

Design Drafting Standards



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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



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Acknowledgements

The development of Nevada career and technical education (CTE) standards and assessments is a collaborative effort sponsored by the Nevada Department of Education (NDE) Office of Career Readiness, Adult Learning, and Education Options. The Nevada Department of Education relies on educators and industry representatives who have the technical expertise and teaching experience to develop standards and performance indicators that truly measure student skill attainment. More importantly, the NDE would like to recognize the time and commitment by the writing team members in developing the career and technical standards for Design Drafting.

Standards Development Members

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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 Design Drafting 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 Design Drafting 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 Design Drafting 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 Design Drafting 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 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, DD is the Standards Reference Code for Design Drafting. For Content Standard 2, Performance Standard 3 and Performance Indicator 4 the Standards Reference Code would be DD.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: APPLY FUNDAMENTAL DRAFTING SKILLS**Performance Standard 2.1: Create Geometric Constructions**

- 2.1.1 Define geometric terms and recognize various geometric shapes by name
- 2.1.2 Use lines, circles, and arcs to construct regular and irregular geometric shapes
- 2.1.3 Construct angles, to include acute, obtuse, and right angles
- 2.1.4 Divide lines and bisect angles and arcs
- 2.1.5 Construct tangent, concentric, and perpendicular geometric relationships
- 2.1.6 Calculate area, perimeter, and volume of geometric shapes to include circle, square, rectangle, and triangle

Performance Standard 2.2: Demonstrate Measuring and Scaling Techniques

- 2.2.1 Explain the purpose for scaling of objects
- 2.2.2 Determine appropriate engineering, architecture, and metric scales
- 2.2.3 Measure using appropriate tools, (e.g., calipers, micrometer, tape measures, scales) and calculate object size, area, and volume
- 2.2.4 Construct drawings utilizing metric and customary (i.e., Standard American English [SAE], Imperial) measurement systems
- 2.2.5 Transcribe drawings accurately using ratios and proportions
- 2.2.6 Determine and apply the equivalence between fractions and decimals
- 2.2.7 Convert between customary (i.e., SAE, Imperial) and metric systems

Performance Standard 2.3: Demonstrate Conventional Drafting Practices

- 2.3.1 Identify and select appropriate drafting media (e.g., paper type and size, digital formats) for various presentations
- 2.3.2 Complete title blocks
- 2.3.3 Utilize appropriate drawing composition and layout
- 2.3.4 Identify and utilize industry standard object properties (i.e., line weight, line type)
- 2.3.5 Produce drawings from sketches
- 2.3.6 Apply symbols to industry standards (i.e., American National Standards Institute [ANSI], American Society of Mechanical Engineers [ASME])
- 2.3.7 Apply appropriate annotations to drawings
- 2.3.8 Produce lettering and text using industry standards

Performance Standard 2.4: Create Multi-View Drawings Using Orthographic Projection

- 2.4.1 Determine the principal view of an object
- 2.4.2 Identify, create, and arrange the six standard views (using properties of similarities of right angles)
- 2.4.3 Project from an existing view to create additional views (i.e., sectional views, primary auxiliary views)
- 2.4.4 Apply appropriate measurement

Performance Standard 2.5: Apply Dimensions and Annotations

- 2.5.1 Differentiate appropriate dimension standards (e.g., American Institute of Architects [AIA], ANSI, International Standards Organization [ISO])
- 2.5.2 Arrange dimensions and annotations using appropriate standards (e.g., AIA, ANSI, ISO)
- 2.5.3 Use various dimensioning styles (i.e., aligned, unidirectional, polar, ordinate, datum)
- 2.5.4 Identify tolerance annotation standards within industry practices

Performance Standard 2.6: Identify Pictorial Drawings

- 2.6.1 Identify oblique drawings (cavalier, cabinet)
- 2.6.2 Identify axonometric drawings (e.g., isometric, dimetric, trimetric)
- 2.6.3 Identify perspective drawings (one point, two point, three point)

