Engineering Career Cluster

Revised – March 2024

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
- Principles of Technology
- Introduction to Computer-Aided Design and Drafting
- Introduction to Engineering Design (PLTW)
- Engineering Essentials (PLTW)

Level 2
- Robotics I
- Manufacturing Engineering Technology I
- Intermediate Computer-Aided Design and Drafting
- Construction Engineering (TBD)
- Engineering Design Process (TBD)

Level 3
- Robotics II
- Engineering Design and Presentation I
- Engineering Mathematics
- Engineering Science
- Digital Electronics
- Aerospace Engineering (PLTW)
- Environmental Sustainability (PLTW)
- Civil Engineering and Architecture (PLTW)
- Computer Integrated Manufacturing (PLTW)
- Engineering Design and Development (PLTW)
- Introduction to Fluids (TBD)
- Introduction to Mechanics of Materials (TBD)
- Introduction to Statics (TBD)
- Programming for Engineers (TBD)

Level 4
- Engineering Design and Problem Solving
- Engineering Design and Presentation II
- Practicum in Science, Technology, Engineering, and Mathematics
- Practicum in Science, Technology, Engineering, and Mathematics + Extended Practicum in Science, Technology, Engineering, and Mathematics
- Practicum in Engineering (TBD)
- Career Preparation for Programs of Study + Extended Career Preparation
- Scientific Research and Design
- Career and Technical Education Project-Based Capstone

Aligned Advanced Academic Courses

AP or IB	AP Calculus AB AP Computer Science A AP Physics 1	AP Physics 2 AP Statistics IB Physics SL	IB Physics HL IB Computer Science SL IB Computer Science HL
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 TSA or SkillsUSA • Join a local engineering association and attend meetings.

Aligned Industry-Based Certifications

- Autodesk Associate (Certified User) AutoCAD
- Autodesk Associate (Certified User) Fusion 360
- Autodesk Associate (Certified User) Inventor for Mechanical Design
- Autodesk Associate (Certified User) Revit Architecture
- Autodesk Associate (Certified User) Revit for Electrical
- Autodesk Associate (Certified User) Revit for Structural Design
- Autodesk Certified Professional Fusion 360
- Autodesk Certified Professional in AutoCAD for Design and Drafting
- Autodesk Certified Professional in Civil 3D for Infrastructure Design
- Autodesk Certified Professional in Inventor for Mechanical Design
- Autodesk Certified Professional in Revit for Architectural Design
- Autodesk Certified Professional in Revit for Electrical Design
- Autodesk Certified Professional in Revit for Structural Design
- C-103 Certified Industry 4.0 Associate – Robot System Operations
- Certified SOLIDWORKS Associate (CSWA) – Academic
- Certified SOLIDWORKS Associate (CSWA) – Electrical
- Certified SOLIDWORKS Associate (CSWA) – Mechanical Design
- Certified SOLIDWORKS Associate (CSWA) – Simulation
- Certified SOLIDWORKS Associate (CSWA) – Sustainability
- Certified SOLIDWORKS Professional (CSWP) – Academic
- Certified SOLIDWORKS Professional (CSWP) – Mechanical Design
- Certified SOLIDWORKS Professional (CSWP) – Model Based Definition
- Certified SOLIDWORKS Professional (CSWP) – Simulation
- Certified SOLIDWORKS Professional (CSWPA) – Drawing Tools
- Engineering Technology Foundations
- Pre-Engineering/Engineering Technology – Job Ready
- FANUC Robot Operator 1
- Certified Logistics Technician (CLT)
- Certified Production Technician (CPT) 4.0

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

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

Engineering Foundations

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Statewide Program of Study: Engineering Foundations

Course Information

Level 1

Course	Prerequisites | Corequisites	Career Clusters
Principles of Applied Engineering 13036200 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Principles of Technology* 13037100 (1 credit)	**Prerequisites:** One credit of high school science and Algebra I **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Introduction to Computer-Aided Design and Drafting* N1303769 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Introduction to Engineering Design (PLTW)* N1303742 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Engineering Essentials (PLTW)* N1303760 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	

Level 2

Course	Prerequisites | Corequisites	Career Clusters
Manufacturing Engineering Technology I 13032900 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** Algebra I Recommended Corequisites: **None**	
Robotics I 13037000 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** Principles of Applied Engineering Recommended Corequisites: None	
Intermediate Computer-Aided Design and Drafting* N1303770 (1 credit)	**Prerequisites:** Architectural Design I, Introduction to Computer-Aided Design and Drafting ,or Engineering Design and Presentation I **Corequisites:** None **Recommended Prerequisites:** None **Recommended Corequisites:** None	
Construction Engineering TBD (TBD credit)	**Prerequisites:** TBD **Corequisites:** TBD **Recommended Prerequisites: TBD** **Recommended Corequisites:**TBD	
Engineering Design Process TBD (TBD credit)	**Prerequisites:** TBD **Corequisites: TBD** **Recommended Prerequisites:** TBD Recommended Corequisites: TBD	

