Advanced Manufacturing Technologies Standards

Learning that works for Nevada
CTE™

This document was prepared by:

Office of Career Readiness, Adult Learning, and Education Options
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Nevada State Board of Education

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Vision

All Nevada students are equipped and feel empowered to attain their vision of success

Mission

To improve student achievement and educator effectiveness by ensuring opportunities, facilitating learning, and promoting excellence

Nevada Department
of Education

Nevada Ready!

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Acknowledgements

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Business and Industry Validation

All CTE standards developed through the Nevada Department of Education are validated by business and industry through one or more of the following processes: (1) the standards are developed by a team consisting of business and industry representatives; or (2) a separate review panel is coordinated with industry experts to ensure the standards include the proper content; or (3) nationally recognized standards currently endorsed by business and industry.

The Advanced Manufacturing Technologies standards were validated through active participation of business and industry representatives on the development team.

Introduction

The standards in this document are designed to clearly state what the student should know and be able to do upon completion of an advanced high school Advanced Manufacturing Technologies program. These standards are designed for a two-credit course sequence that prepares the student for a technical assessment directly aligned to the standards.

These exit-level standards are designed for the student to complete all standards through their completion of a program of study. These standards are intended to guide curriculum objectives for a program of study.

The standards are organized as follows:

- **Content Standards** are general statements that identify major areas of knowledge, understanding, and the skills students are expected to learn in key subject and career areas by the end of the program.

- **Performance Standards** follow each content standard. Performance standards identify the more specific components of each content standard and define the expected abilities of students within each content standard.

- **Performance Indicators** are very specific criteria statements for determining whether a student meets the performance standard. Performance indicators may also be used as learning outcomes, which teachers can identify as they plan their program learning objectives.

The crosswalks and alignment sections of the document show where the performance indicators support the Nevada Academic Content Standards. Where correlation with an academic content standard exists, students in the Advanced Manufacturing Technologies program perform learning activities that connect with and support the academic content standards that are listed. The crosswalks and alignments are not intended to teach academic standards.

All students are encouraged to participate in the career and technical student organization (CTSO) that relates to the Advanced Manufacturing Technologies program. CTSOs are co-curricular national organizations that directly reinforce learning in the CTE classroom through curriculum resources, competitive events, and leadership development. CTSOs provide students the ability to apply academic and technical knowledge, develop communication and teamwork skills, and cultivate leadership skills to ensure college and career readiness.

The Employability Skills for Career Readiness identify the "soft skills" needed to be successful in all careers and must be taught as an integrated component of all CTE course sequences. These standards are available in a separate document.

The **Standards Reference Code** is only used to identify or align performance indicators listed in the standards to daily lesson plans, curriculum documents, or national standards. The Standards Reference Code is an abbreviated name for the program, and the content standard, performance standard and performance indicator are referenced in the program standards. This abbreviated code for identifying standards uses each of these items. For example, ADVMFG is the Standards Reference Code for Advanced Manufacturing Technologies. For Content Standard 2, Performance Standard 3 and Performance Indicator 4 the Standards Reference Code would be ADVMFG.2.3.4.

CONTENT STANDARD 1.0: INTEGRATE CAREER AND TECHNICAL STUDENT ORGANIZATIONS (CTSOs)*

Performance Standard 1.1: Explore the History and Organization of CTSOs

1.1.1   Discuss the requirements of CTSO participation/involvement as described in Carl D. Perkins Law

1.1.2   Research nationally recognized CTSOs

1.1.3   Investigate the impact of federal and state government regarding the progression and operation of CTSOs (e.g., Federal Statutes and Regulations, Nevada Administrative Code [NAC], Nevada Revised Statutes [NRS])

Performance Standard 1.2: Develop Leadership Skills

1.2.1   Discuss the purpose of parliamentary procedure

1.2.2   Demonstrate the proper use of parliamentary procedure

1.2.3   Differentiate between an office and a committee

1.2.4   Discuss the importance of participation in local, regional, state, and national conferences, events, and competitions

