Engineering Career Cluster

The Engineering career cluster focuses on planning, designing, testing, building, and maintaining of machines, structures, materials, systems, and processes using empirical evidence and science, technology, and math principles. This career cluster includes occupations ranging from mechanical engineer and drafter to electrical engineer and to mapping technician.

Statewide Program of Study: Engineering Foundations

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 incudes applying scientific, mathematical, and empirical evidence to solve problems through innovation, design, construction, operation, and maintenance of different engineering systems.

Secondary Courses for High School Credit

Level 1	• Principles of Applied Engineering • Introduction to Engineering Design (PLTW) • Engineering Essentials (PLTW)
Level 2	
Level 3	• Engineering Mathematics • Engineering Science • Digital Electronics • Computer Integrated Manufacturing (PLTW) • Engineering Design and Development (PLTW)
Level 4	• Extended Career Prep for Programs of Study

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)

Aligned Advanced Academic Courses

AP or IB	AP Calculus AB AP Computer Science A	AP Physics 1 AP Physics 2 AP Statistics	

Dual Credit	Dual credit offerings will vary by local education agency.

Students should be advised to consider these course opportunities to enrich their preparation. AP or IB courses not listed under the Secondary Courses for High School Credit section of this framework document do not count towards concentrator/completer status for this program of study.

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.

Aligned Industry-Based Certifications

- Engineering Technology Foundations

Example Aligned Occupations

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%

Data Source: TexasWages, Texas Workforce Commission. Retrieved 3/8/2024.

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

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

COURSE INFORMATION

COURSE NAME	COURSE NUMBER AND CREDITS	PREREQUISITES (PREQ) COREQUISITES (CREQ)	GRADE
Introduction to Engineering Design	8716 (1 credit)	Algebra I or 8th grade math final average 80 or higher	9-10
Engineering Science	8715 (1 credit)	Algebra I and Biology	10
Digital Electronics	8717 (1 credit)	Algebra I & Geometry; IED and Engineering Science	11
Computer Integrated Manufacturing	8718 (1 credit)	IED & Engineering Science	11
Engineering Design & Development	8719 (1 credit)	CIM or DE	12
Extended Career Prep for Programs of Study Reg or DC	8607 (3 credits) or 8607DC & D2 (3 credits)	Eng Sci, DE, CIM, or EDD DC: pre-req & SWTX reqs.	12

COURSE DESCRIPTIONS

Introduction to Engineering Design:

This course provides students with opportunities to be creative and to apply decision making and problem solving skills. Students will use powerful computer hardware and software (Inventor) to develop 3D models or solid renderings of objects.

Engineering Science: Satisfies a Science graduation requirement

This course is designed to help you understand field and career possibilities of engineering and engineering technology. You will be introduced to a wide variety of real problems that today's engineers are faced with.

Digital Electronics: Satisfies a Math graduation requirement

This is a course in applied digital logic. Students will be introduced to the digital circuits found in video games, watches, calculators, digital cameras, and thousands of other devices. This course is similar to a first semester college course, and it's important for anyone in engineering or engineering technology.

Computer Integrated Manufacturing:

This is a course that applies principles of prototyping, robotics, and automation. It builds on the solid modeling skills developed in IED. You will also be introduced to the fundamentals of robotics and how this equipment is used in an automated manufacturing environment.

Engineering Design & Development:

In this course, students will work in a team with one to three others to design and construct a solution to an engineering problem. Each team will be responsible in making final presentations to an outside review panel. The completed project will be very useful in college applications.

Engineering Math (8740): Satisfies a Math graduation requirement

Pre-requisite: Algebra II

Engineering Mathematics is a course where students solve and model robotic design problems. Students use a variety of mathematical methods and models to represent and analyze problems involving data acquisition, spatial applications, electrical measurement, manufacturing processes, materials engineering, mechanical drives, pneumatics, process control systems, quality control, and robotics with computer programming.

Extended Career Prep for Programs of Study Reg or DC: College Credit: BMGT 1382

Students are given the opportunity to work in their program of study while earning high school credit and develop employment experiences, which must be related to the student's current program of study alongside advanced classroom instruction. The goal is to prepare students with a variety of skills to transition from job-to career-mindedness. This course provides a continuing focus on collaborative feedback between the employer, teacher, and student. Students are taught about finding their future careers, keeping, as well as leaving, a job, and how to expound on their employable talents.

Courses in yellow are Level 3 or 4 courses.