MS Robotics

MS Mechatronics/Robotics Current Standards

	Indicator # MSR 1 Understand the components that make up a robot
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	MSR 1.1. Know the equipment used in robotics
Level 2: Skill/Concept	MSR 1.2. Identify various mechanical systems used in robotics
Level 3: Strategic Thinking	MSR 1.3. Demonstrate the use of programming commands

	Indicator # MSR 2 Investigate the impact of robotics on our society
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	MSR 2.1. Compare and contrast robotics labor vs. human labor
Level 2: Skill/Concept	MSR 2.2. Explore career outlook for robotic applications
Level 2: Skill/Concept	MSR 2.3. Explore new entrepreneurial opportunities using robotics

	Indicator # MSR 3 Design a robot to solve a particular problem
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	MSR 3.1. Identify robotic applications
Level 4: Extended thinking	MSR 3.2. Propose a robotic design
Level 4: Extended thinking	MSR 3.3. Construct a functional robot
Level 4: Extended thinking	MSR 3.4. Program a robot to perform a specific task
Level 4: Extended thinking	MSR 3.5. Evaluate robot programming

Middle School Robotics Proposed Standards

	Indicator # MSR 1 Understand the components that make up a robot
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	MSR 1.1. Know the equipment used in robotics
Level 2: Skill/Concept	MSR 1.2. Identify various mechanical systems used in robotics
Level 3: Strategic Thinking	MSR 1.3. Demonstrate the use of programming commands

	Indicator # MSR 2 Investigate the impact of robotics on our society
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	MSR 2.1. Compare and contrast robotics labor vs. human labor
Level 2: Skill/Concept	MSR 2.2. Explore career outlook for robotic applications
Level 2: Skill/Concept	MSR 2.3. Explore new entrepreneurial opportunities using robotics

	Indicator # MSR 3 Design a robot to solve a particular problem
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	MSR 3.1. Identify robotic applications
Level 4: Extended thinking	MSR 3.2. Propose a robotic design
Level 4: Extended thinking	MSR 3.3. Construct a functional robot
Level 4: Extended thinking	MSR 3.4. Program a robot to perform a specific task
Level 4: Extended thinking	MSR 3.5. Evaluate robot programming

Exploring STEM in CTE

MS Introduction to STEM Current Standards

	INDICATOR #STEM 1: Understand the components of STEM
Webb Level	*Sub-indicator*
Webb Level: 2	STEM 1.1 Understand the components of STEM and the impact of STEM on society
Webb Level: 3	STEM 1.2 Explore the impact of STEM related careers

	INDICATOR #STEM 2: Understand the foundation of STEM in aviation
Webb Level	*Sub-indicator*
Webb Level: 4	STEM 2.1 Identify how STEM is applied in the field of aviation
Webb Level: 3	STEM 2.2 Evaluate careers related to aviation

	INDICATOR #STEM 3: Understand the foundation of STEM in relation to Energy
Webb Level	*Sub-indicator*
Webb Level: 4	STEM 3.1 Identify the application of STEM in the field of energy and/or energy production.
Webb Level: 3	STEM 3.2 Explore the career opportunities in the field of energy related to STEM

	INDICATOR #STEM 4: Understand the foundation of STEM in Engineering
Webb Level	*Sub-indicator*
Webb Level: 4	STEM 4.1 Understand how STEM is a part of all aspects of engineering
Webb Level: 3	STEM 4.2 Evaluate the career opportunities associated with engineering

	INDICATOR #STEM 5: Understand the foundation of STEM in robotics
Webb Level	*Sub-indicator*
Webb Level: 4	STEM 5.1 Explore the relationship between STEM and robotics
Webb Level: 3	STEM 5.2 Evaluate the career opportunities associated with the field of robotics

Exploring STEM in CTE Proposed Standards

	Indicator # STEM 1 Understand the components of STEM in CTE
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	STEM 1.1 Understand the components of STEM in CTE and the impact of STEM on society
Level 3: Strategic Thinking	STEM 1.2 Explore the impact of STEM in CTE related careers

	Indicator # STEM 2 Understand how Science relates to STEM in CTE
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	STEM 2.1 Understand scientific terminology as it applies to STEM in CTE
Level 2: Skill/Concept	STEM 2.2 Apply scientific concepts as they relate to STEM in CTE

	Indicator # STEM 3 Understand how Technology relates to STEM in CTE
Webb Level	*Sub-indicator*
Level 1: Recall	STEM 3.1 Understand technology terminology as it applies to STEM in CTE
Level 2: Skill/Concept	STEM 3.2 Apply technology concepts as they relate to STEM in CTE

	Indicator # STEM 4 Understand how Engineering relates to STEM in CTE
Webb Level	*Sub-indicator*
Level 1: Recall	STEM 4.1 Understand engineering terminology as it applies to STEM in CTE
Level 2: Skill/Concept	STEM 4.2 Apply engineering concepts as they relate to STEM in CTE

	Indicator # STEM 5 Understand how Mathematics relates to STEM in CTE
Webb Level	*Sub-indicator*
Level 1: Recall	STEM 5.1 Understand mathematical terminology as it applies to STEM in CTE
Level 2: Skill/ Concept	STEM 5.2 Apply mathematical concepts as they relate to STEM in CTE

MS Introduction to STEM
Current Standards

Exploring STEM in CTE
Proposed Standards

Level 2: Skill/Concept	STEM 5.3 Understand and apply measurement tools and practices

	Indicator # STEM 6 Understand how technical and soft skills apply to STEM and CTE careers.
Webb Level	Sub-indicator
Level 2: Skill/ Concept	STEM 6.1 Explore technical skills required for STEM and CTE careers
Level 2: Skill/ Concept	STEM 6.2 Explore soft skills required for STEM and CTE careers
Level 2: Skill/ Concept	STEM 6.3 Explore health standards and safety skills in relation to STEM in CTE careers