1.2.5   Participate in local, regional, state, or national conferences, events, or competitions

1.2.6   Describe the importance of a constitution and bylaws to the operation of a CTSO chapter

Performance Standard 1.3: Participate in Community Service

1.3.1   Explore opportunities in community service-related work-based learning (WBL)

1.3.2   Participate in a service learning (program related) and/or community service project or activity

1.3.3   Engage with business and industry partners for community service

Performance Standard 1.4: Develop Professional and Career Skills

1.4.1   Demonstrate college and career readiness (e.g., applications, resumes, interview skills, presentation skills)

1.4.2   Describe the appropriate professional/workplace attire and its importance

1.4.3   Investigate industry-standard credentials/certifications available within this Career Cluster™

1.4.4   Participate in authentic contextualized instructional activities

1.4.5   Demonstrate technical skills in various student organization activities/events

Performance Standard 1.5: Understand the Relevance of Career and Technical Education (CTE)

1.5.1   Make a connection between program standards to career pathway(s)

1.5.2   Explain the importance of participation and completion of a program of study

1.5.3   Promote community awareness of local student organizations associated with CTE programs

*Refer to the program of study Curriculum Framework for appropriate CTSO(s).

CONTENT STANDARD 2.0: IDENTIFY LAB ORGANIZATION AND SAFETY PROCEDURES

Performance Standard 2.1: Demonstrate General Lab Safety Rules and Procedures

2.1.1   Describe general shop safety rules and procedures

2.1.2   Demonstrate knowledge of Occupational Safety and Health Association (OSHA) and its role in workplace safety

2.1.3   Introduce other regulatory agencies that relate to different manufacturing processes

2.1.4   Comply with the required use of personal protective equipment (PPE) during lab/shop activities

2.1.5   Utilize safe procedures for handling of tools and equipment

2.1.6   Operate lab equipment according to safety guidelines

2.1.7   Demonstrate proper lifting procedures and proper use of support equipment

2.1.8   Utilize proper ventilation procedures for working within the lab/shop area

2.1.9   Identify marked safety areas

2.1.10 Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment

2.1.11 Identify the location and use of eye wash stations

2.1.12 Identify the location of the posted evacuation routes

2.1.13 Identify and wear appropriate clothing for lab/shop activities

2.1.14 Secure hair and jewelry for lab/shop activities

2.1.15 Demonstrate knowledge of the safety aspects of high/low voltage circuits

2.1.16 Locate and interpret safety data sheets (SDS)

2.1.17 Prepare and interpret time/job cards, reports (incident, hazard checklists), or records

2.1.18 Demonstrate proper lock-out/tag-out procedures and how to properly identify and log

2.1.19 Perform workstation/shop housekeeping, including proper time management for duties (6S's - Sort, Straighten, Shine, Standardize, Sustain, and Safety)

2.1.20 Follow verbal instructions to complete work assignments

2.1.21 Follow written instructions to complete work assignments

Performance Standard 2.2: Identify and Utilize Hand Tools

2.2.1   Identify hand tools and their appropriate usage

2.2.2   Identify standard and metric designations

2.2.3   Demonstrate the proper techniques when using hand tools

2.2.4   Demonstrate safe handling and use of appropriate hand tools

2.2.5   Demonstrate proper cleaning, storage, and maintenance of hand tools

Performance Standard 2.3: Identify and Utilize Power Tools and Equipment

2.3.1   Identify power tools and their appropriate usage

2.3.2   Identify equipment and their appropriate usage

2.3.3   Demonstrate the proper techniques when using power tools and equipment

2.3.4   Demonstrate safe handling and use of appropriate power tools and equipment

2.3.5   Demonstrate proper cleaning, storage, and maintenance of power tools and equipment

CONTENT STANDARD 3.0: ANALYZE PROFESSIONAL PRACTICES

Performance Standard 3.1: Analyze Professional Ethical Practices Ethics in Advanced Manufacturing

