

# ***Advanced Manufacturing Technologies Supplemental Program Resources***



This document was prepared by:

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## Introduction

This document provides supplemental information for the Advanced Manufacturing Technologies program of study. It may be updated or revised as the base program of study, or complementary programs, are updated, added, or removed. Please contact the appropriate Education Programs Professional with any questions.

The Program of Study includes the approved courses, complementary courses, alignment(s) to industry, postsecondary options, and additional information.

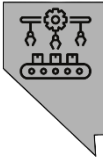
The Equipment List for the Advanced Manufacturing Technologies program of study is included and, if applicable, additional items used only in the complementary course(s) are noted.

The Crosswalks and Alignments connect and support the Advanced Manufacturing Technologies standards for the Manufacturing program of study. Complementary course standards are not listed in the crosswalks and alignments.

## Program of Study Information

The following program of study information sheet as well as the program structure tables for the courses are provided to be able to print separately for handouts. The information provided is based on the best available information at the time of this document and will be updated as appropriate.

### Advanced Manufacturing Technologies



The Advanced Manufacturing Technologies program introduces students to the fundamentals of manufacturing and automation. Areas of emphasis include print reading, spatial reasoning, engineering design process, basic electrical and mechanical systems, additive and subtractive manufacturing processes, fundamentals of electronics, switches and relays, quality control, and an introduction to robotic systems in manufacturing.

### Manufacturing Career Cluster

Manufacturing is focused on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing, and process engineering.

### Postsecondary Options

#### Associate Degrees

- Engineering Technology: Manufacturing-Industrial and Operations, AAS (CSN)
- Technology-Automated Systems, AAS (WNC)
- Technology-Mechatronics Technology, AAS (WNC)
- Manufacturing Technologies, Automation and Robotics, AAS (TMCC)
- Manufacturing Technologies, Production Systems, AAS (TMCC)
- Manufacturing Technologies, Advanced Manufacturing, AAS (TMCC)
- Manufacturing Technologies, Machining, AAS (TMCC)

#### Bachelor's Degree

- Cyber-Physical Manufacturing, BAS (TMCC)
- Organization & Project Management, BAS (WNC)



For additional information on this cluster, please contact:

[cteinfo@doe.nv.gov](mailto:cteinfo@doe.nv.gov)

Website: <https://doe.nv.gov/offices/craleo/cte>

### Required Courses

Advanced Manufacturing Technologies I  
Advanced Manufacturing Technologies II  
Advanced Manufacturing Technologies II Lab

### Complementary Courses

Advanced Manufacturing Technologies Advanced Studies  
Advanced Manufacturing Practices  
CTE Work Experience – Manufacturing  
Industry-Recognized Credential – Advanced Manufacturing Technologies

### Work-Based Learning Opportunities

Job Shadowing / Internship / CTE Work Experience/ School-based Enterprise/ Apprenticeship Ready Programs

### Career and Technical Student Organization

SkillsUSA/TSA



### State Recognized Industry Certifications

Refer to the Governor's Office of Workforce Innovation's [Nevada Industry Recognized Credential List](#)

Aligned to Industry			
Occupation	Median Wage Per year	Annual Openings	% Growth
Industrial Engineering Technologists and Technicians	\$60,220	6,600	3.0%
Industrial Production Managers	\$103,150	15,400	3.0%
Electro-Mechanical and Mechatronics Technologists and Technicians	\$60,360	1,100	-4.0%
Industrial Engineers	\$93,300	22,00	10.0%
Mechanical Engineer	\$95,300	17,900	2.0%
Food Processing Equipment Workers	\$35,430	36,700	4.0%

Source U.S. Bureau of Labor Statistics 2022

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## Program Structure for Advanced Manufacturing Technologies

The core course sequencing is provided in the following table. Complementary Courses are available and provided later in this document. The following courses provides a completed program of study. The Lab is a complementary course available concurrently with the Advanced Manufacturing Technologies II course.

