

Course Title – Drafting and Design 1	
Implement start year – 2018-2019	
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Unit #1 – Technical Drawing and Design	
Transfer Goal – Students will be able to independently use the engineering design process and drawing techniques to solve problems and communicate ideas effectively and accurately.	
Stage 1 – Desired Results	
<u>Established Goals</u> 2014 New Jersey Student Learning Standards, Strand(s)/CPI #	<u>21st Century Themes</u> (www.21stcenturyskills.org)
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge. A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.	<input checked="" type="checkbox"/> Global Awareness <input type="checkbox"/> Financial, Economic, Business and Entrepreneurial Literacy <input type="checkbox"/> Civic Literacy <input type="checkbox"/> Health Literacy <input checked="" type="checkbox"/> Environmental Literacy

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

C. Design: The design process is a systematic approach to solving problems.

- 8.2.12.C.7 Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.

9.1 21st-Century Life & Career Skills All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

9.1.12.A.1

Apply critical thinking and problem-solving strategies during structured learning experiences.

21st Century Skills

Learning and Innovation Skills:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration

Information, Media and Technology Skills:

- Information Literacy
- Media Literacy
- ICT (Information, Communications and Technology) Literacy

Life and Career Skills:

- Flexibility and Adaptability
- Initiative and Self-Direction
- Social and Cross-Cultural Skills
- Productivity and Accountability
- Leadership and Responsibility

Enduring Understandings:

Students will understand that . . .

EU 1

hand sketching of simple objects is a technique used to convey visual and technical information.

EU 2

technical drawings convey information according to an established set of drawing practices which allow for detailed and universal interpretation of the drawing.

EU 3

an engineering design process involves a set of practices and steps used to develop innovative solutions to problems.

Essential Questions:

EU 1

- What can cause a technical drawing to be misinterpreted or to be inadequate?
- How is sketching similar to and different from artistic drawing?
- Why do designers use hand sketching?

EU 2

- What information should be on a technical drawing?
- Why would designers need different types of technical drawings?
- Why does a manufacturer need an accurate drawing?

EU 3

- How and why do engineers and designers stay organized when solving a problem?

	<ul style="list-style-type: none"> • How does the engineering design process enable someone to solve a problem? • Is there a place for creativity in the engineering design process? • Why a loop and not a line?
<p>Knowledge: <i>Students will know . . .</i></p> <p><i>EU 1</i></p> <ul style="list-style-type: none"> • terms related to sketching, such as: scale, proportion, linetypes, and lineweights. • different sketching techniques such as: holding a pencil properly, focusing on the end point, line quality, line constancy, tonal shading. <p><i>EU 2</i></p> <ul style="list-style-type: none"> • US Customary and Metric systems of measurement. • drafting tools such as t-square, triangles, eraser shields, dusting brush, scale, compass, drafting board. <p><i>EU 3</i></p> <ul style="list-style-type: none"> • the steps of the engineering design process are: identify the problem, collect information, develop possible solutions, select the best solution, implement a solution, evaluate a solution, and if possible redesign and improve the solution. 	<p>Skills: <i>Students will be able to . . .</i></p> <p><i>EU 1</i></p> <ul style="list-style-type: none"> • illustrate proportion, scale, line types, line weight, etc. • utilize pencil techniques to properly sketch various geometric and everyday objects. <p><i>EU 2</i></p> <ul style="list-style-type: none"> • measure with a ruler (inches and centimeters). • properly use mechanical drawing tools and equipment. <p><i>EU 3</i></p> <ul style="list-style-type: none"> • create and utilize a design loop to solve a problem.
<p>Stage 2 – Assessment Evidence</p>	
<p>Other Recommended Evidence:</p> <ul style="list-style-type: none"> • Design Challenges • Teacher observations • Project rubric(s) • Worksheets • Quizzes/tests • Drawing Packets 	

- Engineering notebook

Stage 3 – Learning Plan

Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections:

- Teacher led discussions on the proper sketching/technical drawing techniques (A)
- Demonstrate proper sketching techniques by sketching real life objects with an emphasis on scale and proportion (M,T)
- Teacher led discussions on the various types of drawings (A)
- Sketch the views of an object (M, T)
- Measurement worksheets (M)
- Measure objects around the room (M, T)
- Demonstrate proper measuring techniques (A)
- Practice new drawing skillsets (M)
- Demonstrate proper tool usage by completing various technical drawings (M, T)
- Geometric Construction worksheets (M, T)
- Demonstrate geometric construction by various technical drawings (M, T)
- Teacher led discussions on the Engineering Design Process (A)
- Teacher-created design challenges using the engineering design process (M, T)