3.1.1   Discuss current professional code of ethics

3.1.2   Explore ethical advanced manufacturing issues

3.1.3   Describe how ethics influence the advanced manufacturing process

CONTENT STANDARD 4.0: APPLY FUNDAMETNAL ADVANCED MANUFACTURING SKILLS

Performance Standard 4.1: Utilize Mathematical Operations and Measuring Techniques
4.1.1   Identify industry standard units of measure
4.1.2   Convert between customary (i.e., SAE and Imperial) and metric units
4.1.3   Determine and apply the equivalence between fractions and decimals
4.1.4   Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, and dial-caliper)
4.1.5   Utilize measurement systems to solve real manufacturing problems
4.1.6   Utilize reference material (e.g., data charts, graphs/tables)

Performance Standard 4.2: Interpret Schematics and Technical Drawings
4.2.1   Identify industrial standard symbols (i.e., fluid, power, electrical, mechanical)
4.2.2   Interpret schematics and technical drawings
4.2.3   Create schematic diagrams using proper symbols
4.2.4   Understand the general redline process for changing schematics/drawings

Performance Standard 4.3: Demonstrate Spatial Reasoning and 3D Modeling Techniques
4.3.1   Define spatial reasoning
4.3.2   Identify spatial reasoning techniques (e.g., mapping, rotating, matching, patterning, counting)
4.3.3   Utilize spatial reasoning techniques to solve design problems
4.3.4   Prepare freehand sketches utilizing appropriate proportions
4.3.5   Utilize 3D modeling software to solve manufacturing design problems

Performance Standard 4.4: Investigate Materials Used in Advanced Manufacturing
4.4.1   Discuss the importance of material selection used in advanced manufacturing processes
4.4.2   Identify the major material families (e.g., woods, glass, metals, plastics, polymers)
4.4.3   Differentiate between the various types of materials, their properties, and applications (e.g., mechanical, physical, chemical)
4.4.4   Discuss the impact of material usage on the environment
4.4.5   Explain how production is affected by the availability, quality, and quantity of resources

Performance Standard 4.5: Investigate the Engineering Design Process
4.5.1   Identify the engineering design process
4.5.2   Identify the activities that occur during each phase of the engineering design process
4.5.3   Utilize office software to perform engineering recordkeeping and communication
4.5.4   Describe the importance of engineering teams
4.5.5   Utilize technical writing/reading techniques to communicate

Performance Standard 4.6: Identify Fundamental Advanced Manufacturing Components and Systems

4.6.1   Identify common systems used in advanced manufacturing

4.6.2   Identify the basic processes, systems, design processes, and materials used in advanced manufacturing

4.6.3   Describe the function of components in advanced manufacturing systems

4.6.4   Examine the functions of an industrial network (e.g., communication transfer)

4.6.5   Analyze the application of advanced manufacturing in various industries

CONTENT STANDARD 5.0: APPLY FUNDAMENTAL POWER SYSTEM PRINCIPLES

Performance Standard 5.1: Identify and Utilize Basic Electrical Systems
5.1.1   Define AC and DC electrical systems and terminology
5.1.2   Describe the principles of generation, transmission, distribution, and storage of electricity
5.1.3   Compute values of current, resistance, and voltage using Ohm's law
5.1.4   Identify series, parallel and series-parallel (combination) circuits
5.1.5   Discuss the safety concerns of working with electricity (e.g., arc flash, electrical burns, electrostatic discharge, grounding needs)
5.1.6   Solve series and parallel circuits using basic laws of electricity including Kirchhoff's laws
5.1.7   Introduce single-phase and three-phase AC power
5.1.8   Construct and test simple electrical circuits from a schematic

Performance Standard 5.2: Identify and Utilize Basic Mechanical Systems
5.2.1   Locate and explain examples of the six simple machines, their attributes, and components (e.g., gears, compressors, gear boxes, pully systems)
5.2.2   Measure forces and distances related to mechanisms
5.2.3   Calculate mechanical advantage
5.2.4   Design, construct, and test various basic mechanical systems