Performance Standard 2.7: Demonstrate Sketching Techniques

- 2.7.1 Develop design ideas using freehand sketching
- 2.7.2 Create pictorial and multi-view sketches
- 2.7.3 Create rough sketches
- 2.7.4 Produce drawings from sketches
- 2.7.5 Utilize hand lettering techniques
- 2.7.6 Utilize the alphabet of lines (i.e., styles and weights)
- 2.7.7 Prepare field sketches (e.g., as built, satellite views)

CONTENT STANDARD 3.0: APPLY FUNDAMENTAL COMPUTER-AIDED DESIGN AND DRAFTING (CADD) SKILLS**Performance Standard 3.1: Utilize Basic Computer and IT Skills**

- 3.1.1 Use computer hardware and input/output devices to solve design drafting problems
- 3.1.2 Apply basic commands of an operating system and software
- 3.1.3 Apply file and disk management techniques
- 3.1.4 Access and use a network to transfer files
- 3.1.5 Demonstrate the use of various storage media
- 3.1.6 Identify basic troubleshooting skills related to fundamental hardware and software problems (e.g., power, plugs, updates, help resources)
- 3.1.7 Evaluate resources to acquire information to complete drafting problems (e.g., electronic, internet, books)
- 3.1.8 Demonstrate personal safety (i.e., electrical and mechanical hazards)
- 3.1.9 Interpret and utilize acceptable use policies (i.e., network and lab agreements, restrictions, school/district networking agreements)
- 3.1.10 Import and export data files using various formats

Performance Standard 3.2: Set Up a Drawing Environment

- 3.2.1 Select appropriate existing title blocks
- 3.2.2 Set drafting settings (i.e., grid, snap, and modes)
- 3.2.3 Determine and apply scaling factors
- 3.2.4 Assign line weights, line types, and colors
- 3.2.5 Utilize template files
- 3.2.6 Utilize sheets/layouts for plotting/printing
- 3.2.7 Scale sheets/layout views for plotting/printing

Performance Standard 3.3: Utilize the Cartesian Coordinate System to Create Geometric Shapes and Objects

- 3.3.1 Describe and utilize the Cartesian Coordinate System to create geometric shapes and objects (x, y, z)
- 3.3.2 Calculate input coordinates
- 3.3.3 Manipulate coordinate systems (i.e., absolute, relative, and polar)
- 3.3.4 Utilize appropriate coordinate entry methods

Performance Standard 3.4: Create and Modify Objects Utilizing CADD Commands

- 3.4.1 Utilize multiple entry methods to invoke CADD commands (i.e., hot keys, icons, and menus)
- 3.4.2 Utilize geometric relationships to ensure accuracy (i.e., endpoint, midpoint, and center)
- 3.4.3 Create and modify objects using CADD commands
- 3.4.4 Assign property styles to objects
- 3.4.5 Access and integrate help resources to solve problems

Performance Standard 3.5: Create and Modify Annotations

- 3.5.1 Define, create, and modify industry standards text styles
- 3.5.2 Arrange text based on industry standards
- 3.5.3 Create and modify dimension styles
- 3.5.4 Arrange dimensions based on industry standards (may include dual dimensioning)
- 3.5.5 Use industry standard symbols to annotate drawings

Performance Standard 3.6: Utilize Basic Output Methods

- 3.6.1 Recognize plot/print areas for assigned plotter/printer
- 3.6.2 Utilize plot preview function
- 3.6.3 Plot drawings to proper scale
- 3.6.4 Plot drawings to various output media (i.e., paper, electronic)

CONTENT STANDARD 4.0: DEMONSTRATE ADVANCED CADD SKILLS AND TECHNIQUES**Performance Standard 4.1: Utilize Templates, Symbols, and Libraries**

- 4.1.1 Describe the use of symbols
- 4.1.2 Create, edit, save, and use symbols
- 4.1.3 Assign symbol properties (i.e., attributes, parameters, constraints)
- 4.1.4 Create and utilize symbol libraries
- 4.1.5 Create template files

Performance Standard 4.2: Develop and Display Three-Dimensional Models

- 4.2.1 Interpret and define the x-, y-, and z-axes
- 4.2.2 Develop three-dimensional models (i.e., wireframe, surface, solid, or parametric)
- 4.2.3 Manipulate the x-y plane in three-dimensional space
- 4.2.4 Display three-dimensional objects from various viewpoints
- 4.2.5 Edit the shape and configuration of three-dimensional models
- 4.2.6 Display objects as shaded or hidden lines removed
- 4.2.7 Create working drawings from three-dimensional models

