The National Academy of Sciences Standards:

1.0 Science Inquiry
   1.1 Ability necessary to do scientific inquiry
   1.2 Understandings about scientific inquiry

2.0 Physical Science
   2.1 Structure of atoms
   2.2 Structure and properties of matter
   2.3 Chemical reactions
   2.4 Motions and forces
   2.5 Conservation of energy and increase in disorder
   2.6 Interactions of energy and matter

3.0 Life Science
   3.1 The cell
   3.2 Molecular basis of heredity
   3.3 Biological evolution
   3.4 Interdependence of organisms
   3.5 Matter, energy, and organization in living systems
   3.6 Behavior of organisms

4.0 Science and Technology
   4.1 Abilities of technological design
   4.2 Understandings about science and technology

5.0 Science in Personal and Social Perspectives
   5.1 Personal and community health
   5.2 Population growth
   5.3 Natural resources
   5.4 Environmental quality
   5.5 Natural and human-induced hazards
   5.6 Science and technology in local, national, and global challenges

6.0 History and Nature of Science
   6.1 Science as a human endeavor
   6.2 Nature of scientific knowledge
6.3 Historical perspectives

The National Council of Teachers of Mathematics Standards:

1.0 Numbers and Operations
   1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems
   1.2 Understand the meaning of operations and how they relate to each other
   1.3 Use computational tools and strategies fluently and estimate appropriately

2.0 Patterns, Functions, and Algebra
   2.1 Understand various types of patterns and functional relationships
   2.2 Use symbolic forms to represent and analyze mathematical situations and structures
   2.3 Use mathematical models and analyze change in both real and abstract contexts

3.0 Geometry and Spatial Sense
   3.1 Analyze characteristics and properties of two- and three-dimensional geometric objects
   3.2 Select and use different representational systems, including coordinate geometry and graph theory
   3.3 Recognize the usefulness of transformations and analyzing mathematical situations
   3.4 Use visualization and spatial reasoning to solve problems both within and outside of mathematics

4.0 Measurement
   4.1 Understand attributes, units, and systems of measurements
   4.2 Apply a variety of techniques, tools, and formulas for determining measurements

5.0 Data Analysis, Statistics, and Probability
5.1 Pose questions and collect, organize, and represent data to answer those questions
5.2 Interpret data using methods of exploratory data analysis
5.3 Develop and evaluate inferences, predictions, and arguments that are based on data
5.4 Understand and apply basic notions of chance and probability

6.0 Problem Solving
6.1 Build new mathematical knowledge through their work with problems
6.2 Develop a disposition to formulate, represent, abstract, and generalize in situations within and outside mathematics
6.3 Apply a wide variety of strategies to solve problems and adapt the strategies to new situations
6.4 Monitor and reflect on their mathematical thinking in solving problems

7.0 Reasoning and Proof
7.1 Recognize reasoning and proof as essential and powerful parts of mathematics
7.2 Make and investigate mathematical conjectures
7.3 Develop and evaluate mathematical arguments and proofs
7.4 Select and use various types of reasoning and methods of proof as appropriate

8.0 Communication
8.1 Organize and consolidate their mathematical thinking to communicate with others
8.2 Express mathematical ideas coherently and clearly to peers, teachers, and others
8.3 Extend their mathematical knowledge by considering the thinking and strategies of others
8.4 Use the language of mathematics as a precise means of mathematical expression

9.0 Connections
9.1 Recognize and use connections among different mathematical ideas
9.2 Understand how mathematical ideas build on one another to produce a coherent whole
9.3 Recognize, use, and learn about mathematics in contexts outside of mathematics

10.0 Representation
10.1 Create and use representations to organize, record, and communicate mathematical ideas
10.2 Develop a repertoire of mathematical representations that can be used purposefully, flexibly, and appropriately
10.3 Use representations to model and interpret physical, social, and mathematical phenomena

International Technology Education Association Standards:

1.0 The Nature of Technology
1.1 Students will develop an understanding of the characteristics and scope of technology.
1.2 Students will develop an understanding of the core concepts of technology.
1.3 Students will develop an understanding of the relationships among technologies and connections between technology and other fields of study.

2.0 Technology and Society
2.1 Students will develop an understanding of the cultural, social, economic, and political effects of technology.
2.2 Students will develop an understanding of the effects of technology on the environment.
2.3 Students will develop an understanding of the role of society in the development and use of technology.
2.4 Students will develop an understanding of the influence of technology on history.
3.0 Design

3.1 Students will develop an understanding of the attributes of design.
3.2 Students will develop an understanding of engineering design.
3.3 Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

4.0 Abilities for a Technological World

4.1 Students will develop the abilities necessary to apply the design process.
4.2 Students will develop the abilities to use and maintain technological products and systems.
4.3 Students will develop the abilities to assess the impact of products and systems.