Introduction to Technology Education - Current Standards

	Indicator # ITE 1 Analyze the scope and nature of technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	ITE 1.1 Examine the relationship between technology and other areas of study
Level 2: Skill/Concept	ITE 1.2. Understand the effects of technology on the natural environment
Level 2: Skill/Concept	ITE 1.3. Examine the relationship between the cultural, social, economic, and political effects of technology on society

	Indicator # ITE 2 Apply the system-thinking model (the feedback loop) to technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	ITE 2.1 Apply the design process to the engineering design process

	Indicator # ITE 3 Solve problems using innovation, research, experimentation, and design
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	ITE 3.1 Use research and experimentation methods to solve problems
Level 3: Strategic Thinking	ITE 3.2. Use innovative and/or troubleshooting methods to solve problems

	Indicator # ITE 4 Apply appropriate skill sets to various ranges of technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	ITE 4.1. Understand biotechnologies
Level 2: Skill/Concept	ITE 4.2 Understand energy and power technologies
Level 2: Skill/Concept	ITE 4.3 Understand information and communication technologies
Level 2: Skill/Concept	ITE 4.4 Understand transportation technologies
Level 2: Skill/Concept	ITE 4.5 Understand manufacturing technologies and materials
Level 2: Skill/Concept	ITE 4.6 Understand construction technologies

	Indicator # ITE 5 Understand ethics and professionalism in technology
Webb Level	*Sub-indicator*

Introduction to Technology Education - Proposed Standards

	Indicator # ITE 1 Analyze the scope and nature of technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	ITE 1.1 Examine the relationship between technology and other areas of study
Level 2: Skill/Concept	ITE 1.2. Understand the effects of technology on the natural environment
Level 2: Skill/Concept	ITE 1.3. Examine the relationship between the cultural, social, economic, and political effects of technology on society

	Indicator # ITE 2 Apply the system-thinking model (the feedback loop) to technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	ITE 2.1 Apply the design process to the engineering design process

	Indicator # ITE 3 Solve problems using innovation, research, experimentation, and design
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	ITE 3.1 Use research and experimentation methods to solve problems
Level 3: Strategic Thinking	ITE 3.2. Use innovative and/or troubleshooting methods to solve problems

	Indicator # ITE 4 Apply appropriate skill sets to various ranges of technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	ITE 4.1. Understand biotechnologies
Level 2: Skill/Concept	ITE 4.2 Understand energy and power technologies
Level 2: Skill/Concept	ITE 4.3 Understand information and communication technologies
Level 2: Skill/Concept	ITE 4.4 Understand transportation technologies
Level 2: Skill/Concept	ITE 4.5 Understand manufacturing technologies and materials
Level 2: Skill/Concept	ITE 4.6 Understand construction technologies

	Indicator # ITE 5 Understand ethics and professionalism in technology
Webb Level	*Sub-indicator*

Introduction to Technology Education - Current Standards

Level 3: Strategic Thinking	ITE 5.1 Investigate and demonstrate understanding of professionalism and ethics in the technological environment

	Indicator # ITE 6 Understand safety and health in technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	ITE 6.1. Understand implication of health and public safety standards

Introduction to Technology Education - Proposed Standards

Level 3: Strategic Thinking	ITE 5.1 Investigate and demonstrate understanding of professionalism and ethics in the technological environment

	Indicator # ITE 6 Understand safety and health in technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	ITE 6.1. Understand implication of health and public safety standards

Introduction to Engineering

Introduction to Engineering Current Standards

	Indicator # IE 1 Examine the fields of engineering
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	IE 1.1 Examine the evolution of engineering
Level 1: Recall	IE 1.2 Identify types of engineers
Level 1: Recall	IE 1.3 Describe the engineering team

	Indicator # IE 2 Investigate various engineering systems
Webb Level	*Sub-indicator*
Level 1: Recall	IE 2.1 Identify various types of engineering systems
Level 2: Skill/Concept	IE 2.2 Apply the engineering systems to solve problems

	Indicator # IE 3 Apply the engineering process to a product
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	IE 3.1 Design a product
Level 2: Skill/Concept	IE 3.2 Create a three-dimensional (3-D) model
Level 2: Skill/Concept; Level 3: Strategic Thinking	IE 3.3 Build and test a prototype
Level 2: Skill/Concept; Level 4: Extended Thinking	IE 3.4 Develop a system to produce a final product

	Indicator # IE 4 Demonstrate effective communication
Webb Level	*Sub-indicator*
Level 2: Skill/Concept; Level 3: Strategic Thinking	IE 4.1 Demonstrate effective oral communication
Level 3: Strategic Thinking; Level 4: Extended Thinking	IE 4.2 Demonstrate effective written communication
Level 4: Extended Thinking	IE 4.3 Demonstrate effective graphic communication

	Indicator # IE 5 Examine testing procedures used on materials in engineering
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	IE 5.1 Analyze materials based on their properties
Level 3: Strategic Thinking	IE 5.2 Analyze material testing procedures

Introduction to Engineering Proposed Standards

	Indicator # IE 1 Examine the fields of engineering
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	IE 1.1 Examine the evolution of engineering
Level 1: Recall	IE 1.2 Identify types of engineers
Level 1: Recall	IE 1.3 Describe the engineering team

	Indicator # IE 2 Investigate various engineering systems
Webb Level	*Sub-indicator*
Level 1: Recall	IE 2.1 Identify various types of engineering systems
Level 2: Skill/Concept	IE 2.2 Apply the engineering design process to solve problems