** Indicates course is included in more than one program of study.*

For additional information on the **Engineering** career cluster,
contact cte@tea.texas.gov or visit https://tea.texas.gov/cte

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Course Information

Level 3

Course	Prerequisites | Corequisites	Career Clusters
Engineering Design and Presentation I 13036500 (1 credit)	**Prerequisites:** Algebra I and at least one credit in a course from the STEM career cluster **Corequisites:** None **Recommended Prerequisites:** Principles of Applied Engineering Recommended Corequisites: None	
Engineering Mathematics* 13036700 (1 credit)	**Prerequisites:** Algebra II **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Robotics II 13037050 (1 credit)	**Prerequisites:** Robotics I **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Engineering Science 13037500 (1 credit)	**Prerequisites:** Algebra I, one credit in Biology, and at least one credit in a course from the STEM Cluster **Corequisites:** None **Recommended Prerequisites:** Geometry, Integrated Physics and Chemistry (IPC), one credit in chemistry, or one credit in physics Recommended Corequisites: None	
Digital Electronics 13037600 (1 credit)	**Prerequisites:** Algebra I and Geometry **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Aerospace Engineering (PLTW) N1303745 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** At least one credit in a Level 2 or higher course in Engineering Recommended Corequisites: None	
Environmental Sustainability (PLTW) N1303746 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** At least one credit in a Level 2 or higher course in engineering or renewable energy Recommended Corequisites: None	
Civil Engineering and Architecture (PLTW) N1303747 (1 credit)	**Prerequisites:** None **Corequisites:** College Prep Math and Science **Recommended Prerequisites:** Introduction to Engineering Design Recommended Corequisites: None	
Computer Integrated Manufacturing (PLTW) N1303748 (1 credit)	**Prerequisites:** None **Corequisites:** College Preparatory Math and Science **Recommended Prerequisites:** Introduction to Engineering Design **Recommended Corequisites:** None	
Engineering Design and Development (PLTW)* N1303749 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** At least two courses in engineering with at least one being a Level 2 or higher course Recommended Corequisites: None	
Introduction to Fluids TBD (credit TBD)	**Prerequisites:** TBD **Corequisites:** TBD **Recommended Prerequisites:** TBD Recommended Corequisites: None	

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Course Information

Level 3

Course	Prerequisites | Corequisites	Career Clusters
Introduction to Mechanics of Materials TBD (credit TBD)	**Prerequisites:** TBD **Corequisites:** TBD Recommended Prerequisites: TBD **Recommended Corequisites:** None	
Introduction to Statics TBD (credit TBD)	**Prerequisites:** TBD **Corequisites:** TBD Recommended Prerequisites: TBD **Recommended Corequisites:** TBD	
Programming for Engineers* TBD (credit TBD)	**Prerequisites:** TBD **Corequisites:** TBD Recommended Prerequisites: TBD **Recommended Corequisites:** TBD	

Level 4

Course	Prerequisites | Corequisites	Career Clusters
Engineering Design and Problem Solving 13037300 (1 credit)	**Prerequisites:** Algebra I, Geometry, and at least one credit in a Level 2 or higher course in the STEM Career Cluster **Corequisites:** None **Recommended Prerequisites:** None **Recommended Corequisites:** None	
Engineering Design and Presentation II* 13036600 (2 credits)	**Prerequisites:** Principles of Applied Engineering or Engineering Design and Presentation I, Algebra I, and Geometry **Corequisites:** None **Recommended Prerequisites:** Principles of Applied Engineering or Engineering Design and Presentation I Recommended Corequisites: None	
Practicum in Science, Technology, Engineering, and Mathematics First Time Taken: 13037400 (2 credits) Second Time Taken: 13037410 (2 credits)	**Prerequisites:** Algebra I and Geometry **Corequisites:** None **Recommended Prerequisites:** None **Recommended Corequisites:** None	
Practicum in Science, Technology, Engineering, and Mathematics/Extended Practicum in Science, Technology, Engineering, and Mathematics First Time Taken: 13037405 (3 credits) Second Time Taken: 13037415 (3 credits)	**Prerequisites:** Algebra I and Geometry **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Practicum in Engineering* TBD (credit TBD)	**Prerequisites:** TBD **Corequisites:** TBD **Recommended Prerequisites:** TBD **Recommended Corequisites:** TBD	

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Level 4

Course	Prerequisites | Corequisites	Career Clusters
Career Preparation for Programs of Study First Time Taken: 12701121 (2 credits)	**Prerequisites**: at least one Level 2 or higher Career and Technical Education course **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Career Preparation for Programs of Study/ Extended Career Preparation* First Time Taken: 12701141 (3 credits)	**Prerequisites:** at least one Level 2 or higher Career and Technical Education course **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	
Scientific Research and Design* 13037200 (1 credit)	**Prerequisites:** Biology, Chemistry, Integrated Physics, Chemistry (IPC), or Physics **Corequisites:** None Recommended Prerequisites: None Recommended Corequisites: None	
Career and Technical Education Project-Based Capstone* First Time Taken: 12701101 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** None Recommended Corequisites: None	

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