### Core Course Sequence (R) with Lab Course(s) (C)

Required/ Complementary	Course Title	Abbreviated Name	CIP Code	SCED Subject Area	SCED Course Identifier	SCED Course Level	SCED Unit Credit	SCED Course Sequence	SCED Course Number
R	Advanced Manufacturing Technologies I	AMT I	15.0613	13	104	G	1.00	12	13104G1.0012
R	Advanced Manufacturing Technologies II	AMT II	15.0613	13	104	G	1.00	22	13104G1.0022
C	Advanced Manufacturing Technologies II LAB	AMT II L	15.0613	13	104	E	1.00	22	13104E1.0022

The complementary courses are provided in the following table. **The qualifying program of study must be completed prior to enrolling in the complementary course(s).** A program does not have to utilize the complementary courses for students to complete their program of study.

Required/ Complementary	Course Title	Abbreviated Name	CIP Code	SCED Subject Area	SCED Course Identifier	SCED Course Level	SCED Unit Credit	SCED Course Sequence	SCED Course Number
C	Advanced Manufacturing Technologies Advanced Studies	AMT AS	15.0613	13	104	E	1.00	11	13104E1.0011
C	Advanced Manufacturing Practices	ADV MFG PRAC	15.0613	13	104	E	1.00	11	13104E1.0011
C	Industry Recognized Credential - Advanced Manufacturing Technologies	IRC AMT	15.0613	13	999	E	1.00	11	13999E1.0011
C	CTE Work Experience - Manufacturing	WORK EXPER MANUF	99.0013	13	098	G	1.00	11	13098G1.0011

CIP Code – Classification of Instructional Programs (CIP) Codes

SCED – School Courses for the Exchange of Data that populates the State Infinite Campus System and the System for Accountability Information in Nevada (SAIN)

## Course Descriptions

### Advanced Manufacturing Technologies I

*Prerequisite: None*

The Advanced Manufacturing Technologies I course introduces the students to the fundamental advanced manufacturing skills such as measuring techniques, mathematic operations, 3D modeling, and the materials used in manufacturing. The fundamentals of power systems, control devices and various manufacturing processes will be investigated in this course. The use of robotics in Advanced Manufacturing will also be introduced.

### Advanced Manufacturing Technologies II

*Prerequisite: Advanced Manufacturing Technologies I*

This course is a continuation of Advanced Manufacturing Technologies I. This course expands on the fundamental advanced manufacturing skills such as utilizing schematics and technical drawings, investigating the engineering design process, 3D modeling, and the materials used in manufacturing. Continuing the identification and use of power systems, control devices, sensors, actuators, and programmable logic controllers. Various manufacturing processes will be demonstrated in this course. The use of robotics in Advanced Manufacturing will also be continued.

### Advanced Manufacturing Technologies II LAB

*Prerequisite: Concurrent enrollment in Advanced Manufacturing Technologies II*

This course is designed to expand the students' opportunities for applied learning. This course provides an in-depth lab experience that applies the processes, concepts, and principles as described in the classroom instruction. The coursework will encourage students to explore and develop advanced skills in their program area. The appropriate use of technology and industry-standard equipment is an integral part of this course.

### Advanced Manufacturing Technologies Advanced Studies

*Prerequisite: Completion of Advanced Automation Technologies Program of Study*

This course is offered to students who have completed all content standards in the Advanced Manufacturing Technologies program of study and desire to pursue advanced study through investigation and in-depth research. Students are expected to work independently or in a team and consult with their supervising teacher for guidance. The supervising teacher will give directions, monitor, and evaluate the students' topic of study. Coursework may include various work-based learning experiences such as internships and job shadowing, involvement in a school-based enterprise, completion of a capstone project, and/or portfolio development. This course may be repeated for additional instruction and credit.