5.0 The Designed World

5.1 Students will develop an understanding of and be able to select and use medical technologies.
5.2 Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.
5.3 Students will develop an understanding of and be able to select and use energy and power technologies.
5.4 Students will develop an understanding of and be able to select and use information and communication technologies.
5.5 Students will develop an understanding of and be able to select and use transportation technologies.
5.6 Students will develop an understanding of and be able to select and use manufacturing technologies.
5.7 Students will develop an understanding of and be able to select and use construction technologies.
Digital Electronics

Unit 1: Fundamentals

Lesson 1.1 Safety
  1.1.1. Electrical
  1.1.2. Equipment
  1.1.3. Hand Tools
  1.1.4. Clothing
  1.1.5. Procedures
  1.1.6. Material Safety Data

Lesson 1.2 Basic Electron Theory
  1.2.1. Current Flow
    1.2.1.1. Conventional vs. Electron Flow
    1.2.1.2. DC
    1.2.1.3. AC
  1.2.2 Structure of Atoms
    1.2.2.1 Nucleus
    1.2.2.2 Protons
    1.2.2.3 Electrons
    1.2.2.4 Electron Orbit

Lesson 1.3 Prefixes, Engineering Notation
  1.3.1. Mega
  1.3.2. Kilo
  1.3.3. milli
  1.3.4. micro
  1.3.5. micro-micro
  1.3.6. nano
  1.3.7. pico

Lesson 1.4 Resistors
  1.4.1. Theory
  1.4.2. Units
    1.4.2.1. Ohms
    1.4.2.2. Wattage
  1.4.3. Fixed
  1.4.4. Color Code
  1.4.5. Measuring Resistance
  1.4.6. Variable

Lesson 1.5 Laws
  1.5.1 Circuits
    1.5.1.1. Parts to a Simple Circuit
      1.5.1.1.1. Source
1.5.1.1.2. Load
1.5.1.1.3. Control
1.5.1.1.4. Conductor
1.5.1.2. Schematics
1.5.1.3. Series
1.5.1.4. Parallel
1.5.1.5. Series – Parallel
1.5.1.6. Open/closed loop
1.5.1.7. Switches
   1.5.1.7.1. Single Pole Single Throw
   1.5.1.7.2. Single Pole Double Throw
   1.5.1.7.3. Push Button Normally Closed
   1.5.1.7.4. Push Button Normally Closed
1.5.1.8. Short Circuit
1.5.1.9. Continuity
1.5.2. Ohm's Law
   1.5.2.1. Measuring Voltage
   1.5.2.2. Measuring Current
1.5.3. Kirchhoff's Law
   1.5.3.1. Current
   1.5.3.2. Voltage
1.5.4. Voltage
   1.5.4.1. In series
   1.5.4.2. In parallel
1.5.5. Current
   1.5.5.1. In series
   1.5.5.2. In parallel
1.5.6. Resistance
   1.5.6.1. In series
   1.5.6.2. In parallel

Lesson 1.6 Capacitance
1.6.1 Theory
1.6.2. Reading the value
1.6.3. Units
   1.6.3.1. Farads
   1.6.3.2. Voltage
1.6.4. Type
   1.6.4.1. Ceramic
   1.6.4.2. Electrolytic
1.6.5. Polarity
1.6.6. Measuring
   1.6.6.1. Scope
      1.6.6.1.1. Time
      1.6.6.1.2. Voltage
   1.6.6.2. Capacity Checker
Lesson 1.7 Analog and Digital Waveforms
1.7.1. Reading Waveforms
  1.7.1.1. Signal Generator
  1.7.1.2. Wave types
    1.7.1.2.1. Square
    1.7.1.2.2. Sine
    1.7.1.2.3. Sawtooth
  1.7.1.3. Period/Wavelength
  1.7.1.4. Amplitude
  1.7.1.5. Rise and Fall time
  1.7.1.6. Offset
  1.7.1.7. Pulse Width
  1.7.1.8. Duty Cycle
  1.7.1.9. Calculating Frequency
1.7.2. Logic Conditions
  1.7.2.1. High
  1.7.2.2. Low
1.7.3. Multivibrators

Lesson 1.8 Obtaining Data Sheets
  1.8.1 Internet Search
  1.8.2 Information included

Unit 2: Number Systems
Lesson 2.1 Conversions
  2.1.1. Binary to Decimal
  2.1.2. Decimal to Binary
  2.1.3. Hexadecimal to Binary
  2.1.4. Binary to Hexadecimal
  2.1.5. Hexadecimal to Decimal
  2.1.6. Decimal to Hexadecimal

Unit 3: Gates
Lesson 3.1 Logic Gates
  3.1.1. The Logic Symbols for the AND, OR, NOT, NAND, NOR Gates
  3.1.2. Reading Pin-out Diagram
  3.1.3. Truth Tables
  3.1.4. Boolean Expression
  3.1.5. Creating Multiple Input Gates

Unit 4: Boolean Algebra
Lesson 4.1 Boolean Expressions
4.1.1. Boolean Expressions and Truth Tables  
4.1.2. Minterm Expressions, Sum of Products  
4.1.3. Maxterm Expressions, Product of Sums  
4.1.4. Unnamed Boolean Expression and Schematic Circuits

