

SIEMENS ENGINEERING 1-4
Course Code: 57R0, 57R1, 57R2, 57R3
Academic Standards and Indicators (Alignment Reference)

English and Language Arts

SC Standard A2. Reading: Informational Text (RI)

Reading-Informational Text: Principles of Reading (P)

Standard 1: Demonstrate understanding of the organization and basic features of print.

Standard 2: Demonstrate understanding of spoken words, syllables, and sounds.

Standard 3: Know and apply grade-level phonics and word analysis skills when decoding words.

Standard 4: Read with sufficient accuracy and fluency to support comprehension.

Reading-Informational Text: Meaning and Context (MC)

Standard 5: Determine meaning and develop logical interpretations by making predictions, inferring, drawing conclusions, analyzing, synthesizing, providing evidence, and investigating multiple interpretations.

Standard 6: Summarize key details and ideas to support analysis of central ideas.

Reading-Informational Language, Craft, and Structure (LCS)

Standard 9: Apply a range of strategies to determine and deepen the meaning of known, unknown, and multiple-meaning words, phrases, and jargon; acquire and use general academic and domain-specific vocabulary.

SC Standard A3. Reading: Building Vocabulary

Reading-Informational Text: Principles of Reading (P)

Standard 2: Demonstrate understanding of spoken words, syllables, and sounds

Standard 3: Know and apply grade-level phonics and word analysis skills when decoding words.

Reading-Informational Text: Language, Craft, and Structure (LCS)

Standard 9: Interpret and analyze the author's use of words, phrases, and conventions, and how their relationships shape meaning and tone in print and multimedia texts.

SC Standard A4. Writing: Developing Written Communications (W)

Writing: Meaning, Context, and Craft (MCC)

Standard 1: Write arguments to support claims with clear reasons and relevant evidence.

Standard 2: Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

SC Standard A5. Writing: Producing Written Communications in a Variety of Forms

Writing: Meaning, Context, and Craft (MCC)

Standard 3: Write narratives to develop real or imagined experiences or events using effective techniques, well-chosen details, and well-structured event sequences.

Writing: Language (L)

Standard 4: Demonstrate command of the conventions of standard English grammar and usage when writing and speaking.

Standard 5: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

Writing: Range and Complexity (RC)

Standard 6: Write independently, legibly, and routinely for a variety of tasks, purposes, and audiences over short and extended time frames.

SC Standard A6. Researching: Applying the Skills of Inquiry and Oral Communication Inquiry-Based Literacy Standards (I)

Standard 1: Formulate relevant, self-generated questions based on interests and/or needs that can be investigated.

Standard 2: Transact with texts to formulate questions, propose explanations, and consider alternative views and multiple perspectives.

Standard 3: Construct knowledge, applying disciplinary concepts and tools, to build deeper understanding of the world through exploration, collaboration, and analysis.

Standard 4: Synthesize information to share learning and/or take action.

Standard 5: Reflect throughout the inquiry process to assess metacognition, broaden understanding, and guide actions, individually and collaboratively.

Reading-Informational Text: Meaning and Context (MC)

Standard 7: Analyze the relationship among ideas, themes, or topics in multiple media and formats, and in visual, auditory, and kinesthetic modalities.

Communication: Meaning and Context (MC)

Standard 1: Interact with others to explore ideas and concepts, communicate meaning, and develop logical interpretations through collaborative conversations; build upon the ideas of others to clearly express one's own views while respecting diverse perspectives.

Standard 2: Articulate ideas, claims, and perspectives in a logical sequence using information, findings, and credible evidence from sources.

Standard 3: Communicate information through strategic use of multiple modalities and multimedia to enrich understanding when presenting ideas and information.

Language, Craft, and Structure (LCS)

Standard 4: Critique how a speaker addresses content and uses stylistic and structural craft techniques to inform, engage, and impact audiences.

Standard 5: Incorporate craft techniques to engage and impact the audience and convey messages.

MATHEMATICS ACADEMIC STANDARDS**Elementary Algebra (Algebra 1, Foundations in Algebra, Intermediate Algebra, Algebra 2)**

SC Standard A7. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation. **(SCEA-1)**

Arithmetic with Polynomials and Rational Expressions

AAPR.1* 1A.AAPRI* A2.AAPR.1* Add, subtract, and multiply polynomials and understand that polynomials are closed under these operations.