	Indicator # IE 3 Apply the engineering process to a product
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	IE 3.1 Design a product
Level 2: Skill/Concept	IE 3.2 Create a three-dimensional (3-D) model
Level 2: Skill/Concept; Level 3: Strategic Thinking	IE 3.3 Use the engineering design process to build and test a prototype
Level 2: Skill/Concept; Level 4: Extended Thinking	IE 3.4 Utilize a systems approach to produce a final product

	Indicator # IE 4 Demonstrate effective communication
Webb Level	*Sub-indicator*
Level 2: Skill/Concept; Level 3: Strategic Thinking	IE 4.1 Demonstrate effective oral communication
Level 3: Strategic Thinking; Level 4: Extended Thinking	IE 4.2 Demonstrate effective written communication
Level 4: Extended Thinking	IE 4.3 Demonstrate effective graphic communication

	Indicator # IE 5 Examine testing procedures used on materials in engineering
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	IE 5.1 Analyze materials based on their properties
Level 3: Strategic Thinking	IE 5.2 Analyze material testing procedures

Engineering Design and Development Current Standards

	Indicator # EDD 1 Identify a technologically related problem
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	EDD 1.1 Examine current state of a problem
Level 3: Strategic Thinking	EDD 1.2 Research solution options to solve problem
Level 3: Strategic Thinking	EDD 1.3 Propose new solutions to solve problem
Level 4: Extended Thinking	EDD 1.4 Identify the best solution

	Indicator # EDD 2 Construct a prototype of the solution to problem
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	EDD 2.1 Construct a prototype to model solution
Level 4: Extended Thinking	EDD 2.2 Test prototype for effectiveness

	Indicator # EDD 3 Analyze test data results for prototype performance
Webb Level	*Sub-indicator*
Level 4: Extended Thinking	EDD 3.1 Analyze test results
Level 3: Strategic Thinking	EDD 3.2 Make decisions based on test result data
Level 4: Extended Thinking	EDD 3.3 Redesign the product to meet performance needs

	Indicator # EDD 4 Communicate solution(s) and the prototype for others
Webb Level	*Sub-indicator*
Level 4: Extended Thinking	EDD 4.1 Communicate solutions for product

Engineering Design and Development Proposed Standards

	Indicator # EDD 1 Utilize the engineering design process to identify a technologically related problem
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	EDD 1.1 Examine current state of a problem
Level 3: Strategic Thinking	EDD 1.2 Research solution options to solve problem
Level 3: Strategic Thinking	EDD 1.3 Propose new solutions to solve problem
Level 4: Extended Thinking	EDD 1.4 Identify the best solution

	Indicator # EDD 2 Utilize the engineering design process to construct a prototype of the solution to problem
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	EDD 2.1 Construct a prototype to model solution
Level 4: Extended Thinking	EDD 2.2 Test prototype for effectiveness

	Indicator # EDD 3 Utilize the engineering design process to analyze test data results for prototype performance
Webb Level	*Sub-indicator*
Level 4: Extended Thinking	EDD 3.1 Analyze test results
Level 3: Strategic Thinking	EDD 3.2 Make decisions based on test result data
Level 4: Extended Thinking	EDD 3.3 Redesign the product to meet performance needs

	Indicator # EDD 4 Communicate solution(s) and the prototype for others
Webb Level	*Sub-indicator*
Level 4: Extended Thinking	EDD 4.1 Communicate solutions for product

Bioprocess Engineering

Bioprocess Engineering
Current Standards

	Indicator # BE 1 Understand the basic concepts of bioprocess system and biotechnological processes
Webb Level	*Sub-indicator*
Level 1: Recall; Level 2: Thinking	BE 1.1 Identify bio-based products
Level 1: Recall and Understand	BE 1.2 Identify microbial processes that can be implemented in bioprocessing
Level 2: Understand and Demonstrate	BE 1.3 Understand how biotechnology can be integrated with engineering

	Indicator # BE 2 Apply basic knowledge of biological science and engineering in developing products
Webb Level	*Sub-indicator*
Level 1: Recall; Level 2: Thinking Explain	BE 2.1 Understand how raw materials are used for developing products
Level 1: Recall; Level 2: Thinking Explain	BE 2.2 Understand how the chemical composition of a raw material affects the design process

	Indicator # BE 3 Understand issues associated with implementation and operation of biotechnological processes
Webb Level	*Sub-indicator*
Level 3: Strategic thinking	BE 3.1 Analyze problems associated with bioprocessing, for example, environmental, technical, sustainable
Level 2: Thinking Explain	BE 3.2 Understand how to operate a bioreactor

	Indicator # BE 4 Career exploration in bioprocess engineering
Webb Level	*Sub-indicator*
Level 3: Strategic thinking	BE 4.1 Explore the role of bioprocess engineering in an agriculture related area
Level 2: Thinking Explain	BE 4.2 Understand the role of bioprocess engineering in food processing
Level 2: Thinking Explain	BE 4.3 Understand how bioprocess engineering is critical to water and wastewater treatment technologies
Level 2: Thinking Explain	BE 4.4 Understand how bioprocess engineering can improve the rural economy

Bioprocess Engineering
Proposed Standards

	Indicator # BE 1 Understand the basic concepts of bioprocess system and biotechnological processes
Webb Level	*Sub-indicator*
Level 1: Recall; Level 2: Thinking	BE 1.1 Identify bio-based products
Level 1: Recall and Understand	BE 1.2 Identify microbial processes that can be implemented in bioprocessing
Level 2: Understand and Demonstrate	BE 1.3 Understand how biotechnology can be integrated with engineering

	Indicator # BE 2 Apply basic knowledge of biological science and engineering in developing products
Webb Level	*Sub-indicator*
Level 1: Recall; Level 2: Thinking Explain	BE 2.1 Understand how raw materials are used for developing products
Level 1: Recall; Level 2: Thinking Explain	BE 2.2 Understand how the chemical composition of a raw material affects the design process and product outcome

