

# 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>Physics for Engineering</li> <li>Introduction to Computer-Aided Design and Drafting</li> </ul>                                                                                                                                                                                                                                                                                                                |
| <b>Level 2</b> | <ul style="list-style-type: none"> <li>Intermediate Computer-Aided Design and Drafting</li> <li>Geographic Information Systems (GIS)</li> <li>Civil Engineering I</li> <li>Surveying and Geomatics</li> <li>Engineering Project Management</li> </ul>                                                                                                                                                                                                                                           |
| <b>Level 3</b> | <ul style="list-style-type: none"> <li>Engineering Design and Presentation</li> <li>Engineering Mathematics</li> <li>Topographical Drafting</li> <li>Spatial Technology and Remote Sensing</li> <li>Architectural Engineering</li> <li>Civil Engineering II</li> <li>Programming for Engineers</li> </ul>                                                                                                                                                                                       |
| <b>Level 4</b> | <ul style="list-style-type: none"> <li>Advanced Engineering Design and Presentation</li> <li>Engineering Design and Problem Solving</li> <li>Career and Technical Education Project-Based Capstone</li> <li>Practicum in Engineering</li> <li>Practicum in Engineering + Extended Practicum in Engineering</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> </ul> |

## 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 SkillsUSA or TSA</li> <li>Join a local engineering association and attend meetings</li> </ul> |

## Aligned Industry-Based Certifications

- 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
- Autodesk Certified User 3ds MAX
- Autodesk Certified User AutoCAD
- Autodesk Certified User Fusion 360
- Autodesk Certified User Inventor
- Autodesk Certified User Revit
- Certified SOLIDWORKS Additive Manufacturing Associate (CSWA-AM)
- Certified SOLIDWORKS Associate (CSWA) - Academic
- Certified SOLIDWORKS Associate (CSWA) - Electrical
- Certified SOLIDWORKS CAD Design Associate (CSWA) - Academic
- Certified SOLIDWORKS CAD Design Professional (CSWP) - Academic
- Certified SOLIDWORKS Professional (CSWP) - Model Based Design
- Certified SOLIDWORKS Professional (CSWP) - Simulation
- Certified SOLIDWORKS Professional (CSWPA) - Drawing Tools
- Engineering Technology Foundations
- FDM Certification for EDU - Level 1
- HBI Pre-Apprenticeship Certificate Training (PACT), Building Construction Technology
- HBI Pre-Apprenticeship Certificate Training (PACT), Core
- Lean Six Sigma Green Belt Certification
- LEED Green Associate
- Pre-Engineering/Engineering Technology - Job Ready
- Residential Plans Examiner - R3
- Tosa Certification for Autodesk AutoCAD (Advanced or Expert)

Successful completion of the Civil Engineering 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

- 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: \$48,203  
Annual Openings: 1,325  
10-Year Growth: 18%

### Architectural and Civil Drafters

Median Wage: \$58,539  
Annual Openings: 1,579  
10-Year Growth: 15%

### Civil Engineers

Median Wage: \$82,483  
Annual Openings: 2,223  
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/eng-civil-engineering-extended.pdf>

# Engineering Career Cluster

## Statewide Program of Study: Civil Engineering

### Course Information

#### Level 1

| Course                                                                            | Prerequisites   Corequisites                                                                                                                                                                                                                   | Career Clusters                                                                     |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Principles of Applied Engineering*</b><br>13036200 (1 credit)                  | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                     |  |
| <b>Physics for Engineering*</b><br>13037150 (1 credit)                            | <b>Prerequisites:</b> One credit of Algebra I and one credit of chemistry, physics, or Integrated Physics and Chemistry (IPC)<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None  |  |
| <b>Introduction to Computer-Aided Design and Drafting*</b><br>13037350 (1 credit) | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Principles of Applied Engineering, Principles of Architecture and Design, or Principles of Manufacturing<br><b>Recommended Corequisites:</b> None |  |

#### Level 2

| Course                                                                         | Prerequisites   Corequisites                                                                                                                                                                                                                                                                            | Career Clusters                                                                       |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Intermediate Computer-Aided Design and Drafting*</b><br>13037360 (1 credit) | <b>Prerequisites:</b> Architectural Design I, Introduction to Computer-Aided Design and Drafting, or Engineering Design and Presentation<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                |   |
| <b>Geographic Information Systems (GIS)*</b><br>13027545 (1 credit)            | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Principles of Arts, Audio/Video Technology, and Communications, Principles of Information Technology, Physics for Engineers, or Principles of Applied Engineering<br><b>Recommended Corequisites:</b> None |  |
| <b>Civil Engineering I</b><br>12756050 (1 credit)                              | <b>Prerequisites:</b> Algebra I and Introduction to Computer-Aided Design and Drafting or Principles of Applied Engineering<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Geometry<br><b>Recommended Corequisites:</b> None                                                         |  |
| <b>Surveying and Geomatics</b><br>12756070 (2 credits)                         | <b>Prerequisites:</b> Algebra I<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Geometry and Introduction to Computer-Aided Design and Drafting<br><b>Recommended Corequisites:</b> None                                                                                              |  |
| <b>Engineering Project Management*</b><br>12756060 (1 credit)                  | <b>Prerequisites:</b> Algebra I<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> English II<br><b>Recommended Corequisites:</b> None                                                                                                                                                   |  |

