Auburn School District Framework: Engineering Design and Architecture 1 and 2

<table>
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<tr>
<th>Course: CAD/CADD Drafting and Design Technology</th>
<th>Total Framework Hours: 180 Hours</th>
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<tr>
<td>CIP Code: 151302</td>
<td>Type: Exploratory</td>
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<tr>
<td>Career Cluster: Science, Technology, Engineering and Mathematics</td>
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<td>Date Last Modified: Sunday, June 12, 2016</td>
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Resources and Standard used in Framework Development:
Standards used for this framework are from the OSPI Model Framework for 151302 CAD/CADD Drafting and Design Technology

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<tr>
<th>Unit 1 SKETCHING AND APPLICATIONS</th>
<th>Hours: 16</th>
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**Performance Assessment(s):**

Apply and demonstrate freehand sketching skills.
Create pictorial drawings and models.

**SKETCHING AND APPLICATIONS**
1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
5. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.

**Leadership Alignment:**

Think Creatively
1. A.1 Use a wide range of idea creation techniques (such as brainstorming)

   Technical Sketching and application
   Draw 3 views of a CO2 Car or like project

Reason Effectively
2. A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

   Design CO2 Car or like project within measurement requirements

**Standards and Competencies**

Standard: Fundamental Computer Skills
- Demonstrate proper care of equipment
- Start and shut down work station
- Start and exit a software program as required.
- Format and save drawings to storage devices

Standard: Drafting Technical Skills
- Use basic measurement systems
- Use drafting equipment, measuring scales, drafting instruments and reproduction equipment.
- Prepare title blocks and other drafting formats.
- Use various freehand and other lettering techniques
- Use technical skills to develop a working set of drawings.
- Use appropriate standards in the design process.
- Create freehand technical sketches
### Arts
1.2 Develops arts skills and techniques.
   - Identifies audience and purpose.
   - Analyzes the structure, context, and/or aesthetics of the work.
4.5. Understands how arts knowledge and skills are used in the world of work including careers in the arts.

### Communication - Speaking and Listening

### Health and Fitness

### Language

### Mathematics

**CC: Mathematical Practices (MP)**
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
6. Attend to precision.

### Reading

**CC: Reading Informational Text**
4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word
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# Performance Assessment(s):

- Apply mathematical concepts to problems in engineering and design.
- Apply measurement and scale concepts in engineering and design.
- Interpret engineering documents and control documents.
- Create technical drawings using basic drafting procedures.
- Students explain the difference between one-point, two-point, and three-point perspectives.
- Students demonstrate and explain to another student how to measure objects using a scale or dial caliper.
- Students make journal entries reflecting on their learning and experiences.

## Leadership Alignment:

- Design an object
  - Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts
  - Adapt to varied roles, students take on the role of consulting.
  - Leverage strengths of others
    - Students conference with their peers to develop a design per the client’s request.

## Standards and Competencies

### Standard: Fundamental Computer Skills
- Demonstrate proper care of equipment
- Operate and adjust input devices
- Correct handling and operation of storage media
- Start and exit a software program as required.

### Standard: Drafting Technical Skills
- Use basic measurement systems
- Demonstrate the use of the alphabet of lines including styles and weights.
- Use technical skills to develop a working set of drawings.
- Create freehand technical sketches
- Read technical drawings and documents to plan a project.

### Standard: Math and Measurements for Drafting
- Demonstrate basic math principles
- Perform addition, subtraction, division and multiplication of whole numbers, fractions, decimals, metric and percentages.
- Measure parts using an engineer scale (1/50th scale), fractional scale, metric scale, vernier caliper, micrometer.
- Develop drawings utilizing measurements.
- Solve problems using algebra

### Standard: Basic CAD Skills - Create
- Create new drawing
- Perform drawing set up
- Use and control accuracy enhancement tools for entity positioning methods such as snap and XYZ.
- Plot drawings on media using layout and scale.
Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Number and Quantity (N)
Quantities (N-Q)
2 - Define appropriate quantities for the purpose of descriptive modeling.*

CC: Geometry (G)
1 - Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around
3 - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*

Reading

CC: Reading Informational Text
2 - Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an
4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word
4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the
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### Social Studies

- **Learning and Innovation**
  - Creativity and Innovation
  - Reason Effectively
  - Solve Problems

- **Information, Media and Technology Skills**
  - Information Literacy
  - Access and Evaluate Information
  - Use and Manage Information

- **Life and Career Skills**
  - Flexibility and Adaptability
  - Adapt to Change
  - Be Flexible

- **Initiative and Self-Direction**
  - Mange Goals and Time
  - Work Independently
  - Be Self-Directed Learners

- **Social and Cross-Cultural**
  - Interact Effectively with Others
  - Work Effectively in Diverse Teams

- **Productivity and Accountability**
  - Manage Projects
  - Produce Results

- **Leadership and Responsibility**
  - Guide and Lead Others
  - Be Responsible to Others
### Performance Assessment(s):

- Apply mathematical concepts to problems in engineering and design.
- Apply measurement and scale concepts in engineering and design.
- Interpret engineering documents and control documents.
- Create technical drawings using basic drafting procedures.