Creating Equations

A1.ACE.1* FA.ACE.1* 1A.ACE.1* Create and solve equations and inequalities in one variable that model real-world problems involving linear, quadratic, simple rational, and exponential relationships. Interpret the solutions and determine whether they are reasonable.

Reasoning with Equations and Inequalities

A1.AREI.4* IA.AREI.4* A2.AIEI.1* Solve mathematical and real-world problems involving quadratic equations in one variable.

Structure and Expressions

A1.ASE.1* FA.ASE.1* IA.ASE.1* A2.ASE.1* Interpret the meanings of coefficients, factors, terms, and expressions based on their real-world contexts. Interpret complicated expressions as being composed of simpler expressions.

Interpreting Data

A1.SPID.7* FA.SPID.7* Create a linear function to graphically model data from a real-world problem and interpret the meaning of the slope and intercept(s) in the context of the given problem.

SC Standard A8. The student will demonstrate through the mathematical processes an understanding of relationships and functions. **(SCEA-3)**

Building Functions

FBF.1* Write a function that describes a relationship between two quantities.

- b. Combine functions using the operations addition, subtraction, multiplication, and division to build new functions that describe the relationship between two quantities in mathematical and real-world situations.

Interpreting Functions

FIF.2* Evaluate functions and interpret the meaning of expressions involving function notation from a mathematical perspective and in terms of the context when the function describes a real-world situation.

GEOMETRY

SC Standard A9. The student will understand and utilize the mathematical processes of problem solving, reasoning, and proof, communication, connections, and representation. **(SCG-1)**

- Communicate knowledge of geometric relationship using mathematical terminology appropriately.
- Demonstrate and understanding of how geometry applies in real-world contexts (including architecture, construction, farming, and astronomy).

SC Standard A10. The student will demonstrate through the mathematical processes an understanding of the properties of basic geometric figures and the relationships between and among them. **(SCG.2)**

Circles

GCI.5* Derive the formulas for the length of an arc and the area of a sector in a circle and apply these formulas to solve mathematical and real-world problems.

Congruence

GCO.1* Define angle, perpendicular line, parallel line, line segment, ray, circle, and skew in terms of the undefined notions of point, line, and plane. Use geometric figures to represent and describe real world objects.

GCO.9* Prove, and apply in mathematical and real-world contexts, theorems about the relationships within and among triangles...

GCO.10* Prove, and apply in mathematical and real-world contexts, theorems about parallelograms...

Geometric Measurement and Dimension

GGMD.1* Explain the derivations of the formulas for the circumference of a circle, area of a circle, and volume of a cylinder, pyramid, and cone. Apply these formulas to solve mathematical and real world problems.

Expressing Geometric Properties with Equations

GGPE.5* Analyze slopes of lines to determine whether lines are parallel, perpendicular, or neither. Write the equation of a line passing through a given point that is parallel or perpendicular to a given line. Solve geometric and real-world problems involving lines and slope.

Modeling

GM.1* Use geometric shapes, their measures, and their properties to describe real-world objects.

GM.2 Use geometry concepts and methods to model real-world situations and solve problems using a model.

Similarity, Right Triangles, and Trigonometry

GSRT.4* Prove, and apply in mathematical and real-world contexts, theorems involving similarity about triangles...

GSRT.11 Use the Law of Sines and the Law of Cosines to solve for unknown measures of sides and angles of triangles that arise in mathematical and real-world problems.

Pre-Calculus

SC Standard A11. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation. (SC PC-1)

Probability and Statistics

SC Standard A12. The student will understand and utilize the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation. (SCPS-1)

Conditional Probability and Rules of Probability

SPCR.1 Describe events as subsets of a sample space and

- Use Venn diagrams to represent intersections, unions, and complements.
- Relate intersections, unions, and complements to the words and, or, and not.
- Represent sample spaces for compound events using Venn diagrams.

SC Standard A13. The student will demonstrate through the mathematical processes an understanding of the design of a statistical study. (SCPS-2)

Making Inferences and Justifying Conclusions

PS.SPMJ.2* Distinguish between experimental and theoretical probabilities. Collect data on a chance event and use the relative frequency to estimate the theoretical probability of that event. Determine whether a given probability model is consistent with experimental results.