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 Design Drafting Standards show connections with the Nevada Academic Content Standards. The crosswalk identifies the performance indicators in which the learning objectives in the Design Drafting 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 Design Drafting Standards Performance Indicators and the Mathematical Practices. This alignment identifies the performance indicators in which the learning objectives in the Design Drafting 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 Design Drafting Standards Performance Indicators and the Science and Engineering Practices. This alignment identifies the performance indicators in which the learning objectives in the Design Drafting program connect with and support academic learning.

Crosswalks (Common Career Technical Core)

The crosswalks of the Design Drafting Standards show connections with the Common Career Technical Core. The crosswalk identifies the performance indicators in which the learning objectives in the Design Drafting 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 Design Drafting Standards are crosswalked to the Architecture & Construction Career Cluster™ and the Design/Pre-construction Career Pathway.

**Crosswalk of Design Drafting 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	<p>English Language Arts: Speaking and Listening Standards</p> <p>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.</p> <p>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.</p> <p>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.</p>
1.1.2	<p>English Language Arts: Speaking and Listening Standards</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</p> <p>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.</p>
1.1.3	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</p> <p>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.</p>

Performance Indicators	Nevada Academic Content Standards
1.2.1	<p>English Language Arts: Speaking and Listening Standards</p> <p>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.</p> <p>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.</p> <p>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.</p>
1.2.4	<p>English Language Arts: Speaking and Listening Standards</p> <p>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.</p> <p>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.</p> <p>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.</p>
1.2.5	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</p> <p>WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>
1.4.1	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</p> <p>WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>

Performance Indicators	Nevada Academic Content Standards
1.4.2	<p>English Language Arts: Speaking and Listening Standards</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</p> <p>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.</p>
1.4.3	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</p> <p>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.</p>
1.4.4	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</p> <p>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.</p>
1.4.5	<p>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</p> <p>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.</p>

Performance Indicators	Nevada Academic Content Standards
1.5.2	<p>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.</p> <p>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.</p> <p>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.</p>

Content Standard 2.0: Apply Fundamental Drafting Skills

Performance Indicators	Nevada Academic Content Standards
2.1.1	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects 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.</p> <p>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.</p>
2.1.2	<p>Math: Geometry – Circles GC.A.4 (+) Construct a tangent line from a point outside a given circle to the circle.</p> <p>Math: Geometry – Congruence GCO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</p> <p>GCO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.</p>
2.1.3	<p>Math: Geometry – Congruence GCO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</p>
2.1.4	<p>Math: Geometry – Congruence GCO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</p>
2.1.5	<p>Math: Geometry – Circles GC.A.4 (+) Construct a tangent line from a point outside a given circle to the circle.</p> <p>Math: Geometry – Congruence GCO.D.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</p>

Performance Indicators	Nevada Academic Content Standards
2.2.1	<p>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.</p> <p>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.</p> <p>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.</p> <p>Math: Geometry – Similarity, Right Triangles, and Trigonometry GSRT.A.1 Verify experimentally the properties of dilations given by a center and a scale factor:</p>
2.2.6	<p>Math: Functions – Building Functions FBF.A.1b Combine standard function types using arithmetic operations.</p>
2.2.7	<p>Math: Functions – Building Functions FBF.A.1b Combine standard function types using arithmetic operations.</p>
2.3.4	<p>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.</p> <p>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.</p>
2.3.6	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects 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.</p> <p>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.</p>
2.3.7	<p>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.</p>
2.4.3	<p>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.</p>
2.4.4	<p>Math: Number & Quantity – Quantities NQ.A.2 Define appropriate quantities for the purpose of descriptive modeling. NQ.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p>
2.5.2	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects 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.</p>

Performance Indicators	Nevada Academic Content Standards
2.5.3	<p>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.</p>
2.5.4	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects 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.</p> <p>Math: Number & Quantity – Quantities NQ.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p>

Content Standard 3.0: Apply Fundamental Computer-Aided Design and Drafting (CADD) Skills

