

Engineering Course Descriptions

Introduction to Engineering Design PLTW Engineering Program Course

TEA # N1303742

Course # 0911

Grade Placement: 9-12

Credit: 1

Introduction to Engineering Design (IED) is an Activity-Project-Problem-Based course designed to build on foundational engineering concepts with an emphasis on the application of modeling in the engineering design process to develop solutions. Embedded throughout the course are important engineering concepts, such as engineering mindset, systems thinking, and computational thinking. Students will dig deep into the engineering design process, applying math, science, and engineering standards to hands-on projects. Students will work both individually and in teams to design solutions to a variety of problems using 3-D modeling software and use an engineering notebook to document their work. This course prepares students for college, a career, or the military by developing their spatial reasoning, design thinking, problem-solving skills, and transportable skills and by exposing them to a variety of careers.

Principles of Applied Engineering Robotics Program Course

TEA # 13036200

Course # 0928P

Grade Placement: 9-12

Credit: 1

Principles of Applied Engineering provides an overview of the various fields of science, technology, engineering, and mathematics and their interrelationships. Students will develop engineering communication skills, which include computer graphics, modeling, and presentations, by using a variety of computer hardware and software applications to complete assignments and projects. Upon completing this course, students will understand the various fields of engineering and will be able to make informed career decisions. 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.

Note: This course is only offered once every four years. It is part of the Robotics course sequence and has a competition requirement.

Computer Integrated Manufacturing PLTW Engineering Program Course

TEA # N1303748

Course # 0920

Grade Placement: 10-12

Credit: 1

PLTW Computer Integrated Manufacturing is one of the specialization courses in the PLTW Engineering program. The course deepens the skills and knowledge of an engineering student within the context of efficiently creating the products around us. Students build upon their Computer Aided Design (CAD) experience through the use of Computer Aided Manufacturing (CAM) software. CAM transforms a digital design into a program that a Computer Numerical Controlled (CNC) mill uses to transform a block of raw material into a product designed by a student. Students learn and apply concepts related to integrating robotic systems such as Automated Guided Vehicles (AGV) and robotic arms into manufacturing systems. Throughout the course students learn about manufacturing processes and systems. This course culminates with a capstone project where Page 189 of 213 Copyright © Texas Education Agency, 2020. All rights reserved. Revised 08/31/2023 students design, build, program, and present a manufacturing system model capable of creating a product.

Digital Electronics Honors PLTW Engineering Program Course

TEA # 13037600

Course # 0913

Grade Placement: 11-12

Credit: 1

Prerequisite: Algebra I and Geometry

Digital Electronics is the study of electronic circuits that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by

two discreet voltages or logic levels. This distinction allows for greater signal speed and storage capabilities and has revolutionized the world of electronics. Digital electronics is the foundation of modern electronic devices such as cellular phones, digital audio players, laptop computers, digital cameras, and high-definition televisions. The primary focus of Digital Electronics is to expose students to the design process of combinational and sequential logic design, teamwork, communication methods, engineering standards, and technical documentation.

Note: This course can satisfy a math credit requirement for students on the Foundation High School Program. Students are encouraged to meet with their Academic Counselor to ensure they are following the appropriate math course sequence and can apply this course to their math graduation requirements.

Engineering Design and Presentation I Robotics Program Course

TEA # 13036500

Course # 0935P

Grade Placement: 9-12

Credit: 1

Prerequisite: Algebra I

Engineering Design and Presentation I is a continuation of knowledge and skills learned in Principles of Applied Engineering. Students enrolled in this course will demonstrate knowledge and skills of the design process 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.

Note: This course is only offered once every four years. It is part of the Robotics course sequence and has a competition requirement.

Engineering Science Honors PLTW Engineering Program Course

TEA # 13037500

Course # 0912

Grade Placement: 11-12

Credit: 1

Prerequisite: Algebra I; Biology; and either Chemistry, IPC, or Physics

Recommended Prerequisite: Geometry

Engineering Science is an engineering course designed to expose students to some of the major concepts and technologies that they will encounter in a postsecondary program of study in any engineering domain. Students will have an opportunity to investigate engineering and high-tech careers. In Engineering Science, students will employ science, technology, engineering, and mathematical concepts in the solution of real-world challenge situations. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students will also learn how to document their work and communicate their solutions to their peers and members of the professional community.