### Advanced Manufacturing Practices

*Prerequisite: Completion of Advanced Manufacturing Technologies Program of Study*

This course is offered to students who have completed all content standards in the Advanced Manufacturing Technologies program of study. This course provides advanced manufacturing technologies students the ability to further their skills and knowledge levels. Areas of emphasis include product development, quality control, principles of automation, use of programmable logic controllers, and diagnostic/troubleshooting practices. The appropriate use of technology and industry-standard equipment is an integral part of this course. Upon successful completion of this course, students will have acquired entry-level skills for employment and be prepared for postsecondary education.

### Industry-Recognized Credential – Advanced Manufacturing Technologies

*Prerequisite: Completion of Advanced Manufacturing Technologies Program of Study*

This course is offered to students who have completed all content standards in the Advanced Manufacturing Technologies program of study and desire to pursue an Industry-Recognized Credential that aligns with the standards and skills associated with the Advanced Manufacturing Technologies Program of Study. This course is designed to expand the students' opportunities to pursue certification aligned with employment standards in the industry aligned with this program of study. The supervising teacher will provide instruction aligned with the certification requirements, monitor progress toward certification, and provide the students with appropriate testing or certification opportunities associated with the intended Industry-Recognized Credential that is the subject of the course. This course may be repeated for additional instruction and credit.

## **CTE Work Experience – Manufacturing**

*Prerequisite: Completion of Level 2 course in the qualifying program of study*

This course is designed to expand the students' opportunities for applied learning. This course provides an in-depth CTE work experience that applies the processes, concepts, and principles as described in the classroom instruction. This course will encourage students to explore and develop advanced skills through work-based learning directly related to the program of study. The course must follow NAC 389.562, 389.564, 389.566 regulations.

**Equipment List**

This recommended list is based upon a classroom size of 25 students. All costs are estimated and may be adjusted once verified and justified by districts with current quotes. No specific equipment vendor or brand names are endorsed due to various possibilities, but school districts should consult with stakeholders to ensure industry-recognized equipment and software are purchased. The intent of this list is to provide school districts with guidance on the equipment needed to implement the state standards for an Advanced Manufacturing Technologies program.

**CTE Classroom Equipment**

**Total: \$1,560**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
2	Storage Cabinets (36" x 12" x 72") (lockable)	\$400	\$800
1	Eyewash Station	\$300	\$00
2	Fire Extinguisher	\$130	\$260
1	Sink with Soap Dispenser	\$100	\$100
1	First Aid Kit	\$100	\$100

**Program Equipment**

**Total: \$56,400**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Student Computers	\$1,000	\$25,000
1	Teacher Computer (enhanced memory/storage, download capable)	\$1,500	\$1,500
1	Technology Storage/Charging System	\$2,000	\$2,000
1	Gas Cylinder Storage	\$3,500	\$3,500
1	Heavy Duty Shop Toolbox	\$1,100	\$1,100
6	HVAC Simulators – Heating Units	\$1,000	\$6,000
1	Storage Cabinet for Eye Protection Equipment	\$800	\$800
12	HVAC Simulators – Condenser Units	\$750	\$9,000

**Instructional Materials**

**Total: \$3,000**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Student Textbooks Approved CTE Instructional Materials list can be found <a href="#">here</a> .	\$100	\$2,500
1	Teacher Textbook Edition and Resources	\$500	\$500



