

# ENGINEERING TECHNOLOGY AND DESIGN (S.T.E.A.M)

The Engineering Technology Department is dedicated to provide students with a genuine hands-on curriculum that reflects STEAM (Science, Technology, Engineering, Art, and Math) education as it pertains to the fast paced technological advances in our society. These courses are designed for independent and group work opportunities that encourage critical problem solving skills, leadership, and design. An emphasis will be placed on reflections, exploration, demonstration, and evaluation as they progress through the Engineering Technology courses. Students enrolled in these courses will be given opportunities such as, but not limited to: competition involvements, scholarships, portfolios, work-based learning, and field trips.

<b>Level</b>	<b>Grade 9</b>	<b>Grade 10</b>	<b>Grade 11</b>	<b>Grade 12</b>
<b>Design Engineering</b>	Engineering Foundations 81000	Engineering Foundations 81000	Engineering Design & CAD A/B 80132 – 80142	Engineering Design & CAD A/B 80132 – 80142
	Engineering Design & CAD A/B 80132 – 80142	Engineering Design & CAD A/B 80132 – 80142	Architectural Design A/B 80172-80182	Architectural Design A/B 80172-80182
	Architectural Design A/B 80172-80182	Architectural Design A/B 80172-80182	Advanced Architectural Design A/B 80192-80200	Advanced Architectural Design A/B 80192-80200
		Advanced Architectural Design A/B 80192-80200	3D Modeling A/B 81082BL-81092BL	3D CAD Modeling A/B 81082BL-81092BL
<b>Engineering Technology</b>	Intro to Energy Tech A/B 80212-80222	Intro to Energy Tech A/B 80212-80222	Intro to Energy Tech A/B 80212-80222	Intro to Energy Tech A/B 80212-80222
		Engineering Systems A/B 81082-81092	Engineering Systems A/B 81082-81092	Engineering Systems A/B 81082-81092
			Robotics/Automation A/B 82242-82252	Robotics/Automation A/B 82242-82252
			Advanced Robotics/Automation A/B 82242-82252	Advanced Robotics/Automation A/B 82242-82252
			Independent Study 82122	

**\*\* Every Engineering Technology & Design course qualifies as a 4<sup>th</sup> year math related course.**

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## 81000 Engineering Foundations

(½ unit of credit)



This innovative course integrates design, imagination and creativity, which are all key elements of critical thinking and problem solving. Students will learn about the engineering design process while working in small groups and individually on various hands-on activities. In this project based class, students will explore various STEM opportunities, develop basic CAD/Architecture skills, and learn about energy, civil engineering, and robotics. This class is project oriented and will give each student an excellent background for future engineering/design classes.

**Prerequisites for Engineering Foundations: None**

**Grades Taught: 9 & 10**

## 81032 Engineering Design & CAD A

## 81042 Engineering Design & CAD B

(½ unit of credit each)

This course introduces the basic idea of mechanical drawing to students through the use of CAD software. Students will apply basic mathematical skills and sketching exercises to solve various design challenges through the principles of drawing, engineering, and hands-on collaborative projects. Topics include orthographic projections, dimensioning, sections, and auxiliaries. **College credit available**, see teacher for details.

**Engineering Design & CAD A Prerequisites: none**

**Engineering Design & CAD B Prerequisites: Engineering & CAD Design A**

**Grades Taught: 9, 10, 11, 12**

## 81082BL Engineering Design & 3D CAD Modeling A

## 81092BL Engineering Design & 3D CAD Modeling B

(½ unit of credit each)

This **blended** course is for students interested in expanding their engineering drawing experiences. Drawings and activities focus on in-class application of 3D CAD programs and design apps to create advanced engineering drawings, assemblies, and 3D Printed products. Topics include threads and fasteners, descriptive geometry, exploded views, and assembly drawing. 3D Modeling will also focus on the Engineering Design Process and problem solving skills to create hands on collaborative projects. **College credit available, see teacher for details!!!**

