# 03 Computer Aided Design

Content Area: **Technology**
Course(s):
Time Period: **Full Year**
Length: **10 Weeks**
Status: **Published**

## General Overview, Course Description or Course Philosophy

This full year honors course continues to emphasize the application of integrated STEM (Science, Technology, Engineering and Mathematics) principles and the design method to invent solutions to real world problems through robotic applications. Students will identify problems, research, design and fabricate solutions. Problem solving, critical thinking and design skills are taught through a variety of activities. Hands-on themes include structural and robotic systems, as well as system control technology. This course provides all students with valuable skills such as: problem solving, design, creative thinking, systems thinking, team work, documentation, programming and computer applications.

## OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Computer Aided Design (CAD) is used by Designers, Engineers, and Architects to create technical drawings used to communicate design solutions. CAD software is used to develop visual representation of design ideas in 2D and 3D drawings.

What are the advantages of using a CAD system to create, view, and manage design drawings? What are the types of drawings created using CAD software applications?

## CONTENT AREA STANDARDS

| | |
|---|---|
| TECH.8.2.12.D.3 | Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system. |
| TECH.8.2.12.D.CS1 | Apply the design process. |

## RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

| | |
|---|---|
| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.K-12.5 | Use appropriate tools strategically. |
| MA.K-12.6 | Attend to precision. |

| | |
|---|---|
| MA.K-12.7 | Look for and make use of structure. |
| MA.K-12.8 | Look for and express regularity in repeated reasoning. |
| CRP.K-12.CRP2 | Apply appropriate academic and technical skills. |

## STUDENT LEARNING TARGETS

### Declarative Knowledge

Students will understand that:

- Being able to identify and utilize all drawing icons and toolbars is instrumental to creating complicated CAD designs.
- The use of CAD for planning purposes will save both time and materials in the design of technological solutions.
- The design process is not linear.
- Naming and saving work properly is required to save time and properly create and assemble a CAD project.
- Parametric CAD software dimensioning can be used to properly proportion and constrain parts and assemblies.
- Sketches and extrusions can be edited for content and dimensioning using tthe sidebar.
- They need to plan out complex designs in advance in order to set them up properly (Example: which datum plane to draw)

### Procedural Knowledge

Students will be able to:

- Apply the design process to both simple and complex drawings, extrusions and assemblies.
- Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
- Apply appropriate academic and technical skills.
- Make sense of problems.
- Persevere in solving problems.
- Use appropriate tools strategically.
- Look for structure.
- Make use of structure.
- Look for regularity in repeated reasoning.
- Express regularity in repeated reasoning.

## EVIDENCE OF LEARNING

### Formative Assessments

Observation/projects:

- Recognize and explain CAD software icons and toolbars.
- Draw 2 dimensional shapes and dimension the shapes.
- Extrude a variety of 3 dimensional designs.
- Identify and explain datum planes and when to utilize Front, Back or Top.
- Identify and utilize all sketching icons.
- Demonstrate advanced dimensioning/parametric techniques.
- Create complex assemblies utilizing individual parts that they have created.
- Design and assemble complex robitics sub-systems for the purpose of problem solving.

Daily sketches/extrusions.

Quizzes (Hands-on software based and written).

### Summative Assessments

- Final parts and assemblies.
- Written tests.
- Final Engineering Log.

## RESOURCES (Instructional, Supplemental, Intervention Materials)

- http://www.vertanux1.com/
- Teacher created presentations and hand outs.
- Notes, handouts and assignments utilizing Google Classroom and Google Suite software.

## INTERDISCIPLINARY CONNECTIONS

- Modeling with Mathematics and Make sense of problems and persevere in solving them.

## ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.