

# 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

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

### Aligned Advanced Academic Courses

<b>AP or IB</b>	AP Calculus AB AP Calculus BC	AP Physics 1 AP Statistics	AP Physics 2 IB Physics SL IB Physics HL
<b>Dual Credit</b>	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

<b>Work-Based Learning Activities</b>	<ul style="list-style-type: none"> <li>Intern at a local infrastructure company and use computer-aided design (CAD)</li> <li>Shadow a civil engineering professional</li> </ul>
<b>Expanded Learning Opportunities</b>	<ul style="list-style-type: none"> <li>Tour a construction site</li> <li>Participate in TSA or SkillsUSA</li> <li>Join a local engineering association and attend meetings</li> </ul>

### 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 Design
- 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/Licensures

- 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
<b>Principles of Applied Engineering*</b> 13036200 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	
<b>Principles of Technology*</b> 13037100 (1 credit)	Prerequisites: One credit of high school science and Algebra I Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	
<b>Introduction to Computer-Aided Design and Drafting*</b> N1303769 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	

Level 2

Course	Prerequisites   Corequisites	Career Clusters
<b>Geographic Information Systems</b> 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	
<b>Intermediate Computer-Aided Design and Drafting*</b> N1303770 (1 credit)	Prerequisites: Architectural Design I or Introduction to Computer-Aided Design and Drafting Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	
<b>Civil Engineering I</b> TBD (TBD credit)	Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: None Recommended Corequisites: None	
<b>Construction Engineering and Management</b> TBD (TBD credit)	Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: None Recommended Corequisites: None	
<b>Surveying</b> TBD (TBD credit)	Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: None Recommended Corequisites: None	

Level 3

Course	Prerequisites   Corequisites	Career Clusters
<b>Engineering Design and Presentation I*</b> 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	
<b>Engineering Mathematics*</b> 13036700 (1 credit)	Prerequisites: Algebra II Corequisites: None Recommended Prerequisites: TBD Recommended Corequisites: None	
<b>Topographical Drafting</b> N1300421 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Architectural Design, Algebra I, and Geometry Recommended Corequisites: None	

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

For additional information on the **Engineering** career cluster, contact [cte@tea.texas.gov](mailto: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
<b>Spatial Technology and Remote Sensing</b> N1302807 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Geographic Information Systems and Raster-Based GIS Recommended Corequisites: None	
<b>Civil Engineering and Architecture (PLTW)</b> N1303747 (1 credit)	Prerequisites: None Corequisites: College preparatory math and science Recommended Prerequisites: Engineering Design Recommended Corequisites: None	
<b>Civil Engineering II</b> TBD (TBD credit)	Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: TBD Recommended Corequisites: TBD	
<b>Programming for Engineers*</b> TBD (TBD credit)	Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: TBD Recommended Corequisites: TBD	

Level 4

Course	Prerequisites   Corequisites	Career Clusters
<b>Engineering Design and Problem Solving*</b> 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	
<b>Engineering Design and Presentation II*</b> 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	
<b>Practicum in Science, Technology, Engineering, and Mathematics</b> 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	
<b>Practicum in Science, Technology, Engineering, and Mathematics + Extended Practicum in Science, Technology, Engineering, and Mathematics</b> 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	
<b>Practicum in Engineering*</b> TBD (TBD credit)	Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: TBD Recommended Corequisites: TBD	

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

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# Engineering Career Cluster

## Statewide Program of Study: Civil Engineering

### Course Information

Level 4	Course	Prerequisites   Corequisites	Career Clusters
	<b>Career Preparation for Programs of Study</b> First Time Taken: 12701121 (2 credits)	<b>Prerequisites:</b> at least one Level 2 or higher Career and Technical Education course <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	
	<b>Career Preparation for Programs of Study + Extended Career Preparation</b> First Time Taken: 12701141 (3 credits)	<b>Prerequisites:</b> at least one Level 2 or higher Career and Technical Education course <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	
	<b>Scientific Research and Design</b> 13037200 (1 credit)	<b>Prerequisites:</b> Biology, Chemistry, Integrated Physics and Chemistry (IPC), or Physics <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	
	<b>Career and Technical Education Project-Based Capstone</b> First Time Taken: 12701101 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	

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