXPECTATION		**Understand solving equations as a process of reasoning and explain the reasoning.**
EXPECTATION	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.
STRAND / STANDARD	**NH.CC.F.**	**Functions**
STANDARD / GLE	**F-IF.**	**Interpreting Functions**
GRADE LEVEL EXPECTATION		**Analyze functions using different representations.**
EXPECTATION	**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.
STRAND / STANDARD	**NH.CC.F.**	**Functions**
STANDARD / GLE	**F-LE.**	**Linear and Exponential Models**
GRADE LEVEL EXPECTATION		**Construct and compare linear and exponential models and solve problems.**
EXPECTATION	**F-LE.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**
INDICATOR	F-LE.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 / STANDARD	**NH.CC.G.**	**Geometry**
STANDARD / GLE	**G-GPE.**	**Expressing Geometric Properties with Equations**
GRADE LEVEL EXPECTATION		**Use coordinates to prove simple geometric theorems algebraically**
EXPECTATION	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).

STRAND / STANDARD	NGSS.HS-PS.	PHYSICAL SCIENCE
STANDARD / GLE	HS-PS1.	Matter and Its Interactions
GRADE LEVEL EXPECTATION		Students who demonstrate understanding can:
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 / STANDARD	NGSS.HS-PS.	PHYSICAL SCIENCE
STANDARD / GLE	HS-PS3.	Energy
GRADE LEVEL EXPECTATION		Students who demonstrate understanding can:
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 / STANDARD	NGSS.HS-PS.	PHYSICAL SCIENCE
STANDARD / GLE	HS-PS4.	Waves and Their Applications in Technologies for Information Transfer
GRADE LEVEL EXPECTATION		Students who demonstrate understanding can:
EXPECTATION	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

STRAND / STANDARD	NGSS.HS-LS.	LIFE SCIENCE
STANDARD / GLE	HS-LS2.	Ecosystems: Interactions, Energy, and Dynamics
GRADE LEVEL EXPECTATION		Students who demonstrate understanding can:
EXPECTATION	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

STRAND / STANDARD	NGSS.HS-ESS.	EARTH AND SPACE SCIENCE
STANDARD / GLE	HS-ESS2.	Earth's Systems
GRADE LEVEL EXPECTATION		Students who demonstrate understanding can:
EXPECTATION	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.

STRAND / STANDARD	NGSS.HS-ESS.	EARTH AND SPACE SCIENCE
STANDARD / GLE	HS-ESS3.	Earth and Human Activity

GRADE LEVEL EXPECTATION		Students who demonstrate understanding can:
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.
EXPECTATION	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
EXPECTATION	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
EXPECTATION	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
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 / STANDARD	**NGSS.HS-ETS.**	**ENGINEERING DESIGN**
STANDARD / GLE	**HS-ETS1.**	**Engineering Design**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
EXPECTATION	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.
EXPECTATION	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.
EXPECTATION	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.

New Hampshire College and Career Ready Standards

Science

Grade **12** - Adopted: **2016**

STRAND / STANDARD	NGSS.HS-PS.	PHYSICAL SCIENCE
STANDARD / GLE	**HS-PS1.**	**Matter and Its Interactions**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
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 / STANDARD	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STANDARD / GLE	**HS-PS3.**	**Energy**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**

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 / STANDARD	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STANDARD / GLE	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
EXPECTATION	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

STRAND / STANDARD	**NGSS.HS-LS.**	**LIFE SCIENCE**
STANDARD / GLE	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
EXPECTATION	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

STRAND / STANDARD	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STANDARD / GLE	**HS-ESS2.**	**Earth's Systems**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
EXPECTATION	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.

STRAND / STANDARD	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STANDARD / GLE	**HS-ESS3.**	**Earth and Human Activity**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
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.
EXPECTATION	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
EXPECTATION	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
EXPECTATION	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

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 / STANDARD	NGSS.HS-ETS.	ENGINEERING DESIGN
STANDARD / GLE	HS-ETS1.	Engineering Design
GRADE LEVEL EXPECTATION		Students who demonstrate understanding can:
EXPECTATION	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.
EXPECTATION	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.
EXPECTATION	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.

New Hampshire College and Career Ready Standards

Technology Education

Grade **11** - Adopted: **2005**

STRAND / STANDARD	NH.ICT.	Information and Communication Technologies Program
STANDARD / GLE	ICT.2.	USE WITH CORE SUBJECTS: Become proficient in the use of 21st century tools to access, manage, integrate, evaluate, and create information within the context of the core subjects of:
GRADE LEVEL EXPECTATION	ICT.2.d.	Science

STRAND / STANDARD	NH.ICT.	Information and Communication Technologies Program
STANDARD / GLE	ICT.3.	COGNITIVE PROFICIENCY: Use 21st century tools to develop cognitive proficiency in:
GRADE LEVEL EXPECTATION	ICT.3.c.	Problem solving

STRAND / STANDARD	NH.ICT.	Information and Communication Technologies Program
STANDARD / GLE	ICT.5.	DIGITAL PORTFOLIOS: Create digital portfolios which:
GRADE LEVEL EXPECTATION	ICT.5.b.	Represent proficient, ethical, responsible use of 21st century tools within the context of the core subjects

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

STRAND / STANDARD		Computer Science
STANDARD / GLE		Algorithms & Programming

GRADE LEVEL EXPECTATION	3B-AP-09.	Implement an artificial intelligence algorithm to play a game against a human opponent or solve a problem.
GRADE LEVEL EXPECTATION	3B-AP-10.	Use and adapt classic algorithms to solve computational problems.
GRADE LEVEL EXPECTATION	3B-AP-14.	Construct solutions to problems using student-created components, such as procedures, modules and/or objects.

New Hampshire College and Career Ready Standards

Technology Education

Grade **12** - Adopted: **2005**

STRAND / STANDARD	**NH.ICT.**	**Information and Communication Technologies Program**
STANDARD / GLE	**ICT.2.**	**USE WITH CORE SUBJECTS: Become proficient in the use of 21st century tools to access, manage, integrate, evaluate, and create information within the context of the core subjects of:**
GRADE LEVEL EXPECTATION	ICT.2.d.	Science

STRAND / STANDARD	**NH.ICT.**	**Information and Communication Technologies Program**
STANDARD / GLE	**ICT.3.**	**COGNITIVE PROFICIENCY: Use 21st century tools to develop cognitive proficiency in:**
GRADE LEVEL EXPECTATION	ICT.3.c.	Problem solving

STRAND / STANDARD	**NH.ICT.**	**Information and Communication Technologies Program**
STANDARD / GLE	**ICT.5.**	**DIGITAL PORTFOLIOS: Create digital portfolios which:**
GRADE LEVEL EXPECTATION	ICT.5.b.	Represent proficient, ethical, responsible use of 21st century tools within the context of the core subjects

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

STRAND / STANDARD		**Computer Science**
STANDARD / GLE		**Algorithms & Programming**
GRADE LEVEL EXPECTATION	3B-AP-09.	Implement an artificial intelligence algorithm to play a game against a human opponent or solve a problem.
GRADE LEVEL EXPECTATION	3B-AP-10.	Use and adapt classic algorithms to solve computational problems.
GRADE LEVEL EXPECTATION	3B-AP-14.	Construct solutions to problems using student-created components, such as procedures, modules and/or objects.