Performance Standard 5.3: Identify Power Systems
5.3.1   Define terms used in power systems (e.g., power, work, horsepower, watts)
5.3.2   Identify the basic power systems
5.3.3   List the basic elements of power systems
5.3.4   Summarize the advantages and disadvantages of various forms of power
5.3.5   Define potential and kinetic energy
5.3.6   Identify forms of potential and kinetic energy
5.3.7   Calculate the efficiency of power systems and conversion devices
5.3.8   Demonstrate the use of an energy conversion device

Performance Standard 5.4: Identify and Utilize Basic Fluid Systems
5.4.1   Define fluid systems (e.g., hydraulic, pneumatic, vacuum)
5.4.2   Identify and define the components of fluid systems
5.4.3   Compare and contrast hydraulic and pneumatic systems
5.4.4   Identify the advantages and disadvantages of using fluid power systems
5.4.5   Explain the difference between gauge pressure and absolute pressure
5.4.6   Discuss the safety concerns of working with liquids and gases under pressure
5.4.7   Identify different control components used in pneumatic systems (e.g., double check valves [DCVs], flow control, solenoids)
5.4.8   Construct and test a simple fluid power system

CONTENT STANDARD 6.0: CHARACTERIZE ADVANCED MANUFACTURING CONTROL DEVICES

Performance Standard 6.1: Investigate Motors in Advanced Manufacturing Systems
6.1.1   Identify the function of an electric motor
6.1.2   Construct and test a simple motor application
6.1.3   Identify the various types of motors and their designated uses (e.g., 1 phase AC, 3 phase AC, DC, servo, linear motor)
6.1.4   Describe various motor applications in advanced manufacturing systems
6.1.5   Define the functions of variable frequency drives

Performance Standard 6.2: Apply Fundamentals of Electronics
6.2.1   Understand and demonstrate basic electrical theory
6.2.2   Utilize tools and test equipment, such as multimeters, appropriately and safely
6.2.3   Measure electrical characteristics of voltage, current, and resistance in basic electronic circuits
6.2.4   Demonstrate appropriate use of various connectors
6.2.5   Identify electronic components and their applications (e.g., resistors, capacitors, inductors, transformers)
6.2.6   Demonstrate appropriate soldering and de-soldering techniques for electronic circuits
6.2.7   Construct, measure, and analyze, simple series, parallel, and series-parallel (combination) circuits

Performance Standard 6.3: Investigate Switches and Relays
6.3.1   Differentiate between switches and relays
6.3.2   Explain the characteristics and operations of switches and relays
6.3.3   Explain the role of electromagnetic relays
6.3.4   Construct and test a simple circuit utilizing switches and relays

Performance Standard 6.4: Investigate Sensors and Actuators
6.4.1   Differentiate between sensors and actuators
6.4.2   Describe the functions of sensors and actuators used in advanced manufacturing systems
6.4.3   Construct and test a circuit utilizing sensors and actuators
6.4.4   Define analog and binary sensors
6.4.5   Differentiate between different binary sensors and what they detect (e.g., inductive, capacitive, photoelectric)
6.4.6   Identify different identification and vision systems used in advanced manufacturing systems
6.4.7   Define the function of different Identification and vision systems (i.e., barcode, radio frequency Identification [RFID], QR codes, machine vision systems, applications of ID systems)

Performance Standard 6.5: Explore Programmable Logic Controllers
6.5.1   Investigate the basic components of a programmable logic controller (PLC)
6.5.2   Identify the major advantages in the use of PLCs in advance manufacturing
6.5.3   Identify the various programming devices used to program a PLC
6.5.4   Explain the various modes of operations of a PLC

