SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Computer-Aided Design (CAD) 2	**Length of Course:** 15 cycles
Grade Level(s): 10-12	**Periods Per Cycle:** 6
Units of Credit: .5	**Length of Period:** 43 minutes
Classification: Elective	**Total Instructional Time:** 64.5 hours

Course Description

Computer Aided Design 2 (CAD2) provides the students opportunities to pursue advanced skills in computer-aided design. Activities include the design of furniture and mechanical systems. The students will integrate Computer Aided Design with a variety of 3D modeling applications to create a presentation of a functioning design. This class will require the creation of a portfolio.

Prerequisite: Successful completion of CAD 1

Instructional Strategies, Learning Practices, Activities, and Experiences

Teacher Demonstration	Formal Assessments	Bell Ringers
Online Tutorials/Resources	Guided Practice	Class Discussion
Critical Thinking		Flexible Groups

Assessments

Final Exam	Unit Projects	Skills Mastery Checklists
Student Portfolio	Design/Lesson Rubrics	

Materials/Resources

Web-based Resources	SolidWorks Educational Package Installed on Modern Computers in a Computer Lab	Laser Cutter/Engraver
Laser Engraver		3D Printer

Adopted: 8/18/08

Revised: 5/21/18

Problem Solving	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Logical Design Process B. Prototype C. Model	The students will have the ability to look at a problem creatively and seek other options for completing the task at hand 3.4.12.A1 ~ Compare and contrast the rate of technological development over time. 3.4.12.A2 ~ Describe how management is the process of planning, organizing, and controlling work. 3.4.12.A3 ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM). 3.4.12.B1 ~ Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies. 3.4.12.C2 ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. 3.4.12.C3 ~ Apply the concept that many technological problems require a multi-disciplinary approach. 3.4.12.D2 ~ Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

Basic Files	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Assembly File B. Drawing Files C. Part File	The students will: • Have the ability to use part, assembly, and drawing files. • Have the ability to describe and correctly use each type of file. 3.4.10.C1 ~ Apply the components of the technological design process. 3.4.10.C2 ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.

Advanced Product Design	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. 3D Printer B. CAD/Computer Aided Manufacturing (CAM) C. Computer Numerically Controlled (CNC) D. Laser Cutter E. Model F. Prototype G. Problem Solving H. Safety I. Testing	The students will have the ability to design and make an artifact using the digital workflow process of designing an object using computer applications and making the object on modern CNC equipment. 3.4.12.A1 ~ Compare and contrast the rate of technological development over time. 3.4.12.A2 ~ Describe how management is the process of planning, organizing, and controlling work. 3.4.12.A3 ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM). 3.4.12.C2 ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. 3.4.12.C3 ~ Apply the concept that many technological problems require a multi-disciplinary approach. 3.4.10.E4 ~ Evaluate the purpose and effectiveness of information and communication systems. 3.4.10.E5 ~ Analyze the development of transportation services and methods and their impact on society. 3.4.10.E6 ~ Illustrate how manufacturing systems may be classified into types such as customized production, batch production, and continuous production. 3.4.10.E7 ~ Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

CNC Machining	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. CAD/CAM B. Digital Workflow C. Subtractive Manufacturing D. Additive Manufacturing	The students will have the ability to design, test and build a part using a digital workflow. 3.4.12.A1 ~ Compare and contrast the rate of technological development over time. 3.4.12.A2 ~ Describe how management is the process of planning, organizing, and controlling work. 3.4.12.B1 ~ Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies. 3.4.12.C3 ~ Apply the concept that many technological problems require a multi-disciplinary approach. 3.4.12.D2 ~ Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. 3.4.12.E6 ~ Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world. 3.4.12.E7 ~ Analyze the technologies of prefabrication and new structural materials and processes as they pertain to constructing the modern world.

Historical Research and Connections to Modern Equipment and Methods	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. 3D Printer B. CAD/CAM C. CNC D. Laser Cutter E. Model F. Prototype G. Problem Solving H. Testing *Enrichment and Expanded Opportunities: The students with a greater ability in this area will be expected and encouraged to apply knowledge and skills learned in this lesson by taking digital images according to guidelines. *Remediation and Intervention Strategies: The students with a lower ability in this area will receive greater assistance from the teacher and other students. The students will be offered assignments with a decreased level of difficulty. *Applies to Entire Course	The students will understand technological devices from a given historical time period and recreate devices using modern equipment and techniques. 3.4.12.A1 ~ Compare and contrast the rate of technological development over time. 3.4.12.A2 ~ Describe how management is the process of planning, organizing, and controlling work. 3.4.12.A3 ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM). 3.4.12.C2 ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. 3.4.12.C3 ~ Apply the concept that many technological problems require a multi-disciplinary approach. 3.4.10.E7 ~ Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.