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

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>Engineering Design and Presentation*</b><br>13036500 (1 credit)  | <b>Prerequisites:</b> Algebra I and at least one credit in a course from the Engineering career cluster<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Principles of Applied Engineering<br><b>Recommended Corequisites:</b> None                                                      |       |
| <b>Engineering Mathematics*</b><br>13036700 (1 credit)              | <b>Prerequisites:</b> Algebra II<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                                                                          |                                                                                          |
| <b>Topographical Drafting</b><br>N1300421 (1 credit)                | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Architectural Design, Algebra I, and Geometry<br><b>Recommended Corequisites:</b> None                                                                                                                       |                                                                                          |
| <b>Spatial Technology and Remote Sensing</b><br>13027555 (1 credit) | <b>Prerequisites:</b> At least one credit in a course from the Information Technology career cluster<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Geographic Information Systems and Raster-Based Geographic Information Systems<br><b>Recommended Corequisites:</b> None            |   |
| <b>Architectural Engineering*</b><br>12756065 (2 credits)           | <b>Prerequisites:</b> Civil Engineering I<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                                                                 |   |
| <b>Civil Engineering II</b><br>12756055 (2 credits)                 | <b>Prerequisites:</b> Geometry and Civil Engineering I<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Introduction to Computer-Aided Design and Drafting<br><b>Recommended Corequisites:</b> None                                                                                      |                                                                                        |
| <b>Programming for Engineers*</b><br>12756005 (1 credit)            | <b>Prerequisites:</b> Algebra I and Principles of Applied Engineering, Physics for Engineering, Introduction to Computer-Aided Design and Drafting, or Introduction to Engineering Design<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None |                                                                                        |

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# Engineering Career Cluster

## Statewide Program of Study: Civil Engineering

### Course Information

Level 4

| Course                                                                                                                                                          | Prerequisites   Corequisites                                                                                                                                                                                                                                                                                                   | Career Clusters                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Advanced Engineering Design and Presentation*</b><br>13036600 (2 credits)                                                                                    | <b>Prerequisites:</b> Algebra I, Geometry, and Engineering Design and Presentation<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                                             |    |
| <b>Engineering Design and Problem Solving*</b><br>13037300 (1 credit)                                                                                           | <b>Prerequisites:</b> Algebra I, Geometry, and at least one credit in a Level 2 or higher course in the Engineering career cluster<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Engineering Science, chemistry, or physics<br><b>Recommended Corequisites:</b> Engineering Science, chemistry, or physics |    |
| <b>Career and Technical Education Project-Based Capstone*</b><br>First Time Taken:<br>12701101 (1 credit)                                                       | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                                                                                                     |   |
| <b>Practicum in Engineering*</b><br>First Time Taken:<br>12756080 (2 credits)<br>Second Time Taken:<br>12756090 (2 credits)                                     | <b>Prerequisites:</b> Algebra I and Geometry and a minimum of two credits with at least one course in a Level 2 or higher course from the Engineering career cluster<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                           |  |
| <b>Practicum in Engineering + Extended Practicum in Engineering*</b><br>First Time Taken:<br>12756085 (3 credits)<br>Second Time Taken:<br>12756095 (3 credits) | <b>Prerequisites:</b> Algebra I and Geometry and a minimum of two credits with at least one course in a Level 2 or higher course from the Engineering career cluster<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                           |  |

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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><br>First Time Taken:<br>12701121 (2 credits)                               | <b>Prerequisites:</b> At least one Level 2 or higher CTE course<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                        |                 |
| <b>Career Preparation for Programs of Study + Extended Career Preparation*</b><br>First Time Taken:<br>12701141 (3 credits) | <b>Prerequisites:</b> At least one Level 2 or higher CTE course<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                        |                 |
| <b>Scientific Research and Design*</b><br>13037200 (1 credit)                                                               | <b>Prerequisites:</b> Biology, and one credit of the following: Physics for Engineering, chemistry, Integrated Physics and Chemistry (IPC), or physics<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None |                 |

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