CONTENT STANDARD 7.0: IDENTIFY AND APPLY MANUFACTURING PROCESSES

Performance Standard 7.1: Apply Additive Manufacturing Processes

   7.1.1   Identify and describe additive manufacturing processes (e.g., casting, molding, 3D printing)

   7.1.2   Construct a 3D model utilizing a design software

   7.1.3   Print a 3D model utilizing the additive process

   7.1.4   Develop a list of additive operations and identify the sequence needed to make a specific product

Performance Standard 7.2: Demonstrate Subtractive Manufacturing Processes

   7.2.1   Identify and describe subtractive manufacturing processes

   7.2.2   Explain the computer numerical control (CNC) processes and software requirements (e.g., Cartesian coordinates, numeric code, machine code, import/export programs)

   7.2.3   Utilize a model or drawing to develop and adjust a CNC tool path

   7.2.4   Perform safety inspections of subtractive equipment and accessories

   7.2.5   Demonstrate the ability to use manual and computer numerical control subtractive equipment (e.g., oxyfuel cutting, plasma cutting, mills, lathes, drill presses, saws, routers, grinders)

   7.2.6   Determine appropriate tooling, cutting speeds, and feed rates with use of cutting fluids to manage tool life and product quality

   7.2.7   Develop a list of manual material-cutting operations and identify the sequence needed to make a specific product

   7.2.8   Utilize manual subtractive equipment to produce a specific product

   7.2.9   Develop a list of CNC material-cutting operations and identify the sequence needed to make a specific product

  7.2.10   Utilize CNC subtractive equipment to produce a specific product

Performance Standard 7.3: Investigate Joining and Fastening Processes

   7.3.1   Identify and describe joining processes (e.g., forming, forging, welding)

   7.3.2   Identify various fastening methods (e.g., rivets, adhesive, screws, seams, spot welds)

   7.3.3   Categorize fastening methods by appropriate applications

   7.3.4   Demonstrate fastening methods on various materials

Performance Standard 7.4: Research Business Operations and Quality Control

   7.4.1   Discuss the importance of management of change (e.g., process change, procedure changes, machine settings, quality control requirements)

   7.4.2   Identify and describe the importance of shift-to-shift communications (e.g., documented work progress/status report)

   7.4.3   Investigate the importance of quality assurance systems

   7.4.4   Research quality control testing methods (e.g., destructive, nondestructive)

CONTENT STANDARD 8.0: INTRODUCTION TO ROBOTIC SYSTEMS

Performance Standard 8.1: Explore Robotic Systems in Advanced Manufacturing

    8.1.1   Research the history of robotics (i.e., industrial, non-industrial)

    8.1.2   Identify Isaac Asimov's three laws of robotics

    8.1.3   Investigate the societal impact of robotics

    8.1.4   Apply robotic vocabulary (e.g., degrees of freedom, axis, work envelope, tool point, tool tip)

    8.1.5   Identify main components of a robot

    8.1.6   Investigate robotic specifications (e.g., payload, repeatability, environmental requirements, power sources)

    8.1.7   Identify robot control systems

    8.1.8   Describe end effectors utilized by robots

    8.1.9   Identify teaching and programming interfaces for robots

Performance Standard 8.2: Construct a Robotic System for Advanced Manufacturing

    8.2.1   Identify programming languages for robotics applications

    8.2.2   Identify path control techniques used by robots

    8.2.3   Create a robotic control program

Crosswalks and Alignments

Crosswalks and alignments are intended to assist the teacher make connections for students between the technical skills within the program and academic standards. The crosswalks and alignments are not intended to teach the academic standards but to assist students in making meaningful connections between their CTE program of study and academic courses.

Crosswalks (Academic Standards)

The crosswalks of the Advanced Manufacturing Technologies Standards show connections with the Nevada Academic Content Standards. The crosswalk identifies the performance indicators in which the learning objectives in the Advanced Manufacturing Technologies program connect with and support academic learning. The performance indicators are grouped according to their content standard and are crosswalked to the Nevada Academic Content Standards in English Language Arts, Mathematics, and Science.

