

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: Civil Engineering

The Civil Engineering program of study focuses on occupational and educational opportunities associated with the design, build, operation, and maintenance of infrastructure related to roads, buildings, airports, bridges, and transportation systems. This program of study includes exploration of infrastructure, site inspections, feasibility assessments and scope, and cost estimates. It addresses applying scientific, mathematical, and empirical evidence to solve problems in construction, infrastructure, and the environment.

Secondary Courses for High School Credit

| | |
|----------------|---|
| Level 1 | <ul style="list-style-type: none"> Principles of Applied Engineering Principles of Technology Introduction to Computer-Aided Design and Drafting |
| Level 2 | <ul style="list-style-type: none"> Intermediate Computer-Aided Design and Drafting Geographic Information Systems Civil Engineering I (TBD) Construction Engineering and Management (TBD) Surveying (TBD) |
| Level 3 | <ul style="list-style-type: none"> Engineering Design and Presentation I Engineering Mathematics Topographical Drafting Spatial Technology and Remote Sensing Civil Engineering and Architecture (PLTW) Civil Engineering II (TBD) Programming for Engineers (TBD) |
| Level 4 | <ul style="list-style-type: none"> Engineering Design and Presentation II Engineering Design and Problem Solving Career and Technical Education Project-Based Capstone Practicum in Engineering (TBD) Practicum in Science, Technology, Engineering, and Mathematics Practicum in Science, Technology, Engineering, and Mathematics + Extended Practicum in Science, Technology, Engineering, and Mathematics Career Preparation for Programs of Study Career Preparation for Programs of Study + Extended Career Preparation Scientific Research and Design |

Aligned Advanced Academic Courses

| | | | |
|--------------------|---|---|--------------------------------|
| AP or IB | AP Calculus AB AP Calculus BC | AP Physics 1 AP Physics 2 AP Statistics | IB Physics SL IB Physics HL |
| Dual Credit | Dual credit offerings vary based 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 | <ul style="list-style-type: none"> Intern at a local infrastructure company and use computer-aided design (CAD) Shadow a civil engineering professional |
| Expanded Learning Opportunities | <ul style="list-style-type: none"> Tour a construction site Participate in SkillsUSA or TSA Join a local engineering association and attend meetings |

Aligned Industry-Based Certifications

- ArcGis Desktop Associate
- LEED Green Associate
- Autodesk Associate (Certified User) 3ds MAX
- 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
- 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
- HBI Pre-Apprenticeship Certificate Training (PACT), Building Construction Technology
- HBI Pre-Apprenticeship Certificate Training (PACT), Core
- Lean Six Sigma Green Belt Certification
- Pre-Engineering/Engineering Technology - Job Ready
- Residential Plans Examiner - R3



Example Postsecondary Opportunities

Apprenticeships

- Surveyor Assistant Instrument Apprentice

Associate Degrees

- Civil Engineering, General
- Surveying Technology/Surveying

Bachelor's Degrees

- Civil Engineering, General
- Construction Engineering

Master's, Doctoral, and Professional Degrees

- Civil Engineering, General
- Surveying Engineering

Additional Stackable IBCs/License

- Professional Civil Engineer (CE License)
- Civil Engineering Certification ASCE

Example Aligned Occupations

Surveying and Mapping Technicians

Median Wage: \$45,804
Annual Openings: 1,487
10-Year Growth: 18%

Architectural and Civil Drafters

Median Wage: \$57,424
Annual Openings: 1,366
10-Year Growth: 15%

Civil Engineers

Median Wage: \$80,980
Annual Openings: 2,823
10-Year Growth: 22%

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 Career Cluster

Statewide Program of Study: Civil Engineering

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* 13037350 (1 credit) | Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None | |

Level 2

| Course | Prerequisites Corequisites | Career Clusters |
|--|--|-----------------|
| Intermediate Computer-Aided Design and Drafting* 13037360 (1 credit) | Prerequisites: Architectural Design I or Introduction to Computer-Aided Design and Drafting Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None | |
| Geographic Information Systems* N1302805 (1 credit) | Prerequisites: None Corequisites: None Recommended Prerequisites: Principles of Art, Audio/Video Technology, Principles of Information Technology, or Principles of Technology Recommended Corequisites: None | |
| Civil Engineering I TBD (TBD credit) | Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: None Recommended Corequisites: None | |
| Construction Engineering and Management TBD (TBD credit) | Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: None Recommended Corequisites: None | |
| Surveying TBD (TBD credit) | Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: None Recommended Corequisites: None | |

* 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>

Engineering Career Cluster

Statewide Program of Study: Civil Engineering

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: TBD Recommended Corequisites: None |  |
| Topographical Drafting N1300421 (1 credit) | Prerequisites: None Corequisites: None Recommended Prerequisites: Architectural Design, Algebra I, and Geometry Recommended Corequisites: None |  |
| Spatial Technology and Remote Sensing N1302807 (1 credit) | Prerequisites: None Corequisites: None Recommended Prerequisites: Geographic Information Systems and Raster-Based GIS Recommended Corequisites: None |  |
| Civil Engineering and Architecture (PLTW)* N1303747 (1 credit) | Prerequisites: None Corequisites: College preparatory math and science Recommended Prerequisites: Engineering Design Recommended Corequisites: None |  |
| Civil Engineering II TBD (TBD credit) | Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: TBD Recommended Corequisites: TBD |  |
| Programming for Engineers* TBD (TBD credit) | Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: TBD Recommended Corequisites: TBD |  |

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Statewide Program of Study: Civil Engineering

Course Information

Level 4

| Course | Prerequisites Corequisites | Career Clusters |
|---|---|---|
| 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 |  |
| 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 |   |
| Career and Technical Education Project-Based Capstone* First Time Taken: 12701101 (1 credit) | Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None |           |
| Practicum in Engineering* TBD (TBD credit) | Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: TBD Recommended Corequisites: TBD |  |
| 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 |     |

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Statewide Program of Study: Civil Engineering

Course Information

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 CTE 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 CTE course Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None | |
| Scientific Research and Design* 13037200 (1 credit) | Prerequisites: Biology, Chemistry, Integrated Physics and Chemistry (IPC), or Physics Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None | |

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