## Supplemental Program Resources

**2024**

### Instructional Supplies

**Total:**

**\$26,780**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
6	Soldering Kits w/accessories	\$30	\$180
Varies	Student Toolboxes with Supplies (toolboxes, nut driver sets, 11-in-1 screwdriver/nut driver/valve core tools, long nose multi-purpose tools, high leverage diagonal cutting pliers, crimping/cutting tools, long nose pliers-side cutting, adjustable wrenches, mini cutters, mini tubing cutters, deburring tools, hex keys for service valve wrench, universal flare/burnishing tools, etc.)	\$10,000	\$10,000
Varies	Project Supplies (acrylonitrile-butadiene-styrene [ABS] pipe, ABS glue, copper pipe and fittings, solder, concrete mortar, cinder blocks, electrical wire, calculators, drywall, tape, texture, lumber, nails, screws, etc.)	\$10,000	\$10,000
Varies	Hand Tools (hammers, chisels, screwdrivers, wrenches, socket sets, pliers, wire cutters, chalk lines, hand saws, files/rasps, utility knives, shovels, picks, clamps, come-alongs, etc.)	\$3,000	\$3,000
Varies	PPE (safety glasses, work gloves, masks etc.)	\$1,000	\$1,000
Varies	Measuring devices (Framing squares, measuring tapes, calipers, micrometers, levels, etc.)	\$2,000	\$2,000
Varies	Computer Accessories (cases, covers, etc.)	\$600	\$600

### Other

**Total:**

**\$1,275**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
1	Occupational Safety and Health Administration (OSHA) Instructor Training	\$300	\$300
25	Occupational Safety and Health Administration (OSHA) Student Exams	\$39	\$975

#### Category Totals:

Classroom Equipment	\$1,560
Program Equipment	\$56,400
Instructional Materials	\$3,000
Instructional Supplies	\$26,780
Other	\$1,275
<b>Estimated Program Total</b>	<b>\$89,015</b>

## Crosswalks and Alignments for Program of Study Standards

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. The crosswalks are for the required program of study courses, not the complementary 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 / Production Career Pathway.

## Crosswalk of Advanced Manufacturing Technologies Program of Study Standards and the Nevada Academic Content Standards

### English Language Arts: Language Standards

Nevada Academic Content Standards		Performance Indicators
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.	1.5.2

### English Language Arts: Reading Standards for Literacy in Science and Technical Subjects

Nevada Academic Content Standards		Performance Indicators
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.	2.1.16
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.	2.1.1, 2.1.20, 2.1.21, 4.1.5 4.1.6 4.3.3, 4.3.5, 5.2.4 5.3.8, 7.1.4 7.2.4 7.2.7 7.2.9, 7.3.4
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.	2.1.16
RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	2.1.16
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.	4.4.3, 4.6.4, 4.6.5, 5.2.1 5.3.4 5.4.3 5.4.5, 6.3.1 6.4.1, 6.4.5 6.5.1, 7.2.3 7.2.6, 8.1.1, 8.1.3 8.1.6 8.2.1, 8.2.3
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.	4.6.3, 4.6.5, 6.1.4, 6.4.2 8.1.8
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.	2.1.1, 2.1.2, 2.1.10, 2.1.21 3.1.1 3.1.2, 3.1.3, 4.4.3 4.4.5, 4.5.4 4.5.5 4.6.3 4.6.4, 4.6.5, 5.1.2 5.4.3 6.1.4 6.3.1, 6.3.2, 6.3.3

	6.4.1, 6.4.2, 6.4.5 6.5.1 6.5.4 7.1.1, 7.2.1, 7.3.1 7.4.3 7.4.4 8.1.1, 8.1.3 8.1.6, 8.1.8, 8.2.1 8.2.3
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**English Language Arts: Speaking and Listening Standards**

<b>Nevada Academic Content Standards</b>		<b>Performance Indicators</b>
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.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2 1.5.2, 2.1.2, 3.1.1 4.4.1, 4.4.4 6.5.4
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.	2.1.20
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.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2 4.4.1, 4.4.4, 5.1.5 5.4.6
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.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2 1.5.2, 4.4.4, 5.1.5 5.3.8, 5.4.6 7.2.2

**English Language Arts: Writing Standards for Literacy in Science and Technical Subjects**

<b>Nevada Academic Content Standards</b>		<b>Performance Indicators</b>
WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	1.2.5, 1.4.1, 2.1.1, 2.1.2 2.1.10 2.1.16, 2.1.17, 4.5.5 7.3.3
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.	1.4.4
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.	1.4.5, 5.3.4