Alignments (Mathematical Practices)

In addition to connections with the Nevada Academic Content Standards for Mathematics, many performance indicators support the Mathematical Practices. The following table illustrates the alignment of the Advanced Manufacturing Technologies Standards Performance Indicators and the Mathematical Practices. This alignment identifies the performance indicators in which the learning objectives in the Advanced Manufacturing Technologies program connect with and support academic learning.

Alignments (Science and Engineering Practices)

In addition to connections with the Nevada Academic Content Standards for Science, many performance indicators support the Science and Engineering Practices. The following table illustrates the alignment of the Advanced Manufacturing Technologies Standards Performance Indicators and the Science and Engineering Practices. This alignment identifies the performance indicators in which the learning objectives in the Advanced Manufacturing Technologies program connect with and support academic learning.

Crosswalks (Common Career Technical Core)

The crosswalks of the Advanced Manufacturing Technologies Standards show connections with the Common Career Technical Core. The crosswalk identifies the performance indicators in which the learning objectives in the Advanced Manufacturing Technologies program connect with and support the Common Career Technical Core. The Common Career Technical Core defines what students should know and be able to do after completing instruction in a program of study. The Advanced Manufacturing Technologies Standards are crosswalked to the Manufacturing Career Cluster™ and the Manufacturing Production Process Development and Production Career Pathways.

Crosswalk of Advanced Manufacturing Technologies Standards
and the Nevada Academic Content Standards

Content Standard 1.0: Integrate Career and Technical Student Organizations (CTSOs)

Performance Indicators	Nevada Academic Content Standards	
1.1.1	**English Language Arts: Speaking and Listening Standards**	
	SL.11-12.1a	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
	SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
	SL.11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
1.1.2	**English Language Arts: Speaking and Listening Standards**	
	SL.11-12.1a	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
	SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
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	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
1.1.3	**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects**	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Performance Indicators	Nevada Academic Content Standards	
1.2.1	**English Language Arts: Speaking and Listening Standards**	
	SL.11-12.1a	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
	SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
	SL.11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
1.2.4	**English Language Arts: Speaking and Listening Standards**	
	SL.11-12.1a	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
	SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
	SL.11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
1.2.5	**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects**	
	WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
1.4.1	**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects**	
	WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Performance Indicators	Nevada Academic Content Standards
1.4.2	**English Language Arts: Speaking and Listening Standards**
	SL.11-12.1a Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
	SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
	SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects
	WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
1.4.3	**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects**
	WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
1.4.4	**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects**
	WHST.11-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
1.4.5	**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects**
	WHST.11-12.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Performance Indicators	Nevada Academic Content Standards
1.5.2	**English Language Arts: Language Standards** L.11-12.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. **English Language Arts: Speaking and Listening Standards** SL.11-12.1a Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Content Standard 2.0: Identify Lab Organization and Safety Procedures

Performance Indicators	Nevada Academic Content Standards	
2.1.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
2.1.2	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Speaking and Listening Standards	
	SL.11-12.1a	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
2.1.10	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
2.1.16	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
	RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
	RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
	WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
2.1.17	**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects**	
	WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Performance Indicators	Nevada Academic Content Standards
2.1.20	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **English Language Arts: Speaking and Listening Standards** SL.11-12.1d Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
2.1.21	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Content Standard 3.0: Analyze Professional Practices

Performance Indicators	Nevada Academic Content Standards
3.1.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Speaking and Listening Standards** SL.11-12.1a Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
3.1.2	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
3.1.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Content Standard 4.0: Apply Fundamental Advanced Manufacturing Skills

Performance Indicators	Nevada Academic Content Standards
4.1.1	**Math: Number & Quantity – Quantities** NQ.A.2 Define appropriate quantities for the purpose of descriptive modeling.
4.1.5	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **Math: Number & Quantity – Quantities** NQ.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
4.1.6	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **Math: Number & Quantity – Quantities** NQ.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
4.3.2	**Math: Geometry – Congruence** GCO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **Math: Geometry – Geometric Measurement and Dimension** GGMD.B.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
4.3.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
4.3.5	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
4.4.1	**English Language Arts: Speaking and Listening Standards** SL.11-12.1a Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