Lesson 4.2 Logic Simplifications  
4.2.1. Boolean Simplification  
4.2.2. DeMorgan’s Theorems  
4.2.3. Karnaugh Mapping  
4.2.4. Electronic Simplification Tools

Lesson 4.3 Duality of Logic Functions  
4.3.1. Using NOR Gates to Emulate All Logic Functions  
4.3.2. Using NAND Gates to Emulate All Logic Functions

Unit 5: Combinational Circuit Design  
Lesson 5.1 Paradigm for Combinational Logic Problems  
5.1.1. Word Problem  
5.1.2. Construct Truth Table  
5.1.3. Create a Logic Equation from a Truth Table  
5.1.4. Simplify the Logic Equation  
5.1.5. Simulate the Circuit  
5.1.6. Construct the Circuit  
5.1.7. Troubleshoot

Lesson 5.2 Specific Application MSI Gates  
5.2.1. Levels of Integration (SSI, MSI, LSI)  
5.2.2. Display Drivers  
5.2.3. Code Converters  
5.2.3.1. Binary Coded Decimal (BCD)  
5.2.3.1.1. BCD to Decimal  
5.2.3.1.2. Decimal to BCD  
5.2.3.1.3. Binary to Hexadecimal

Lesson 5.3 Programmable Logic Devices (PLD)  
5.3.1. Introduction to PLD  
5.3.2. PLD Programming Software  
5.3.3. PLD Programming Hardware

Unit 6: Adding  
Lesson 6.1 Binary Addition  
6.1.1. 2’s Complement Notation, Addition and Subtraction  
6.1.2. The Exclusive OR and Exclusive NOR Functions  
6.1.3. Half Adder Design  
6.1.4. Full Adder Design
6.1.5. N Bit Adder Design

Unit 7: Flip-Flops

Lesson 7.1 Introduction to Sequential Logic
  7.1.1. Latches
  7.1.2. Flip-Flop
  7.1.3. Timing Diagrams

Lesson 7.2 The J-K Flip-Flop
  7.2.1. Operation of J-K Flip-Flop
  7.2.2. Asynchronous Inputs
  7.2.3. Synchronous Inputs

Lesson 7.3 Triggers
  7.3.1. Positive-Edge Trigger
  7.3.2. Negative-Edge Trigger
  7.3.3. Positive-Level Trigger (Latch)
  7.3.4. Negative-Level Trigger (Latch)

Lesson 7.4 Flip-Flop Timing Considerations
  7.4.1. Setup and Hold Times
  7.4.2. Propagation Delays
  7.4.3. Timing Limitations ($f_{\text{max}}$, Minimum Pulse Width)

Lesson 7.5 Elementary Applications of Flip-Flops
  7.5.1. Data Storage
  7.5.2. Logic Synchronizing
  7.5.3. Clock Division
  7.5.4. Switch Debouncing

Unit 8: Shift Registers and Counters

Lesson 8.1 Shift Registers
  8.1.1 Discrete Shift Register
  8.1.2 Integrated Shift Register

Lesson 8.2 Asynchronous Counters
  8.2.1. Discrete Ripple Counter
  8.2.2. Discrete Modulus-N Ripple Counter
  8.2.3. Integrated Ripple Counter (7493)
  8.2.4. Other MSI Counter

Lesson 8.3 Synchronous Counters
  8.3.1. Discrete Up Counter
  8.3.2. Discrete Down Counter
  8.3.3. Discrete Modulus-N Synchronous Counter
8.3.4. Integrated 4-Bit Binary Counter (74163)
8.3.5. Integrated 4-Bit Binary Up/Down Counter (74193)

Unit 9: Families and Specifications
Lesson 9.1 Logic Families
  9.1.1. CMOS
  9.1.2. TTL
  9.1.3. Interfacing Different Logic Families

Lesson 9.2 Spec Sheets
  9.2.1. Electronic Sites
  9.2.2. Voltage Levels
  9.2.3. Current Levels
  9.2.4. Fan-out
  9.2.5. Switching Characteristics – Propagation Delay

Unit 10: Microprocessors
Lesson 10.1 Microcontrollers
  10.1.1. Programming
  10.1.2. Development Tools
  10.1.3. Output to Sound
  10.1.4. Output pins
  10.1.5. Limitations
  10.1.6. Input devices
    10.1.6.1. Switches
    10.1.6.2. Phototransistors
  10.1.7. Analog to Digital
    10.1.7.1. A to D converters
    10.1.7.2. CaDmium Sulfide Cells
    10.1.7.3. Thermistors

Lesson 10.2 Interfacing with Motors
  10.2.1. Types of Motors
    10.2.1.1. AC
    10.2.1.2. DC
    10.2.1.3. Stepper
  10.2.2. Interface Devices
    10.2.2.1. Relays
    10.2.2.2. H-Bridges
    10.2.2.3. Optolisolators

Unit 11: Student Directed Study Topic
Lesson 11.1 Design Paradigm