	Indicator # BE 3 Understand issues associated with implementation and operation of biotechnological processes
Webb Level	*Sub-indicator*
Level 3: Strategic thinking	BE 3.1 Analyze problems associated with bioprocessing, for example, environmental, technical, sustainable
Level 2: Thinking Explain	BE 3.2 Understand how to operate a bioreactor

	Indicator # BE 4 Career exploration in bioprocess engineering
Webb Level	*Sub-indicator*
Level 3: Strategic thinking	BE 4.1 Explore the role of bioprocess engineering in an agriculture related area
Level 2: Thinking Explain	BE 4.2 Understand the role of bioprocess engineering in food processing
Level 2: Thinking Explain	BE 4.3 Understand how bioprocess engineering is critical to water and wastewater treatment technologies
Level 2: Thinking Explain	BE 4.4 Understand how bioprocess engineering can improve the rural economy

Bioprocess Engineering
Current Standards

	Indicator # BE 5 Understand workplace ethics and professionalism in bioprocess engineering
Webb Level	*Sub-indicator*
Level 1: Recall; Level 2: Skill Concept	BE 5.1 Investigate and demonstrate understanding of professionalism and workplace ethics in the technological environment.

	Indicator # BE 6 Understand safety and health in bioprocessing engineering
Webb Level	*Sub-indicator*
Level 1: Recall; Level 2: Thinking Explain	BE 6.1 Understand implications of health and public safety standards.

Bioprocess Engineering
Proposed Standards

	Indicator # BE 5 Understand safety and health in bioprocessing engineering
Webb Level	*Sub-indicator*
Level 1: Recall; Level 2: Thinking Explain	BE 5.1 Understand implications of health and public safety standards.

	Indicator # BE 6 Understand workplace ethics and professionalism in bioprocess engineering
Webb Level	*Sub-indicator*
Level 1: Recall; Level 2: Skill Concept	BE 6.1 Investigate and demonstrate understanding of professionalism and workplace ethics in the technological environment.

Robotics

Robotics - Current Standards

	Indicator # RBT 1 Identify components of a robotic system
Webb Level	*Sub-indicator*
Level 1: Recall	RBT 1.1 Describe the parts necessary to make a robot
Level 2: Skill/ Concept	RBT 1.2 Examine the relationships among the subsystems

	Indicator # RBT 2 Understand safety procedures and ethical issues inherent to robotics
Webb Level	*Sub-indicator*
Level 2: Skill/ Concept	RBT 2.1. Demonstrate proper safety procedures
Level 2: Skill/ Concept	RBT 2.2. Determine how to apply OSHA Compliant Lockout – Tag-out procedures
Level 2: Skill/ Concept	RBT 2.3. Examine current ethical issues

	Indicator # RBT 3 Construct, analyze and troubleshoot circuits
Webb Level	*Sub-indicator*
Level 3: Strategic thinking	RBT 3.1. Build circuit according to schematic diagram
Level 3: Strategic thinking	RBT 3.2. Calculate circuit parameters
Level 3: Strategic thinking	RBT 3.3. Measure circuits parameters
Level 3: Strategic thinking	RBT 3.4. Compare calculated and measured solutions to analyze circuit operation

	Indicator # RBT 4 Design, build and analyze a robotic system
Webb Level	*Sub-indicator*
Level 3: Strategic thinking	RBT 4.1 Build and program a robot to perform a specified task
Level 3: Strategic thinking	RBT 4.2 Test and modify the robot for any flaws in hardware or bugs in software components
Level 3: Strategic thinking	RBT 4.3 Write a technical report evaluating the system performance

	Indicator # RBT 5 Research career opportunities and industry applications
Webb Level	*Sub-indicator*
Level 1: Recall	RBT 5.1 Explore career opportunities in the robotics field

Robotics - Proposed Standards

	Indicator # RBT 1 Identify components of a robotic system
Webb Level	*Sub-indicator*
Level 1: Recall	RBT 1.1 Describe the parts necessary to make a robot
Level 2: Skill/ Concept	RBT 1.2 Examine the relationships among the subsystems

	Indicator # RBT 2 Understand safety procedures and ethical issues inherent to robotics
Webb Level	*Sub-indicator*
Level 2: Skill/ Concept	RBT 2.1. Demonstrate proper safety procedures
Level 2: Skill/ Concept	RBT 2.2. Determine how to apply OSHA Compliant Lockout – Tag-out procedures
Level 2: Skill/ Concept	RBT 2.3. Examine current ethical issues

	Indicator # RBT 3 Construct, analyze and troubleshoot circuits
Webb Level	*Sub-indicator*
Level 3: Strategic thinking	RBT 3.1. Build circuit according to schematic diagram
Level 3: Strategic thinking	RBT 3.2. Calculate circuit parameters
Level 3: Strategic thinking	RBT 3.3. Measure circuits parameters
Level 3: Strategic thinking	RBT 3.4. Compare calculated and measured solutions to analyze circuit operation

	Indicator # RBT 4 Design, build and analyze a robotic system
Webb Level	*Sub-indicator*
Level 3: Strategic thinking	RBT 4.1 Using the design process, design, build and program a robot to perform a specified task
Level 3: Strategic thinking	RBT 4.2 Test and modify the robot for any flaws in hardware or bugs in software components
Level 3: Strategic thinking	RBT 4.3 Write a technical report evaluating the system performance

	Indicator # RBT 5 Research career opportunities and industry applications
Webb Level	*Sub-indicator*
Level 1: Recall	RBT 5.1 Explore career opportunities in the robotics field

Robotics - Current Standards

Level 3: Strategic Thinking	RBT 5.2 Investigate commercial application of robotic systems

Robotics - Proposed Standards

Level 3: Strategic Thinking	RBT 5.2 Investigate commercial application of robotic systems