### Standards and Competencies

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
4. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
5. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

### Leadership Alignment:

- Develop a plan/project within the parameters set by the instructor, present project to the class.
- Use and Manage Information
  - 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation
  - 4.B.1 Use information accurately and creatively for the issue or problem at hand

### Standards and Competencies

**Standard: Architectural Drafting with AutoCad**
- Careers in Architecture
- Architectural Design Process
- Starting Auto CAD
- Creating a new drawing

**Standard: Multi-view or Orthographic Projections**
- Prepare multi-view or orthographic freehand sketches.
- Select proper drawing scale, views and layout.
- Prepare drawings containing horizontal and vertical surfaces.
- Prepare drawings containing circles and/or arcs.

**Standard: Math and Measurements for Drafting**
- Demonstrate basic math principles
- Solve problems using formulas
- Measure parts using an engineer scale (1/50th scale), fractional scale, metric scale, vernier caliper, micrometer.
- Develop drawings utilizing measurements.
### Aligned to Washington State Standards

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### Language

**CC: College and Career Readiness Anchor Standards for Language**

3 - Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when

6 - Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career

### Mathematics

**CC: Number and Quantity (N)**

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

8 (+) - Add, subtract, and multiply matrices of appropriate dimensions.
## Reading

### Social Studies

### Writing

## 21st Century Skills

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| | Productivity and Accountability | Leadership and Responsibility |
| | Manage Projects | □ Guide and Lead Others |
| | Produce Results | □ Be Responsible to Others |
Manage basic computer concepts, operations and applications
Apply and use CADD systems and procedures
Apply and understand detail projection views/components
Explore engineering and architectural design concepts and problems
Demonstrate engineering design concepts as related to basic manufacturing processes

Standards and Competencies
1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Synthesize information from a variety of sources to plan and present effective professional communications using tools and technology.
4. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
5. Demonstrate understanding of terms and principles used in the architectural and engineering profession.
6. Interpret and apply conventional General Drafting Standards to architectural and engineering drafting situations.
7. Interpret and apply conventional Computer Aided Drafting Standards to architectural and engineering drafting situations.

Leadership Alignment:
Utilize the creative process to develop a plan to produce and evaluate a product.
Apply Technology Effectively
6.A.1 Use technology as a tool to research, organize, evaluate and communicate information

Demonstrate understanding of terms and principles used in the architectural and engineering through class presentation.
7.B.2 Deal positively with praise, setbacks and criticism

Standards and Competencies
Standard: Fundamental Computer Skills
- Demonstrate proper care of equipment
- Operate and adjust input devices
- Operate and adjust output devices
- Correct handling and operation of storage media
- Perform basic operating system functions.
- Format and save drawings to storage devices

Standard: Basic CAD Skills - Manipulate
- Control coordinates and display scale
- Control entity properties
- Use viewing commands
- Use display commands
- Use standard parts and/or symbol libraries
- Plot drawings on media using correct layout and scale
- Use layering techniques
- Use grouping techniques
- Minimize file size

Standard: Fundamentals in Design
- Architecture and design
- Elements of design
## Aligned to Washington State Standards

### Arts

2.1. Applies a creative process to the arts (dance, music, theatre and visual arts):
   - Identifies audience and purpose.

### Communication - Speaking and Listening

### Health and Fitness

### Language

3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when needed.

4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.

### Mathematics

CC: Mathematical Practices (MP)

1. Make sense of problems and persevere in solving them.
2. Use appropriate tools strategically.
3. Attend to precision.
4. Look for and make use of structure.
# 21st Century Skills

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Standards and Competencies

1. Utilize the creative process to develop a plan to produce and evaluate a product.
2. Apply mathematical thinking and problem-solving to perform tasks.
3. Understand and apply science skills and concepts to develop solutions in the context of preparing for work.
4. Understand and apply appropriate safety policies and procedures.

Leadership Alignment:

- Design a TSA project/building to incorporate the challenge list, have evaluate by class teams after presentation.