Performance Indicators	Nevada Academic Content Standards
3.1.7	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.
3.1.9	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.
3.2.3	Math: Number & Quantity – Quantities NQ.A.2 Define appropriate quantities for the purpose of descriptive modeling.
3.2.7	Math: Number & Quantity – Quantities NQ.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
3.3.1	Math: Algebra – Creating Equations ACED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
3.3.2	Math: Geometry – Expressing Geometric Properties with Equations GGPE.B.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
3.4.5	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.
3.5.1	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.
3.5.5	English Language Arts: Reading Standards for Literacy in Science and Technical Subjects 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.

Content Standard 4.0: Demonstrate Advanced CADD Skills and Techniques

Performance Indicators	Nevada Academic Content Standards
4.1.1	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects 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.</p> <p>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.</p>
4.2.1	<p>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects 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.</p> <p>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.</p>
4.2.2	<p>Math: Geometry – Modeling with Geometry GMG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).</p>
4.2.3	<p>Math: Geometry – Congruence GCO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.</p>
4.2.4	<p>Math: Geometry – Congruence GCO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.</p> <p>GCO.B.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</p> <p>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.</p>

**Alignment of Design Drafting Standards
and the Mathematical Practices**

Mathematical Practices	Design Drafting Performance Indicators
1. Make sense of problems and persevere in solving them.	4.2.2
2. Reason abstractly and quantitatively.	2.2.1
3. Construct viable arguments and critique the reasoning of others.	
4. Model with mathematics.	2.1.2, 2.1.3 3.2.3; 3.3.1 4.2.3, 4.2.4
5. Use appropriate tools strategically.	2.1.4, 2.1.5 3.2.7
6. Attend to precision.	2.2.3; 2.4.4; 2.5.4 3.3.2
7. Look for and make use of structure.	
8. Look for and express regularity in repeated reasoning.	2.1.6, 2.2.7

Alignment of Design Drafting Standards and the Science and Engineering Practices

Science and Engineering Practices	Design Drafting Performance Indicators
1. Asking questions (for science) and defining problems (for engineering).	
2. Developing and using models.	4.2.2-4.2.4
3. Planning and carrying out investigations.	
4. Analyzing and interpreting data.	2.5.4
5. Using mathematics and computational thinking.	2.1.6; 2.2.2, 2.2.3, 2.2.6, 2.2.7 3.3.1, 3.3.2
6. Constructing explanations (for science) and designing solutions (for engineering).	4.2.7
7. Engaging in argument from evidence.	
8. Obtaining, evaluating, and communicating information.	

Crosswalks of Design Drafting Standards and the Common Career Technical Core

Architecture and Construction Career Cluster	Performance Indicators
1. Use vocabulary, symbols, and formulas common to architecture and construction.	2.1.1; 2.3.4, 2.3.8
2. Use architecture and construction skills to create and manage a project.	2.2.4; 2.3.6; 2.7.7; 3.6.4
3. Comply with regulations and applicable codes to establish and manage a legal and safe workplace.	
4. Evaluate the nature and scope of the Architecture and Construction Career Cluster and the role of architecture and construction in society and the economy.	
5. Describe the roles, responsibilities and relationships found in the architecture and construction trades and professions, including labor/management relationships.	
6. Read, interpret, and use technical drawings, documents, and specifications to plan a project.	2.5.1
7. Describe career opportunities and means to achieve those opportunities in each of the Architecture and Construction Career Pathways.	1.4.3

Design/Pre-construction Career Pathway	Performance Indicators
1. Justify design solutions through the use of research documentation and analysis of data.	
2. Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.	2.7.1, 2.7.3, 2.7.5, 2.7.7
3. Describe the requirements of the integral systems that impact the design of buildings.	
4. Apply building codes, laws, and rules in the project design.	
5. Identify the diversity of needs, values, and social patterns in project design, including accessibility standards.	
6. Apply the techniques and skills of modern drafting, design, engineering, and construction to projects.	3.4.3; 3.5.5; 4.1.3, 4.1.4 4.2.7
7. Employ appropriate representational media to communicate concepts and project design.	
8. Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components, and assemblies in the project design.	