Electronics

Electronics Current Standards

	Indicator # E 1 Determine general technical literacy skills
Webb Level	*Sub-indicator*
Level 1: Recall	E 1.1 Employ appropriate units and abbreviations in electronics
Level 2: Skill/Concept	E 1.2 Determine unknown values in multiple types of electronic circuits
Level 1: Recall	E 1.3 Identify proper terminology in electronics

	Indicator # E 2 Demonstrate proficiency in electronic safety
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	E 2.1. Determine physiological responses to electrical shock
Level 1: Recall	E 2.2. Demonstrate proper safety procedures in the use of soldering and electronics testing equipment

	Indicator # E 3 Demonstrate proficiency in circuit assembly
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	E 3.1. Construct a circuit using schematic symbols for identified components
Level 2: Skill/Concept	E 3.2. Construct circuit boards using correct soldering principles and techniques
Level 3: Strategic Thinking	E 3.3. Determine cause of non-operational circuits

	Indicator # E 4 Determine proper use of electronic test equipment
Webb Level	*Sub-indicator*
Level 1: Recall	E 4.1. Measure resistance, voltage, and current in circuits
Level 1: Recall	E 4.2. Classify equipment for signal analysis

	Indicator # E 5 Troubleshoot circuits for proper operation
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	E 5.1. Calculate voltage, current, and power solutions in circuits
Level 2: Skill/Concept	E 5.2. Troubleshoot solutions to analyze circuit operation

Electronics Proposed Standards

	Indicator # E 1 Determine general technical literacy skills
Webb Level	*Sub-indicator*
Level 1: Recall	E 1.1 Employ appropriate units and abbreviations in electronics
Level 2: Skill/Concept	E 1.2 Determine unknown values in multiple types of electronic circuits
Level 1: Recall	E 1.3 Identify proper terminology in electronics

	Indicator # E 2 Demonstrate proficiency in electronic safety
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	E 2.1. Determine physiological responses to electrical shock
Level 1: Recall	E 2.2. Demonstrate proper safety procedures in the use of soldering and electronics testing equipment

	Indicator # E 3 Demonstrate proficiency in circuit assembly
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	E 3.1. Construct a circuit using schematic symbols for identified components
Level 2: Skill/Concept	E 3.2. Construct circuit boards using correct soldering principles and techniques
Level 3: Strategic Thinking	E 3.3. Determine cause of non-operational circuits

	Indicator # E 4 Determine proper use of electronic test equipment
Webb Level	*Sub-indicator*
Level 1: Recall	E 4.1. Measure resistance, voltage, and current in circuits
Level 1: Recall	E 4.2. Classify equipment for signal analysis

	Indicator # E 5 Troubleshoot circuits for proper operation
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	E 5.1. Calculate voltage, current, and power solutions in circuits
Level 2: Skill/Concept	E 5.2. Troubleshoot solutions to analyze circuit operation

Electronics Current Standards

	Indicator # E 6 Explore electronics career options
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	E 6.1 Research career opportunities in electronics fields
Level 1: Recall	E 6.2 Explore career outlook for robotic applications

Electronics Proposed Standards

	Indicator # E 6 Explore electronics career options
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	E 6.1 Research career opportunities in electronics fields
Level 1: Recall	E 6.2 Explore career outlook for robotic applications

Introduction to Energy/Power

Introduction to Energy/Power Current Standards

	INDICATOR #EP 1: Analyze the history of energy/power sources
Webb Level	*Sub-indicator*
Level: 2 Skill/Content	EP 1.1 Examine the historical development of energy/power production
Level: 1 Recall	EP 1.2 Assess the impact of energy/power on the way people live and work

	INDICATOR #EP 2: Examine the relationships among work, energy, and power
Webb Level	*Sub-indicator*
Level: 1 Recall	EP 2.1 Define work, power, and energy
Level: 2 Skill/Concept	EP 2.2 Examine the relationship between power and energy sources

	INDICATOR #EP 3: Understand the transmission of energy and power
Webb Level	*Sub-indicator*
Level: 1 Recall	EP 3.1 Understand how a mechanical system operates
Level: 2 Skill/Concept	EP 3.2 Understand the types of simple machines
Level: Skill/Concept	EP 3.3 Understand both liquid and gas forms of power transmission
Level: 1 Recall	EP 3.4 Understand the laws that govern electricity

	INDICATOR #EP 4: Understand alternative energy
Webb Level	*Sub-indicator*
Level: 2 Skill/Concept	EP 4.1 Understand the sources of alternative energy
Level: 3 Strategic Thinking	EP 4.2 Analyze the sources of alternative energy

	INDICATOR #EP 5: Implement safety with power technology
Webb Level	*Sub-indicator*
Level: 2 Skill/Concept	EP 5.1 Examine safety issues relating to mechanical systems
Level: 2 Skill/Concept	EP 5.2 Employ safety practices with fluids
Level: 1 Recall	EP 5.3 Identify fire classification and extinguishers
Level: 2 Skill/Concept	EP 5.4 Employ safety practices with electricity

Introduction to Energy/Power Proposed Standards

	Indicator # EP 1 Analyze the history of energy/power sources
Webb Level	*Sub-indicator*
Level 2: Skill/Content	EP 1.1 Examine the historical development of energy/power production
Level 1: Recall	EP 1.2 Assess the impact of energy/power on the way people live and work

	Indicator #EP 2 Examine the relationships among work, energy, and power
Webb Level	*Sub-indicator*
Level 1: Recall	EP 2.1 Define work, power, and energy
Level 2: Skill/Concept	EP 2.2 Examine the relationship between power and energy sources