Performance Indicators	Nevada Academic Content Standards
4.4.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
4.4.4	**English Language Arts: Speaking and Listening Standards** SL.11-12.1a Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
4.4.5	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research. **Science: HS-Engineering Design** 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.
4.5.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Performance Indicators	Nevada Academic Content Standards	
4.5.5	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
4.6.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
4.6.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Performance Indicators	Nevada Academic Content Standards	
4.6.5	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Content Standard 5.0: Apply Fundamental Power System Principles

Performance Indicators	Nevada Academic Content Standards
5.1.2	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 — Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.9 — Draw evidence from informational texts to support analysis, reflection, and research.
5.1.3	**Math: Algebra – Creating Equations** ACED.A.4 — Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. **Math: Algebra – Seeing Structure in Expressions** ASSE.A.1 — Interpret expressions that represent a quantity in terms of its context. ASSE.A.2 — Use the structure of an expression to identify ways to rewrite it.
5.1.5	**English Language Arts: Speaking and Listening Standards** SL.11-12.2 — Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.11-12.4 — Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
5.2.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.7 — Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.9 — Draw evidence from informational texts to support analysis, reflection, and research.
5.2.2	**Math: Algebra – Creating Equations** ACED.A.4 — Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. **Math: Algebra – Seeing Structure in Expressions** ASSE.A.1 — Interpret expressions that represent a quantity in terms of its context. ASSE.A.2 — Use the structure of an expression to identify ways to rewrite it. **Science: HS-Motion and Stability: Forces and Interactions** HS-PS2-3 — Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.
5.2.3	**Math: Algebra – Creating Equations** ACED.A.4 — Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. **Math: Algebra – Seeing Structure in Expressions** ASSE.A.1 — Interpret expressions that represent a quantity in terms of its context. ASSE.A.2 — Use the structure of an expression to identify ways to rewrite it.

Performance Indicators	Nevada Academic Content Standards
5.2.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
5.3.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
5.3.7	**Math: Algebra – Creating Equations** ACED.A.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. **Math: Algebra – Seeing Structure in Expressions** ASSE.A.1 Interpret expressions that represent a quantity in terms of its context. ASSE.A.2 Use the structure of an expression to identify ways to rewrite it. **Science: HS-Energy** HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
5.3.8	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **English Language Arts: Speaking and Listening Standards** SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

Performance Indicators	Nevada Academic Content Standards	
5.4.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
	WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
5.4.5	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
5.4.6	**English Language Arts: Speaking and Listening Standards**	
	SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
	SL.11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

Content Standard 6.0: Characterize Advanced Manufacturing Control Devices

Performance Indicators	Nevada Academic Content Standards
6.1.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
6.2.3	**Math: Number & Quantity – Quantities** NQ.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
6.2.7	**Math: Number & Quantity – Quantities** NQ.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
6.3.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.
6.3.2	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Performance Indicators	Nevada Academic Content Standards	
6.3.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
6.4.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
	WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
6.4.2	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
6.4.3	**Math: Number & Quantity – Quantities**	
	NQ.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Performance Indicators	Nevada Academic Content Standards
6.4.5	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.
6.5.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.
6.5.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Speaking and Listening Standards** SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Content Standard 7.0: Identify and Apply Manufacturing Processes

Performance Indicators	Nevada Academic Content Standards
7.1.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
7.1.2	**Math: Geometry – Congruence** GCO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **Math: Geometry – Geometric Measurement and Dimension** GGMD.B.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
7.1.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
7.2.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
7.2.2	**English Language Arts: Speaking and Listening Standards** SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. **Math: Number & Quantity – Vector and Matrix Quantities** NVM.A.2 (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
7.2.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Performance Indicators	Nevada Academic Content Standards
7.2.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
7.2.6	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
7.2.7	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
7.2.9	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
7.3.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
7.3.3	**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
7.3.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
7.4.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Performance Indicators	Nevada Academic Content Standards
7.4.4	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects** RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **English Language Arts: Writing Standards for Literacy in Science and Technical Subjects** WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Content Standard 8.0: Introduction to Robotic Systems

