Engineering Foundations *(Project Lead the Way)*

The Engineering Foundations program of study focuses on occupational and educational opportunities associated with a wide range of skills applied in the Engineering industry. Students will design, test, and evaluate projects related to engines, machines, and structures. This program of study includes applying scientific, mathematical, and empirical evidence to solve problems through innovation, design, construction, operation, and maintenance of different engineering systems.

Courses for High School Credit

Level 1	• Engineering Design Process
Level 2	• Engineering Science
Level 3	• Aerospace Design (Level 2 with the State) • Digital Electronics • CTE Scientific Research & Design
Level 4	• Engineering Design and Presentation • CTE Project-Based Research and Design

Aligned Industry-Based Certifications

- Autodesk Associate (Certified User) Fusion 360
- Engineering Technology Foundations

Work-Based Learning and Expanded Learning Opportunities

Work-Based Learning Activities	• Intern at an engineering, robotics, or aerospace company. • Visit an engineering firm and shadow multiple types of engineers.
Expanded Learning Opportunities	• Participate in SkillsUSA or TSA • Join a local engineering association and attend meetings.

Successful completion of the Engineering Foundations program of study will fulfill requirements of the STEM endorsement if the math and science requirements are met or the Business and Industry endorsement.

Example Postsecondary Opportunities

Apprenticeships

- Industrial Engineering Technician Apprenticeship

Associate Degrees

- Manufacturing Engineering Technology/ Technician
- Robotics Technology/Technician

Bachelor's Degrees

- Electrical and Electronics Engineering
- Engineering, General

Master's, Doctoral, and Professional Degrees

- Electrical and Electronics Engineering
- Engineering, General

Additional Stackable IBCs/Licensures

- Professional Engineer (PE License)
- Engineer in Training Certification (EIT)

Example Aligned Occupations

(Based on statewide employment data)

Civil Engineering Technologists and Technicians
Median Wage: $61,138
Annual Openings: 765
10-Year Growth: 11%

Aerospace Engineers
Median Wage: $115,694
Annual Openings: 483
10-Year Growth: 18%

Mechanical Engineers
Median Wage: $99,937
Annual Openings: 1,755
10-Year Growth: 19%

For more information visit:
https://tea.texas.gov/academics/college-career-and-military-prep/career-and-technical-education/programs-of-study-additional-resources

Engineering Foundations Course Descriptions:

Engineering Design Process - STE0130H (1 Credit)

Level: 1 | Course Fee: None

Prerequisites: Algebra I | GPA Weight: Advanced

Engineering Design Process is an engineering course applicable to all engineering fields. Students use an iterative engineering design process to solve problems, make decisions, and manage a project. Professional practices are addressed, including development of a problem statement, maintenance of documentation, use of an engineering notebook, research, project management, internal and external communication, and creation of technical drawings and prototypes. The student delivers a professional presentation detailing the experience of working through each step of the engineering design process

Engineering Science TAP- STE0220H (1 credit)

Level: 2 | Course Fee: None

Prerequisites: Algebra I, Biology, & Engineering Design Process | GPA Weight: Advanced

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 satisfies a science credit requirement for students on the Foundation High School Program

Aerospace Design- STE3110H (1 credit)

Level: 3 | Course Fee: None

Prerequisites: Algebra I | GPA Weight: Advanced

Students enrolled in Aerospace Design I demonstrate knowledge and skills associated with the design evolution and emerging trends of aircraft and aerospace systems. Fundamental concepts such as forces of flight, structures, aerodynamics, propulsion, stability and control, and orbital mechanics are introduced as related to design decisions for atmospheric and space flight. These concepts are related to mission requirements and solution approaches.

Digital Electronics TAP- STE3000H (1 credit)

Level: 3 | Course Fee: $20

Prerequisites: Algebra I, Geometry | GPA Weight: Advanced

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 satisfies a math credit requirement for students on the Foundation High School Program.

CTE Scientific Research & Design- PBR3000H (1 credit)

Level: 3 | Course Fee: None

Prerequisite: Must have 2 science credits and be a member of the FIRST Robotics Team. Teacher Approval Required. | GPA Weight: Advanced

CTE Scientific Research and Design is a broad-based course designed to allow districts and schools considerable flexibility to develop local curriculum to supplement any program of study or coherent sequence. The course 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 satisfies a science credit requirement for students on the Foundation High School Program.

Engineering Design & Presentation STE3300H (1 credit)

Level: 4 | Course Fee: None

Prerequisites: 2 Courses in the Program of Study | GPA Weight: Advanced

Students enrolled in Engineering Design and Presentation demonstrate knowledge and skills of the design process as it applies to engineering fields and project management using multiple software applications and tools necessary to produce and present working drawings, solid model renderings, and prototypes. Through implementation of the design process, students transfer advanced academic skills to component designs. Additionally, students explore career opportunities in engineering, technology, and drafting and learn what is required to gain and maintain employment in these areas.

CTE Project-Based Research and Design- PBR4000H (1 credit)

Level: 4 | Course Fee: None

Prerequisite: Must be a member of the FIRST Robotics Team. Teacher Approval Required. | GPA Weight: Advanced

CTE Project-Based Research and Design is a course designed for students to develop and enhance essential skills while investigating real-world problems, issues, or interests. Students work independently or collaboratively with others within or across career clusters or programs of study. Students partner with mentor(s) or advisor(s) to develop a project. Students conduct research, compile findings, implement project activities appropriate to student contribution, and present their work to a relevant audience that may include industry experts. Students may repeat this course with different course content for up to three credits. Note: Second Time Taken and Third Time Taken are not in a program of study and do not count for CCMR and earn 1.1 weighted funding.

For more information visit:
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