	Indicator # EP 3 Understand the transmission of energy and power
Webb Level	*Sub-indicator*
Level 1: Recall	EP 3.1 Understand how a mechanical system operates
Level 2: Skill/Concept	EP 3.2 Understand the types of simple machines
Level 2: Skill/Concept	EP 3.3 Understand both liquid and gas forms of power transmission
Level 1: Recall	EP 3.4 Understand the laws that govern electricity

	Indicator # EP 4 Understand alternative energy
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	EP 4.1 Understand the sources of alternative energy
Level 3: Strategic Thinking	EP 4.2 Analyze the sources of alternative energy

	Indicator # EP 5 Implement safety with power technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	EP 5.1 Examine safety issues relating to mechanical systems
Level 2: Skill/Concept	EP 5.2 Employ safety practices with fluids
Level 1: Recall	EP 5.3 Identify fire classification and extinguishers
Level 2: Skill/Concept	EP 5.4 Employ safety practices with electricity

Introduction to Energy/Power
Current Standards

	INDICATOR #EP 6: Understand scientific concepts for energy and power technology
Webb Level	*Sub-indicator*
Level: 1 Recall	EP 6.1 Understand how energy converts from one form to another
Level: 2 Skill/Concept	EP 6.2 Understand the categories of energy
Level: 3 Strategic Thinking	EP 6.3 Understand that an engine performing work exhausts thermal energy that cannot be retrieved to the surroundings
Level: 3 Strategic Thinking	EP 6.4 Understand which energy sources can be renewable and non-renewable

	INDICATOR #EP 7: Explore energy and power career options
Webb Level	*Sub-indicator*
Level: 3 Strategic Thinking	EP 7.1 Research career opportunities in energy and power fields

Introduction to Energy/Power
Proposed Standards

	Indicator # EP 6 Understand scientific concepts for energy and power technology
Webb Level	*Sub-indicator*
Level 1: Recall	EP 6.1 Understand how energy converts from one form to another
Level 2: Skill/Concept	EP 6.2 Understand the categories of energy
Level 3: Strategic Thinking	EP 6.3 Understand that an engine performing work exhausts thermal energy that cannot be retrieved to the surroundings
Level 3: Strategic Thinking	EP 6.4 Understand which energy sources can be renewable and non-renewable

	Indicator # EP 7 Explore energy and power career options
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	EP 7.1 Research career opportunities in energy and power fields

Alternative Energy Systems

Alternative Energy Systems Current Standards

	INDICATOR #AES 1: Understand the historical development of alternative energy systems
Webb Level	*Sub-indicator*
Level: 3 Strategic Thinking	AES 1.1 Understand the historical background of alternative energy generation
Level: 3 Strategic Thinking	AES 1.2 Analyze the role of society in the use of energy generation methods
Level: 4 Extended Thinking	AES 1.3 Analyze the cultural, socioeconomic and political effects of alternative energy technologies
Level: 3 Strategic Thinking	AES 1.4 Understand the environmental impact of energy production and consumption.

	INDICATOR #AES 2: Understand the types of major energy systems
Webb Level	*Sub-indicator*
Level: 3 Strategic Thinking	AES 2.1 Analyze the characteristics of wind energy generation systems
Level: 4 Extended Thinking	AES 2.2 Analyze the characteristics biomass energy generation systems
Level: 4 Extended Thinking	AES 2.3 Analyze the characteristics of solar energy generation systems
Level: 4 Extended Thinking	AES 2.4 Analyze the characteristics of geothermal energy generation systems
Level: 2 Skill/Concept	AES 2.5 Analyze the characteristics of traditional energy generation systems
Level: 4 Extended Thinking	AES 2.6 Model an alternative energy system.

	INDICATOR #AES 3: Research alternative energy careers and trends in energy development
Webb Level	*Sub-indicator*
Level: 3 Strategic Thinking	AES 3.1 Identify careers in alternative energy.
Level: 1 Recall	AES 3.2 Identify future energy resources.

Alternative Energy Systems Proposed Standards

	Indicator # AES 1 Understand the historical development of alternative energy systems
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AES 1.1 Understand the historical background of alternative energy generation
Level 3: Strategic Thinking	AES 1.2 Analyze the role of society in the use of energy generation
Level 4: Extended Thinking	AES 1.3 Analyze the cultural, socioeconomic and political effects of alternative energy technologies
Level 3: Strategic Thinking	AES 1.4 Understand the environmental impact of energy production and consumption

	Indicator # AES 2 Understand the types of major energy systems
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AES 2.1 Analyze the characteristics of wind energy generation systems
Level 4: Extended Thinking	AES 2.2 Analyze the characteristics biomass energy generation systems
Level 4: Extended Thinking	AES 2.3 Analyze the characteristics of solar energy generation systems
Level 4: Extended Thinking	AES 2.4 Analyze the characteristics of geothermal energy generation systems
Level 2: Skill/Concept	AES 2.5 Analyze the characteristics of traditional energy generation systems
Level 4: Extended Thinking	AES 2.6 Model an alternative energy system

	Indicator # AES 3 Research alternative energy careers and trends in energy development
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AES 3.1 Identify careers in alternative energy
Level 1: Recall	AES3.2 Identify future energy resources

Fundamentals of Aviation

New Course - No Current Standards

Fundamentals of Aviation
Proposed Standards

	Indicator # AV-F 1 Identify events in the history of flight
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AV-F 1.1 Identify flight in the ancient world
Level 2: Skill/Concept	AV-F 1.2 Identify the development of flight in the early 1900s
Level 2: Skill/Concept	AV-F 1.3 Identify the development of flight during the Golden Age of Flight (1918 to 1939)
Level 2: Skill/Concept	AV-F 1.4 Identify the development of flight innovation during World War II (1939 to 1945)
Level 2: Skill/Concept	AV-F 1.5 Identify the development of flight innovation during the Cold War (1945 to 1991)
Level 2: Skill/Concept	AV-F 1.6 Identify the development of flight innovation (1991 to present)
Level 3: Strategic Thinking	AV-F 1.7 Analyze current trends in flight