Note: This course can satisfy a science credit requirement for students on the Foundation High School Program. Students are encouraged to meet with their Academic Counselor to ensure they are following the appropriate science course sequence and can apply this course to their science graduation requirements.

Manufacturing Engineering Technology I Robotics Program Course

TEA # 13032900

Course # 0929P

Grade Placement: 9-12

Credit: 1

Recommended Prerequisite: Algebra I

In Manufacturing Engineering Technology I, students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems and how those knowledge and skills are applied to manufacturing. Students will prepare for success in the global economy. The study of manufacturing engineering will allow students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings in a manufacturing setting.

Note: This course is only offered once every four years. It is part of the Robotics course sequence and has a competition requirement.

Robotics I Robotics Program Course

TEA # 13037000

Course # 0930P

Grade Placement: 9-12

Credit: 1

In Robotics I, students will transfer academic skills to component designs in a project-based environment through implementation of the design process. Students will build prototypes or use simulation software to test their designs. Additionally, students will explore career opportunities, employer expectations, and educational needs in the robotic and automation industry.

Note: This course is only offered once every four years. It is part of the Robotics course sequence and has a competition requirement.

Scientific Research and Design TEA # 13037200 (First Time Taken) Course # 0446 CP
TEA # 13037210 (Second Time Taken)
TEA # 13037220 (Third Time Taken)

Grade Placement: 11–12

Credit: 1

Prerequisite: Biology; and either Chemistry, IPC, or Physics

Scientific Research and Design has the components of any rigorous scientific or engineering program of study from the problem identification, investigation design, data collection, data analysis, formulation, and presentation of the conclusions. These components are integrated with the career and technical education emphasis of helping students gain entry-level employment in high-skill, high-wage jobs and/or continue their education. Students must meet the 40% laboratory and fieldwork requirement. Students may take this course with different course content for a maximum of three credits.

Note: This course can satisfy a science credit requirement for students on the Foundation High School Program. Students are encouraged to meet with their Academic Counselor to ensure they are following the appropriate science course sequence and can apply this course to their science graduation requirements.

Scientific Research and Design TEA # 13037200 (First Time Taken) Course # 0441 Honors
TEA # 13037210 (Second Time Taken)
TEA # 13037220 (Third Time Taken)

Grade Placement: 11–12

Credit: 1

Prerequisite: Biology; and either Chemistry, IPC, or Physics

Scientific Research and Design has the components of any rigorous scientific or engineering program of study from the problem identification, investigation design, data collection, data analysis, formulation, and presentation of the conclusions. These components are integrated with the career and technical education emphasis of helping students gain entry-level employment in high-skill, high-wage jobs and/or continue their education. Students must meet the 40% laboratory and fieldwork requirement. Students are expected to work collaboratively as well as individually to reach specific course requirements. Students may take this course with different course content for a maximum of three credits.

Note: This course can satisfy a science credit requirement for students on the Foundation High School Program. Students are encouraged to meet with their Academic Counselor to ensure they are following the appropriate science course sequence and can apply this course to their science graduation requirements.

STC Dual Enrollment Engineering Academy (DEEA)

Course # 1006 & 2006

Grade Placement: 11-12

Credit: 1 per course

Prerequisite: Meet South Texas College acceptance criteria; 2-Year Commitment

This South Texas College (STC) Dual Enrollment Engineering Academy (DEEA) is a two year-round dual enrollment program developed for high school juniors and seniors who are seriously interested in pursuing a career in engineering. The purpose of this academy is to increase the number of rural area students committed to careers and service in

Manufacturing, Electrical, Industrial Engineering, and others. This academy is designed to encourage area high school students into the engineering profession by providing college course-work and engineering related opportunities that will motivate, educate, and prepare students for higher education in the field of math and science while completing an Associate of Science (AS) degree in Engineering by the end of their high school senior year. With the support of the local engineers, the Dual Enrollment Engineering Academy will promote and participate in efforts that will reinforce the schools' and communities' commitment to prepare students for careers in Engineering. Contact your school Counselor for more information on how to enroll into this program.

Note: This program has an STC application process in place.