**Engineering Design & 3D CAD Modeling A Prerequisites: Eng. Design & CAD A or Architectural Design**

**Engineering Design & 3D CAD Modeling B Prerequisites: Eng. Design & 3D CAD Modeling A**

**Grades Taught: 10, 11, 12**

**This course may be repeated for credit**

## 80172 Architectural Design A

## 80182 Architectural Design B

(½ unit of credit each)

This course begins with the study of residential design and provides instruction in utilizing various CAD software and hand drawing techniques as it relates to the architectural industry. Each student will have the opportunity to combine their creativity with the practicality of floor plans, elevations, plot plan specifications, and interior design, to create a single family home complete with a virtual tour. **College credit available, see teacher for details!!!**

**Architectural Design A Prerequisites: none**

**Architectural Design B Prerequisites: Architectural Design A**

**Grades Taught: 9, 10, 11, 12**

## **80192 Advanced Architectural Design A**

## **80200 Advanced Architectural Design B**

*(½ unit of credit each)*

This course will expand on the Architectural Design A/B courses by allowing students to create a full set of architectural blueprints. Students will be expected to apply the design process, architectural theories, and specifications according to industry to their designs. The use of CAD software will be incorporated to aid in the development of drawings and three-dimensional computer models.

**Advanced Architectural Design A Prerequisites:** *Architectural Design A & B*

**Advanced Architectural Design B Prerequisites:** *Advanced Architectural Design A*

**Grades taught:** *10, 11, 12*

## **80212 Introduction to Energy Technology A**

## **80222 Introduction to Energy Technology B**

*(½ unit of credit each)*

This course is intended to take the mystery out of the technology that we have grown to depend on in our everyday lives. Students work in a living lab setting where renewable energy systems provide lighting, heating & cooling, and electricity for experiments. Activities include the building and testing of simple machines, wind and solar systems, electric vehicles, and fuel cells. The class introduces the basic aspects of energy and transportation systems using problem solving skills, laboratory environments, and student driven activities.

**Prerequisites:** *None*

**Grades Taught:** *9, 10, 11, 12*

## **80152 Engineering Systems A**

## **80162 Engineering Systems B**

*(½ unit of credit each)*

Students will learn engineering fundamentals of electrical, hydraulic, mechanical and pneumatic systems. This is a hands-on, lab driven course that includes house wiring, mechanisms, and fluid power. Students will also have the opportunity to design and build a VEX mobile robot for a competition.

**Prerequisites:** *None*

**Grades Taught:** *10, 11, 12*

## **82222 Robotics/Automation A**

## **82232 Robotics/Automation B**

*(½ unit of credit each)*

A course in the fundamentals and application of industrial robots. Emphasis is placed on the use of micro-controllers to control robots. Topics include micro-controller programming, robot fundamentals, DC stepper motors, sensors, programming, gripper design, and safety. A major emphasis is placed on a design project involving the design, build, and test of a mobile robot for a competition.

**Prerequisites:** *Engineering Systems A&B or current enrollment/completion of Physics A&B or Honors Physics A&B*

**Grades Taught:** *11, 12*

## **82242 Advanced Robotics/Automation A**

## **82252 Advanced Robotics/Automation B**

*(½ unit of credit each)*

A course in the fundamentals and application of automated machines. Topics include programmable logic controllers, robot fundamentals, stepper motors, sensors, fabrication techniques, and safety. Emphasis is placed on the design and building of an automated machine that will compete in regional and national competitions.

**Prerequisites:** *Robotics/Automation A & B*

**Grades Taught:** *11, 12*

## 82122 Personal Contract Learning Engineering

*(½ unit of credit)*

This course is for the students who have successfully completed the most advanced course in an area of technology, and wish to continue studying in that area.

**Prerequisites:** *Completion of the most advanced course in area of interest and permission of instructor. Grades Taught: 11, 12*

**NOTE:** For more information regarding **Engineering Work Based Learning** opportunities: See “CTE Work Based Learning Programs” at the end of the Business Technology Department section.

### **Engineering Technology Department Faculty Email Addresses:**

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