Performance Indicators	Nevada Academic Content Standards	
8.1.1	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
8.1.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
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8.1.6	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Performance Indicators	Nevada Academic Content Standards	
8.1.8	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
	English Language Arts: Writing Standards for Literacy in Science and Technical Subjects	
	WHST.11-12.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
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	WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
8.2.3	**English Language Arts: Reading Standards for Literacy in Science and Technical Subjects**	
	RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
	RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
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	WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.

Alignment of Advanced Manufacturing Technologies Standards and the Mathematical Practices

Mathematical Practices	Advanced Manufacturing Technologies Performance Indicators
1. Make sense of problems and persevere in solving them.	5.1.3, 5.1.6; 5.2.3; 5.3.7
2. Reason abstractly and quantitatively.	
3. Construct viable arguments and critique the reasoning of others.	
4. Model with mathematics.	4.3.2, 4.3.3, 4.3.5 6.2.7 7.2.2
5. Use appropriate tools strategically.	4.1.4
6. Attend to precision.	4.1.1, 4.1.2, 4.1.5
7. Look for and make use of structure.	4.1.6
8. Look for and express regularity in repeated reasoning.	

Alignment of Advanced Manufacturing Standards Technologies and the Science and Engineering Practices

Science and Engineering Practices	Advanced Manufacturing Technologies Performance Indicators
1. Asking questions (for science) and defining problems (for engineering).	
2. Developing and using models.	4.3.3, 4.3.5
3. Planning and carrying out investigations.	
4. Analyzing and interpreting data.	5.1.8
5. Using mathematics and computational thinking.	5.1.6; 5.2.3; 5.3.7
6. Constructing explanations (for science) and designing solutions (for engineering).	4.4.5 5.1.8; 5.2.4; 5.4.8 6.2.7; 6.4.3
7. Engaging in argument from evidence.	
8. Obtaining, evaluating, and communicating information.	

Crosswalks of Advanced Manufacturing Standards Technologies and the Common Career Technical Core

Manufacturing Career Cluster	Performance Indicators
1. Evaluate the nature and scope of the Manufacturing Career Cluster and the role of manufacturing in society and in the economy.	8.1.1, 8.1.3
2. Analyze and summarize how manufacturing businesses improve performance.	7.4.1-7.4.3
3. Comply with federal, state, and local regulations to ensure worker safety and health and environmental work practices.	2.1.2
4. Describe career opportunities and means to achieve those opportunities in each of the Manufacturing Career Pathways.	1.5.1
5. Describe government policies and industry standards that apply to manufacturing.	4.1.1; 4.2.1
6 Demonstrate workplace knowledge and skills common to manufacturing.	4.6.1

Manufacturing Production Process Development Career Pathway	Performance Indicators
1. Produce quality products that meet manufacturing standards and exceed customer satisfaction.	7.4.3, 7.4.4
2. Research, design and implement alternative manufacturing processes to manage production of new and/or improved products.	7.4.1, 7.4.2
3. Monitor, promote, and maintain a safe and productive workplace using techniques and solutions that ensure safe production of products.	7.4.1-7.4.4
4. Implement continuous improvement processes in order to maintain quality within manufacturing production.	
5. Develop procedures to create products that meet customer needs.	

Production Career Pathway	Performance Indicators
1. Diagnose production process problems and take corrective action to meet production quality standards.	
2. Manage safe and healthy production working conditions and environmental risks.	7.4.2
3. Make continuous improvement recommendations based on results of production process audits and inspections.	7.4.1
4. Coordinate work teams when producing products to enhance production process and performance.	4.5.3
5. Demonstrate the safe use of manufacturing equipment.	2.3.3-2.3.5