	Indicator # AV-F 2 Investigate the principles of flight
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AV-F 2.1 Investigate the basic parts and control surfaces on aircraft and drones
Level 3: Strategic Thinking	AV-F 2.2 Investigate the four forces of flight
Level 4: Extended Thinking	AV-F 2.3 Investigate basic aerodynamics
Level 3: Strategic Thinking	AV-F 2.4 Investigate airplane and drone stability

	Indicator # AV-F 3 Understand the flight environment
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AV-F 3.1 Comprehend air safety
Level 2: Skill/Concept	AV-F 3.2 Comprehend the airport layout, inclusive of safety elements
Level 3: Strategic Thinking	AV-F 3.3 Comprehend airspace control
Level 2: Skill/Concept	AV-F 3.4 Comprehend radio communications

	Indicator # AV-F 4 Understand aircraft and drone systems and performance
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AV-F 4.1 Know the basic aircraft instruments
Level 2: Skill/Concept	AV-F 4.2 Know aircraft or drone systems

New Course - No Current Standards

Fundamentals of Aviation
Proposed Standards

Level 3: Strategic Thinking	AV-F 4.3 Predict aircraft or drone performance
Level 3: Strategic Thinking	AV-F 4.4 Calculate weight and balance

	Indicator # AV-F 5 Understand the relationships between weather and flight
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AV-F 5.1 Explain basic weather theory
Level 2: Skill/Concept	AV-F 5.2 Describe weather patterns and clouds
Level 2: Skill/Concept	AV-F 5.3 Explain weather hazards
Level 3: Strategic Thinking	AV-F 5.4 Interpret weather data
Level 2: Skill/Concept	AV-F 5.5 Identify sources of weather information

	Indicator # AV-F 6 Understand navigation in aviation
Webb Level	*Sub-indicator*
Level 1: Recall	AV-F 6.1. Understand basic navigation
Level 1: Recall	AV-F 6.2 Understand dead-reckoning and pilotage
Level 2: Skill/Concept	AV-F 6.3 Utilize a flight computer or GPS programming and tracking
Level 3: Strategic Thinking	AV-F 6.4 Utilize aeronautical charts

	Indicator # AV-F 7 Understanding drone technology
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AV-F 7.1 Understand key concepts affecting safe flight of a drone
Level 2: Skill/Concept	AV-F 7.2 Understand basic drone theory and flight
Level 2: Skill/Concept	AV-F 7.3 Understand maintenance of drones

	Indicator # AV-F 8 Explore the multiple careers in aviation
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AV-F 8.1 Investigate aviation career fields and occupations.

Aviation Careers I

Aviation
Current Standards

	INDICATOR #AV 1: Identify events in the history of flight
Level: 2 Skill/Concept	SUB-INDICATOR 1.1 Identify flight in the ancient world
Level: 2 Skill/Concept	SUB-INDICATOR 1.2 Identify the development of flight in the early 1900s
Level: 2 Skill/Concept	SUB-INDICATOR 1.3 Identify the development of flight during the Golden Age of Flight (1918 to 1939)
Level: 2 Skill/Concept	SUB-INDICATOR 1.4 Identify the development of flight innovation during World War II (1939 to 1945)
Level: 2 Skill/Concept	SUB-INDICATOR 1.5 Identify the development of flight innovation during the Cold War (1945 to 1991)
Level: 2 Skill/Concept	SUB-INDICATOR 1.6 Identify the development of flight innovation (1991 to present)
Level: 3 Strategic Thinking	SUB-INDICATOR 1.7 Analyze current trends in flight

	INDICATOR #AV 2: Investigate the principles of flight
Level: 3 Strategic Thinking	SUB-INDICATOR 2.1 Investigate the basic parts and control surfaces on aircraft
Level: 3 Strategic Thinking	SUB-INDICATOR 2.2 Investigate the four forces of flight
Level: 4 Extended Thinking	SUB-INDICATOR 2.3 Investigate basic aerodynamics
Level: 3 Strategic Thinking	SUB-INDICATOR 2.4 Investigate airplane stability

	INDICATOR #AV 3: Understand the flight environment
Level: 2 Skill/Concept	SUB-INDICATOR 3.1 Comprehend air safety
Level: 2 Skill/Concept	SUB-INDICATOR 3.2 Comprehend the airport layout, inclusive of safety elements
Level: 3 Strategic Thinking	SUB-INDICATOR 3.3 Comprehend airspace control
Level: 2 Skill/Concept	SUB-INDICATOR 3.4 Comprehend radio communications

	INDICATOR #AV 4: Understand aircraft systems and performance
Level: 2 Skill/Concept	SUB-INDICATOR 4.1 Know the basic aircraft instruments
Level: 2 Skill/Concept	SUB-INDICATOR 4.2 Know aircraft systems
Level: 3 Strategic Thinking	SUB-INDICATOR 4.3 Predict aircraft performance
Level: 3 Strategic Thinking	SUB-INDICATOR 4.4 Calculate weight and balance

Aviation Careers I
Proposed Standards

	Indicator # AVC-1 1 Identify events in the history of flight
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AVC-1 1.1 Identify flight in the ancient world
Level 2: Skill/Concept	AVC-1 1.2 Identify the development of flight in the early 1900s through today and beyond

	Indicator # AVC-1 2 Investigate the principles of flight
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-1 2.1 Investigate the basic parts and control surfaces on aircraft
Level 3: Strategic Thinking	AVC-1 2.2 Investigate the Level 4 forces of flight
Level 4: Extended Thinking	AVC-1 2.3 Investigate basic aerodynamics
Level 3: Strategic Thinking	AVC-1 2.4 Investigate airplane stability

