ENGINEERING DESIGN and PRESENTATION  
(3-D Solid Modeling in SolidWorks)

Recommended for students in Grades 10-12*

CLASSROOM PRODUCTS AND SUPPORT PROVIDED BY:

COURSE DESCRIPTION: Students enrolled in this course will demonstrate knowledge and skills of the process of design as it applies to engineering fields using multiple software applications and tools necessary to produce and present working drawings, solid model renderings, and prototypes. Students will use a variety of computer hardware and software applications to complete assignments and projects. Through implementation of the design process, students will transfer advanced academic skills to component designs. Additionally, students explore career opportunities in engineering, technology, and drafting and what is required to gain and maintain employment in these areas.

CERTIFICATION EXAM: SOLIDWORKS® Education Edition is an all-inclusive resource for teaching 3D mechanical CAD, design validation, and data management. Students will focus their learning on the use of SolidWorks and will complete this course by taking the CSWA (Certified SolidWorks Associate) exam, an academic and industry recognized certification. With SOLIDWORKS Certification, students will demonstrate their expertise with SOLIDWORKS 3D solid modeling, design concepts, and sustainable design and their commitment to professional development.

3-D PRINTING: This course also covers concepts in 3-D printing. Students will have an opportunity to create and print designs with our 3-D printers. From time-to-time, organizations host competitions in 3D modeling and printing. Announcements of competitions will be made as notifications are received. Students are encouraged to seek out and notify the instructor of competition opportunities. Additional time to create models, work on assignments and participate in events is available during tutorial times before and after school. NOTE: Use of the 3D printer is restricted to class assignments ONLY. All items to be printed must be approved by the instructor in advance.

RESOURCES AND INFORMATION: Links to resources and additional information regarding 3-D SolidModeling, 3-D printing, etc., can be found on our partner websites:

www.solidworks.com
www.goengineer.com
www.makerbot.com

*Prerequisite – Concepts of Engineering and Technology
**COURSE OVERVIEW:**

- **Using the Interface**
  - Become familiar with the SolidWorks user interface

- **SolidWorks eDrawings basics**
  - Create eDrawings from existing SolidWorks files
  - View and manipulate eDrawings
  - Measure and markup eDrawings
  - Create animations of eDrawings to display multiple views

- **Basic Functionality**
  - Develop an understanding of 3D modeling and recognition of an object in 3D space.
  - Apply 2D sketch geometry, rectangle, circle, and dimensions
  - Understand 3D features that add and remove geometry, including Extruded Base, Extruded Cut, Fillet and Shell

- **Design Tables**
  - Understand configurations
  - Develop a Design Table with Microsoft Excel to create families of parts
  - Explore how values in an Excel spreadsheet automatically change dimensions and features of an existing part to create multiple parts of different sizes

- **40-Minute Running Start**
  - Reinforce the understanding of 3D features that add and remove geometry
  - Apply 2D sketch geometry, rectangle, circle, and dimensions

- **Revolves and Sweeps**
  - Understand 3D features that add and remove geometry including Revolve and Sweep
  - Apply 2D sketch tools such as ellipse, trim, and centerline

- **Assembly Basics**
  - Develop an understanding of 3D assembly modeling by combining parts
  - Apply 2D sketch tools to offset geometry and project geometry to the sketch plane
  - Create an assembly

- **Loft Features**
  - Understand the 3D Loft feature created from multiple profiles sketched on different planes

- **SolidWorks Toolbox Basics**
  - Develop an understanding of SolidWorks Toolbox, a component library of standard parts
  - Understand how library components are utilized in an assembly
  - Modify SolidWorks Toolbox part definitions and create new parts for the Toolbox library

- **Visualization**
  - Understand how to apply materials, scenes and lights to create a photorealistic image in .jpeg format
  - Create an exploded view and develop an animation in AVI format.

- **Drawing Basics**
  - Understand basic drawing concepts
  - Apply drawing standards to part and assembly drawings
  - Create a drawing template
  - Create drawings for parts and assemblies

- **Simulation Xpress**
  - Understand basic concepts of stress analysis
  - Analyze parts to calculate factors of safety and maximum stress and displacement

*Prerequisite – Concepts of Engineering and Technology*