- 8.C.1 Go beyond basic mastery of skills and/or curriculum to explore and expand one’s own learning and opportunities to gain expertise
- 2.A.1 Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Use and Manage Information
- 4.B.1 Use information accurately and creatively for the issue or problem at hand

Standards and Competencies

- **Standard: Drafting Technical Skills**
  - Use drawing media and related drafting materials.
  - Use basic measurement systems
  - Demonstrate the use of the alphabet of lines including styles and weights.
  - Use appropriate media to communicate technical information
  - Use appropriate standards in the design process.
  - Apply basic organizational, spatial, structural and constructional principles to the design of interior and exterior space.
  - Create freehand technical sketches
  - Read technical drawings and documents to plan a project.

- **Standard: Pictorial Drawings**
  - Apply line of sight
  - Identify the use and application of pictorial drawings.
  - Sketch pictorial drawings.
  - Identify and create axonometric drawings
  - Identify and create oblique drawings
  - Identify and create perspective drawings

- **Standard: Dimensioning**
  - Correctly apply ANS/ASME/DOD/ISO dimensioning standards as applicable.
  - Use correct dimension line terminators
  - Dimension objects containing linear, angular, and circular standard dimensions.
  - Dimension complex shapes
  - Dimension features from a center line
  - Use appropriate dual dimensioning standards
- Use size and location dimension practices
- Use various dimensioning styles

**Standard: Tolerances**
- Identify and use tolerance terminology
- Dimension with a consideration for accumulation of tolerance impacts
- Calculate clearance and interference fit tolerance of mating parts using tables.
- Apply tolerance to dimensions using unilateral, bilateral, and limits.

**Standard: Basic CAD Skills - Manipulate**
- Control coordinates and display scale
- Control entity properties
- Use viewing commands
- Use display commands
- Plot drawings on media using correct layout and scale
- Use layering techniques
- Use grouping techniques

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**Aligned to Washington State Standards**

**Arts**

**Communication - Speaking and Listening**

**Health and Fitness**

**Language**

**Mathematics**

**CC: Geometry (G)**

**CC: Mathematical Practices (MP)**
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Use appropriate tools strategically.
5. Attend to precision.
6. Look for and make use of structure.
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<td>✓ Guide and Lead Others</td>
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<td>✓ Be Responsible to Others</td>
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</table>
# Standards and Competencies

**Arts**

- Communication - Speaking and Listening

**Health and Fitness**

**Language**

## Aligned to Washington State Standards

### Conventions of Standard English (9-10)

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

### Knowledge of Language (9-10)

3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when

### Conventions of Standard English (11-12)

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
### Mathematics

### Reading

CC: Reading Informational Text

**Craft and Structure (9-10)**

4 - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on the meaning and tone of a text.

**Range of Reading and Level of Text Complexity (9-10)**

10 - By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

1 - Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves open questions for further investigation.

### Science

### Social Studies

### Writing

#### 21st Century Skills

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<th><strong>LEARNING AND INNOVATION</strong></th>
<th><strong>INFORMATION, MEDIA AND TECHNOLOGY SKILLS</strong></th>
<th><strong>LIFE AND CAREER SKILLS</strong></th>
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<tr>
<td>Creativity and Innovation</td>
<td>Information Literacy</td>
<td>Flexibility and Adaptability</td>
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<tr>
<td>✓ Think Creatively</td>
<td>✓ Access and Evaluate Information</td>
<td>✓ Adapt to Change</td>
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<tr>
<td>✓ Work Creatively with Others</td>
<td>✓ Use and Manage Information</td>
<td>✓ Be Flexible</td>
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<tr>
<td>✓ Implement Innovations</td>
<td>Media Literacy</td>
<td>Initiative and Self-Direction</td>
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<tr>
<td>Creative Thinking and Problem Solving</td>
<td>✓ Analyze Media</td>
<td>✓ Mange Goals and Time</td>
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<td>✓ Reason Effectively</td>
<td>✓ Create Media Products</td>
<td>✓ Work Independently</td>
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<tr>
<td>✓ Use Systems Thinking</td>
<td>Information, Communications, and Technology</td>
<td>☐ Be Self-Directed Learners</td>
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<td>✓ Make Judgements and Decisions</td>
<td>(ICT Literacy)</td>
<td>Social and Cross-Cultural</td>
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<tr>
<td>✓ Solve Problems</td>
<td>✓ Apply Technology Effectively</td>
<td>✓ Interact Effectively with Others</td>
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<tr>
<td>Communication and Collaboration</td>
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<td>✓ Work Effectively in Diverse Teams</td>
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<tr>
<td>✓ Communicate Clearly</td>
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<td>Productivity and Accountability</td>
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<td>✓ Collaborate with Others</td>
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<td>✓ Manage Projects</td>
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<td>✓ Produce Results</td>
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<td>Leadership and Responsibility</td>
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