## Supplemental Program Resources

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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.	4.6.3, 4.6.4
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.	1.1.2, 1.1.3, 1.4.2, 1.4.3 1.5.2 3.1.2, 3.1.3, 4.4.3 4.5.5, 4.6.5 5.3.4, 5.4.3 5.4.3, 6.1.4, 6.3.1 6.3.2 6.4.1, 6.4.2, 6.4.5, 6.5.4 7.1.1, 7.2.1, 7.3.1, 7.4.3 7.4.4 8.1.1, 8.1.3, 8.1.6 8.1.8, 8.2.1 8.2.1, 8.2.3
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.	6.3.1, 6.4.1, 6.4.5, 2.1.16 4.4.5 5.1.2, 5.2.1, 5.4.3 5.4.5, 6.3.3 6.5.1, 8.2.1 8.2.3

## Math: Algebra – Creating Equations

Nevada Academic Content Standards		Performance Indicators
ACED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	5.1.3, 5.2.2, 5.2.3, 5.3.7

## Math: Algebra – Seeing Structure in Expressions

Nevada Academic Content Standards		Performance Indicators
ASSE.A.1	Interpret expressions that represent a quantity in terms of its context.	5.1.3, 5.1.3, 5.2.2, 5.2.3 5.3.7
ASSE.A.2	Use the structure of an expression to identify ways to rewrite it.	5.2.2, 5.2.3, 5.3.7

## Math: Geometry – Congruence

Nevada Academic Content Standards		Performance Indicators
GCO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	4.3.2, 7.1.2

## Math: Geometry – Geometric Measurement and Dimension

Nevada Academic Content Standards		Performance Indicators
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.	4.3.2, 7.1.2

## Math: Number & Quantity – Qualities

Nevada Academic Content Standards		Performance Indicators
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.	4.1.5, 4.1.6
NQ.A.2	Define appropriate quantities for the purpose of descriptive modeling.	4.1.1
NQ.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	6.2.3, 6.2.7, 6.4.3

## Math: Number & Quantity – The Complex Number System

Nevada Academic Content Standards		Performance Indicators
NVM.A.2	(+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	7.2.2

## Science HS: Engineering Design

Nevada Academic Content Standards		Performance Indicators
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.	4.4.5

## Science HS: Motion and Stability – Forces and Interactions

Nevada Academic Content Standards		Performance Indicators
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.	5.2.2

## Science HS: Energy

Nevada Academic Content Standards		Performance Indicators
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.	5.3.7

## 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 Technologies Standards 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 Technologies Standards and the Common Career Technical Core

Manufacturing Career Cluster	Performance Indicators
1. Use vocabulary, symbols and formulas common to architecture and construction.	8.1.1, 8.1.3
2. Use architecture and construction skills to create and manage a project.	7.4.1, 7.4.2, 7.4.3
3. Comply with regulations and applicable codes to establish and manage a legal and safe workplace.	2.1.2
4. Evaluate the nature and scope of the Manufacturing Career Cluster™ and the role of architecture and construction in society and the economy.	1.5.1
5. Describe the roles, responsibilities and relationships found in the architecture and construction trades and professions, including labor/management relationships.	4.1.1, 4.2.1
6. Read, interpret and use technical drawings, documents and specifications to plan a project.	4.6.1

Production Process Development / 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, 2.3.4, 2.3.5

Manufacturing Production Process Development Career Pathway	Performance Indicators
1. Diagnose production process problems and take corrective action to meet production quality standards.	7.4.3, 7.4.4
2. Manage safe and healthy production working conditions and environmental risks.	7.4.1, 7.4.2
3. Make continuous improvement recommendations based on results of production process audits and inspections.	7.4.1, 7.4.2, 7.4.3, 7.4.4
4. Coordinate work teams when producing products to enhance production process and performance.	
5. Demonstrate the safe use of manufacturing equipment.	