	Indicator # AVC-1 3 Understand the flight environment
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AVC-1 3.1 Comprehend air safety
Level 2: Skill/Concept	AVC-1 3.2 Comprehend the airport layout, inclusive of safety elements
Level 3: Strategic Thinking	AVC-1 3.3 Comprehend airspace control
Level 2: Skill/Concept	AVC-1 3.4 Comprehend radio communications

	Indicator # AVC-1 4 Understand aircraft systems and performance
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AVC-1 4.1 Know the basic aircraft instruments
Level 2: Skill/Concept	AVC-1 4.2 Know aircraft types and systems
Level 3: Strategic Thinking	AVC-1 4.3 Predict aircraft performance
Level 3: Strategic Thinking	AVC-1 4.4 Calculate weight and balance

Aviation
Current Standards

	INDICATOR #AV 5: Understand the relationships between weather and flight
Level: 2 Skill/Concept	SUB-INDICATOR 5.1 Explain basic weather theory
Level: 2 Skill/Concept	SUB-INDICATOR 5.2 Describe weather patterns and clouds
Level: 2 Skill/Concept	SUB-INDICATOR 5.3 Explain weather hazards
Level: 3 Strategic Thinking	SUB-INDICATOR 5.4 Interpret weather data
Level: 2 Skill/Concept	SUB-INDICATOR 5.5 Identify sources of weather information

	INDICATOR #AV 6: Understand navigation in aviation
Level: 1 Recall	SUB-INDICATOR 6.1 Understand basic navigation
Level: 1 Recall	SUB-INDICATOR 6.2 Understand dead-reckoning and pilotage
Level: 2 Skill/Concept	SUB-INDICATOR 6.3 Utilize a flight computer
Level: 3 Strategic Thinking	SUB-INDICATOR 6.4 Utilize aeronautical charts
Level: 2 Skill/Concept	SUB-INDICATOR 6.5 Comprehend radio navigation

	INDICATOR #AV 7: Understand aviation physiology
Level: 1 Recall	SUB-INDICATOR 7.1 Know the effect on the body in the flight environment

	INDICATOR #AV 8: Understand aerospace science and technology
Level: 2 Skill/Concept	SUB-INDICATOR 8.1 Understand key concepts affecting exploration of space
Level: 2 Skill/Concept	SUB-INDICATOR 8.2 Understand basic rocket theory and space flight
Webb Level: 1 Recall	SUB-INDICATOR 8.3 (): Analyze existing space platforms

	INDICATOR #AV 9: Explore the multiple careers in aviation
Level: 2 Skill/Concept	SUB-INDICATOR 9.1 Investigate aviation career fields and occupations

Aviation Careers I
Proposed Standards

	Indicator # AVC-1 5 Explore the multiple careers in aviation
Webb Level	*Sub-indicator*
Level 2: Skill/Concept	AVC-1 5.1 Investigate aviation career fields and occupations

Aviation Careers II

New Course - No Current Standards

Aviation Careers II
Proposed Standards

	Indicator # AVC-2 1 Applying the principles of flight
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-2 1.1 Utilize the parts and control surfaces on an aircraft in flight
Level 3: Strategic Thinking	AVC-2 1.2 Utilize the four forces of flight
Level 4: Extended Thinking	AVC-2 1.3 Utilize aerodynamics in flight
Level 3: Strategic Thinking	AVC-2 1.4 Implement airplane stability while in flight

	Indicator # AVC-2 2 Operating in a safe flight environment
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-2 2.1 Practice air safety
Level 3: Strategic Thinking	AVC-2 2.2 Implement proper procedures at the airport
Level 4: Extended Thinking	AVC-2 2.3 Practice working in different airspaces
Level 3: Strategic Thinking	AVC-2 2.4 Implementing proper radio communications

	Indicator # AVC-2 3 Utilizing aircraft systems and performance
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-2 3.1 Implement proper use of aircraft instruments
Level 3: Strategic Thinking	AVC-2 3.2 Implement proper use of aircraft systems
Level 3: Strategic Thinking	AVC-2 3.3 Evaluate and respond to aircraft performance during flight
Level 3: Strategic Thinking	AVC-2 3.4 Calculate weight and balance

	Indicator # AVC-2 4 Utilize the relationships between weather and flight for safety
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-2 4.1 Apply basic weather theory to flights

New Course - No Current Standards

Aviation Careers II
Proposed Standards

Level 2: Skill/Concept	AVC-2 4.2 Describe weather patterns and clouds
Level 3: Strategic Thinking	AVC-2 4.3 Assess weather hazards
Level 3: Strategic Thinking	AVC-2 4.4 Interpret weather data
Level 3: Strategic Thinking	AVC-2 4.5 Utilize sources of weather information

	Indicator # AVC-2 5 Implement navigation in flight
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-2 5.1 Implement proper navigation skills
Level 3: Strategic Thinking	AVC-2 5.2 Utilize dead-reckoning and pilotage
Level 3: Strategic Thinking	AVC-2 5.3 Utilize a flight computer
Level 3: Strategic Thinking	AVC-2 5.4 Utilize aeronautical charts
Level 3: Strategic Thinking	AVC-2 2.4 Implementing proper radio communications

	Indicator # AVC-2 6 Understand aviation physiology
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-2 6.1 Examine and understand the effect on the body in the flight environment.

	Indicator # AVC-2 7 Understand FAA Regulations and Required Flight Paperwork
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-2 7.1 Examine and understand the current FAA regulations for flight
Level 3: Strategic Thinking	AVC-2 7.2 Utilizing flight paperwork

	Indicator # AVC-2 8 Explore the multiple careers in aviation
Webb Level	*Sub-indicator*
Level 3: Strategic Thinking	AVC-2 8.1 Investigate aviation career fields and occupations.