SC Standard A14. The student will demonstrate through the mathematical processes an understanding of the methodology for collecting, organizing, displaying, and interpreting data. (SCPS-3)

Interpreting Data

PS.SPID.1* Select and create an appropriate display, including dot plots, histograms, and box plots, for data that includes only real numbers.

SC Standard A15. The student will demonstrate through the mathematical processes and understanding of basic statistical methods of analyzing data. (SCPS-4)

Using Probability to Make Decisions

PS.SPMD.4* Use probability to evaluate outcomes of decisions by finding expected values and determine if decisions are fair.

PS.SPMD.5* Use probability to evaluate outcomes of decisions. Use probabilities to make fair decisions. PS.SPMD.6* Analyze decisions and strategies using probability concepts.

SCIENCE ACADEMIC STANDARDS

Biology

SC Standard A16. The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions. (SC B-1)

Standard H.B.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

SC Standard A17. The student will demonstrate an understanding of the flow of energy within and between living systems. (SC B-3)

Standard H.B.3: The student will demonstrate the understanding that all essential processes within organisms require energy which in most ecosystems is ultimately derived from the Sun and transferred into chemical energy by the photosynthetic organisms of that ecosystem.

SC Standard A18. The student will demonstrate an understanding of the molecular basis of heredity. (SC B-4)

Standard H.B.2: The student will demonstrate the understanding that the essential functions of life take place within cells or systems of cells.

H.B.2A.1 Construct explanations of how the structures of carbohydrates, lipids, proteins, and nucleic acids (including DNA and RNA) are related to their functions in organisms.

Chemistry

SC Standard A19. The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions. ((SC C-1)

H.C.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

SC Standard A20. The student will demonstrate an understanding of the types, the causes, and the effects of chemical reactions. (SC C-4)

Standard H.C.3: The student will demonstrate an understanding of the structures and classification of chemical compounds.

Standard H.C.5: The student will demonstrate an understanding of the nature and properties of various types of chemical solutions.

Standard H.C.6: The student will demonstrate an understanding of the types, the causes, and the effects of chemical reactions.

SC Standard A21. The student will demonstrate an understanding of the structure and behavior of the different phases of matter. **(SC C-5)**

Standard H.C.4: The student will demonstrate an understanding of the structure and behavior of the different states of matter

Standard H.C.7: The student will demonstrate an understanding of the conservation of energy and energy transfer.

Physics

SC Standard A22. The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions. **(SC P-1)**

Standard H.P.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

Standard H.P.2: The student will demonstrate an understanding of how the interactions among objects and their subsequent motion can be explained and predicted using the concept of forces.

Standard H.P.3: The student will demonstrate an understanding of how the interactions among objects can be explained and predicted using the concept of the conservation of energy.

Earth Science

SC Standard A23. The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions. **(SC ES-1)**

Standard H.E.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

Standard H.E.2: The student will demonstrate an understanding of the structure, properties, and history of the observable universe.

SC Standard A24. The student will demonstrate an understanding of Earth's freshwater and ocean systems. **(SC ES-5)**

Standard H.E.5: The student will demonstrate an understanding of the dynamics of Earth's atmosphere. Standard H.E.6: The student will demonstrate an understanding of Earth's freshwater and ocean systems.

SOCIAL STUDIES ACADEMIC STANDARDS

Economics and Personal Finance

SC Standard A25. The student will demonstrate an understanding of fundamental economic concepts at an individual, business, and governmental level. **(SC ECON-1)**

EPF.1.ER Examine how scarcity of time and resources necessitates decision-making.

EPF.1.IN Research and utilize evidence to explain how various economic systems address the basic economic questions regarding distribution of resources.

EFP.1.IP Evaluate how short-term goals allow individuals and institutions to make rational decisions using marginal analysis.

SC Standard A27. The student will demonstrate an understanding of basic microeconomic principles. **(SC ECON-3)**

EPF.3.ER Apply the laws of supply and demand to determine how changes in market conditions affect prices.

EPF.3.IN Compare and contrast how the organization of various market structures affects decisions and outcomes of individuals and firms.

