



**STEM  
ENGINEERING & ROBOTICS**

GRADES 9 - 10	GRADES 10 - 11	GRADES 11 - 12	GRADE 12
<b>Introduction to Engineering Design (PLTW-IED)</b>	<b>Principles of Engineering (PLTW-POE)</b> <i>Autodesk Inventor Certification</i>	<b>Digital Electronics (PLTW-AE)</b>	<b>Engineering Graphics - DC</b> <i>CAD Certification through Galveston College</i>
<b>1 Credit</b>	<b>1 Credit</b>	<b>1 Credit</b>	<b>2 Credits</b>
	<b>Robotics I</b>	<b>Aerospace Engineering &amp; Architecture (CEA)</b>	<b>Engineering Design &amp; Development</b>
	<b>1 Credit</b>	<b>1 Credit</b>	<b>1 Credit</b>
	<b>Robotics II</b>	<b>Civil Engineering &amp; Architecture (CEA)</b>	
	<b>1 Credit</b>	<b>1 Credit</b>	
	<b>Robotics III (Practicum in STEM)</b>	<b>AP Computer Science Principles &amp; Software Engineering (PLTW-CSE)</b>	
	<b>1 Credit</b>	<b>1 Credit</b>	

**COURSE DESCRIPTIONS**

**INTRODUCTION TO ENGINEERING DESIGN (PLTW-IED)**

**Prerequisites:** Currently enrolled in Algebra 1 or a higher math course

**1 Credit**

**Grades 9 - 10**

This course provides students with opportunities to be creative and to apply decision-making and problem-solving skills to design problems. Students use powerful computer hardware and software (Inventor) to develop 3-D models or solid renderings of objects. Using a Computer Aided Design System, students learn the product design process through creating, analyzing, rendering and producing a model. Students will learn elementary engineering concepts and will explore career opportunities in design engineering as they develop portfolios to display and present their designs.

**PRINCIPLES OF ENGINEERING (PLTW-POE)**

**Prerequisites** IED and currently enrolled in Geometry or higher

**1 Credit**

**Grades 10 - 11**

This course provides an overview of the various fields of science, technology, engineering, and mathematics and their interrelationships. Students will use a variety of computer hardware and software applications to complete assignments and projects. Upon completing this course, students will have an understanding of the various fields and will be able to make informed decisions regarding a coherent sequence of subsequent courses. Further, students will have worked on a design team to develop a product or system. Students will use multiple-software applications to prepare and present course assignments. ***Students will have the opportunity to sit for the Autodesk Inventor Certification.***



## STEM ENGINEERING & ROBOTICS CONTINUED

### ROBOTICS I-III

**Prerequisite** preferred to follow the PLTW Engineering pathway 1 - 2 Credits **Grades 10 - 12**

Students enrolled in this course will demonstrate knowledge and skills necessary for the robotic and automation industry. Through implementation of the design process, students will transfer advanced academic skills to component designs in a project-based environment. Students will build prototypes or use simulation software to test their designs. Additionally, students explore career opportunities, employer expectations, and educational needs in the robotic and automation industry.

### CIVIL ENGINEERING & ARCHITECTURE (CEA)

**Prerequisites** IED and POE **1 Credit** **Grades 11 - 12**  
preferred to have completed Algebra 2 or a higher

Students learn important aspects of building and site design and development. They apply math, science, and standard engineering practices to design both residential and commercial projects and document their work using 3D architecture design software.

### DIGITAL ELECTRONICS (PLTW-DE)

**Prerequisites** IED and POE; **1 Credit** **Grades 11 - 12**  
preferred to have completed Algebra 2 or a higher

Students enrolled in this course will demonstrate knowledge and applications of circuits, electronic measurement, and electronic implementation. Through use of the design process, students will transfer academic skills to component designs in a project-based environment. Students will use a variety of computer hardware and software applications to complete assignments and projects. Additionally, students explore career opportunities, employer expectations, and educational needs in the electronics industry.

### AEROSPACE ENGINEERING (PLTW-AE)

**Prerequisites** IED and POE; **1 Credit** **Grades 11 - 12**  
preferred to have completed Algebra 2 or a higher

The major focus of this course is to expose students to the world of aeronautics, flight and engineering through the fields of aeronautics, aerospace engineering and related areas of study. Lessons engage students in engineering design problems related to aerospace information systems, astronautics, rocketry, propulsion, the physics of space science, space life sciences, the biology of space science, principles of aeronautics, and systems engineering.

### AP COMPUTER SCIENCE PRINCIPLES & SOFTWARE ENGINEERING (PLTW-CSE)

**Prerequisites** IED and POE; **1 Credit** **Grades 11 - 12**  
preferred to have completed Algebra 2 or a higher

Using Python® as a primary tool and incorporating multiple platforms and languages for computation, this course aims to develop computational thinking, generate excitement about career paths that utilize computing, and introduce professional tools that foster creativity and collaboration. This course can be a student's first course in computer science, although we encourage students without prior computing experience to start with Introduction to Computer Science. CSE helps students develop programming expertise and explore the workings of the Internet. Projects and problems include app development visualization of data, cybersecurity, and simulation. This course aligns with the AP Computer Science Principles course.



## STEM ENGINEERING & ROBOTICS CONTINUED

### ENGINEERING DESIGN & DEVELOPMENT

**Prerequisite** IED, POE, and  
choice of AE, DE, CE, or CSE

**2 Credits**

**Grade 12**

Students 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.

### ENGINEERING GRAPHICS-DUAL CREDIT

**Prerequisite** IED, POE, and  
choice of AE, DE, CE, or CSE

**DUAL CREDIT**

**Grades 11 - 12**

Students who take this course learn the translation of ideas from design layouts, specifications, rough sketches, and calculations of engineers & architects into working drawings, maps, plans, and illustrations which are used in making products. Those who enter the workforce through this field of study prepare drawings using Computer Aided Drafting (CAD), Design, and 3D modeling systems. They work in mechanical, electrical electronic, structural, architectural, civil, piping, and technical illustration fields. They make mathematical calculations related to the above fields using algebra, trigonometry, plane and solid geometry, applied mechanics, strength of materials and basic physics. ***Students will have the opportunity to sit for the CAD and SolidWorks certifications.***