EPF.3.CC Illustrate market equilibrium and the impact of shifts in supply and demand, different elasticities, and price controls on market output and price.

EPF.3.IP Research and evaluate geopolitical influences on employment trends and issues at the state and national level.

~~**SC Standard A28.** The student will demonstrate an understanding of basic macroeconomic principles. **(SC ECON-4)**~~

~~EPF.4.ER Identify and analyze important economic indicators and data used to gauge the economic well-being of a society.~~

~~EPF.4.IN Provide justification for or against regulation in a free enterprise system.~~

~~EPF.4.CC Evaluate the impact of globalization and trade on the economic well-being of a country.~~

~~EPF.4.IP Investigate contemporary economic policies, and analyze how political ideologies influenced their implementation.~~

Human Geography

SC Standard A30. The student will demonstrate an understanding of the conditions, interconnections, and levels of economic development across Earth's surface. **(HG-2)**

HG.2.1.PR Identify regions of varying degrees of economic development, and explain the factors that influence the location and spatial distribution of these regions at the local and global scales using maps and geographic models and representations.

HG.2.2.HS Compare and evaluate different measures of development, and analyze patterns and trends in various regions of economic development.

HG.2.3.HS Identify and analyze the spatial distributions and patterns of primary, secondary, and tertiary sectors and activities of production and consumption using maps and geographic models and representations.

HG.2.4.PR Explain the conditions and connections that contribute to global interdependence of communications, economic, and transportation systems.

HG.2.5.ER Analyze the distribution and patterns of energy production and consumption over time, and evaluate the impacts and sustainability of different energy sources at varying scales.

HG.2.6.AG Gather evidence of economic development, construct a map to explain current or future development issues at different scales, and communicate findings.

SC Standard A31. The student will demonstrate an understanding of how cooperation and conflict among people influence the division and control of Earth's surface. **(HG-4)**

HG.4.5.HS Explain how forces of globalization and regional variations in resources can create opportunities for change, conflict, and cooperation for the control of Earth's surface.

United States History and Constitution

SC Standard A32. The student will demonstrate the impact of America's global leadership on technological advancements, the transition to a post-industrial society, and ongoing debates over identity in the period 1945–present. **(USHC-1)**

USHC.5.CX Contextualizes domestic economic development and American national identity within global politics.

United States Government

SC Standard A33. Demonstrate an understanding of the rights and responsibilities associated with citizenship in the United States. **(USG-4)**

USG.4.IN Distinguish between various economic, personal, and political rights of citizens in the U.S., and how these rights can sometimes conflict with each other.

USG.4.CC Analyze contemporary issues and governmental responses at various levels in terms of how they have provided equal protection under the law and equal access to society's opportunities and public facilities.

USG.4.IP Describe and evaluate the ways citizens can participate in the political process at the local, state, national, and global levels.

TECHNOLOGY STANDARDS

yes to all

Empowered Learner

SC Standard A39. Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences. **(ISTE-1)**

- Articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
- Build networks and customize their learning environments in ways that support the learning process.
- Use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
- Understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

Digital Citizen

SC Standard A40. Students recognize the rights, responsibilities, and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical. **(ISTE-2)**

- Cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
- Engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.

- Demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
- Manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.

Knowledge Constructor

SC Standard A41. Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others. **(ISTE-3)**

- Plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
- Evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.
- Curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
- Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

Innovative Designer

SC Standards A42. Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. **(ISTE-4)**

- Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
- Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
- Develop, test, and refine prototypes as part of a cyclical design process.
- Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

Computational Thinker

SC Standard A43. Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. **(ISTE-5)**

- Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
- Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
- Break problems into component parts, extract key information, and develop descriptive models to understand complex systems to facilitate problem-solving.
- Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

Creative Communicator

SC Standard A44. Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals. **(ISTE-6)**

- Choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
- Create original works or responsibly repurpose or remix digital resources into new creations.
- Communicate complete ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations.
- Publish or present content that customizes the message and medium for their intended audiences.

Global Collaborator

SC Standard A45. Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally. **(ISTE-7)**

- Use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
- Use collaborative technologies to work with others, including peers, experts, or community members, to examine issues and problems from multiple viewpoints.
- Contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
- Explore local and global issues and use collaborative technologies to work with others to investigate solutions.

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