

# 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 includes 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

	<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> <li>Introduction to Engineering Design (PLTW)</li> <li>Engineering Essentials (PLTW)</li> </ul>
	<b>Level 2</b>	<ul style="list-style-type: none"> <li>Intermediate Computer-Aided Design and Drafting</li> <li>Manufacturing Engineering Technology I</li> <li>Robotics I</li> <li>Construction Engineering (TBD)</li> <li>Engineering Design Process (TBD)</li> </ul>
	<b>Level 3</b>	<ul style="list-style-type: none"> <li>Engineering Design and Presentation I</li> <li>Robotics II</li> <li>Engineering Mathematics</li> <li>Engineering Science</li> <li>Digital Electronics</li> <li>Aerospace Engineering (PLTW)</li> <li>Environmental Sustainability (PLTW)</li> <li>Civil Engineering and Architecture (PLTW)</li> <li>Computer Integrated Manufacturing (PLTW)</li> <li>Engineering Design and Development (PLTW)</li> <li>Introduction to Fluids (TBD)</li> <li>Introduction to Mechanics of Materials (TBD)</li> <li>Introduction to Statics (TBD)</li> <li>Programming for Engineers (TBD)</li> </ul>
	<b>Level 4</b>	<ul style="list-style-type: none"> <li>Engineering Design and Presentation II</li> <li>Engineering Design and Problem Solving</li> <li>Career and Technical Education Project-Based Capstone</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> </ul>

### Aligned Advanced Academic Courses

<b>AP or IB</b>	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

<b>Work-Based Learning Activities</b>	<ul style="list-style-type: none"> <li>Intern at an engineering, robotics, or aerospace company.</li> <li>Visit an engineering firm and shadow multiple types of engineers.</li> </ul>
<b>Expanded Learning Opportunities</b>	<ul style="list-style-type: none"> <li>Participate in SkillsUSA or TSA</li> <li>Join a local engineering association and attend meetings.</li> </ul>

### 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 (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
- Lean Six Sigma Green Belt Certification



### 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%










# Engineering Career Cluster






## Statewide Program of Study: Engineering Foundations

### Course Information

#### Level 1

Course	Prerequisites   Corequisites	Career Clusters
<b>Principles of Applied Engineering*</b> 13036200 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	  
<b>Principles of Technology*</b> 13037100 (1 credit)	<b>Prerequisites:</b> One credit of high school science and Algebra I <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	
<b>Introduction to Computer-Aided Design and Drafting*</b> 13037350 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> Principles of Applied Engineering, Principles of Architecture and Design, or Principles of Manufacturing. <b>Recommended Corequisites:</b> None	
<b>Introduction to Engineering Design (PLTW)*</b> N1303742 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	
<b>Engineering Essentials (PLTW)*</b> N1303760 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	

#### Level 2

Course	Prerequisites   Corequisites	Career Clusters
<b>Intermediate Computer-Aided Design and Drafting*</b> 13037360 (1 credit)	<b>Prerequisites:</b> Architectural Design I, Introduction to Computer-Aided Design and Drafting, or Engineering Design and Presentation I <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	
<b>Manufacturing Engineering Technology I*</b> 13032900 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> Algebra I <b>Recommended Corequisites:</b> None	 
<b>Robotics I*</b> 13037000 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> Principles of Applied Engineering <b>Recommended Corequisites:</b> None	 

*Continued on next page*

\* 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: Engineering Foundations

### Course Information

#### Level 2

Course	Prerequisites   Corequisites	Career Clusters
<b>Construction Engineering</b> TBD (TBD credit)	<b>Prerequisites:</b> TBD <b>Corequisites:</b> TBD <b>Recommended Prerequisites:</b> TBD <b>Recommended Corequisites:</b> TBD	
<b>Engineering Design Process</b> TBD (TBD credit)	<b>Prerequisites:</b> TBD <b>Corequisites:</b> TBD <b>Recommended Prerequisites:</b> TBD <b>Recommended Corequisites:</b> TBD	

#### Level 3

Course	Prerequisites   Corequisites	Career Clusters
<b>Engineering Design and Presentation I*</b> 13036500 (1 credit)	<b>Prerequisites:</b> Algebra I <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> Principles of Applied Engineering <b>Recommended Corequisites:</b> None	 
<b>Robotics II*</b> 13037050 (1 credit)	<b>Prerequisites:</b> Robotics I <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	 
<b>Engineering Mathematics*</b> 13036700 (1 credit)	<b>Prerequisites:</b> Algebra II <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	
<b>Engineering Science*</b> 13037500 (1 credit)	<b>Prerequisites:</b> Algebra I, one credit in Biology, and at least one credit in a course from the STEM career cluster <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> Geometry, Integrated Physics and Chemistry (IPC), one credit in chemistry, or one credit in physics <b>Recommended Corequisites:</b> None	
<b>Digital Electronics*</b> 13037600 (1 credit)	<b>Prerequisites:</b> Algebra I and Geometry <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> None <b>Recommended Corequisites:</b> None	  

*Continued on next page*

\* 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: Engineering Foundations

### Course Information

Level 3

Course	Prerequisites   Corequisites	Career Clusters
<b>Aerospace Engineering (PLTW)*</b> N1303745 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> At least one credit in a Level 2 or higher course in Engineering <b>Recommended Corequisites:</b> None	
<b>Environmental Sustainability (PLTW)</b> N1303746 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> At least one credit in a Level 2 or higher course in engineering or renewable energy <b>Recommended Corequisites:</b> None	
<b>Civil Engineering and Architecture (PLTW)*</b> N1303747 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> College Prep Math and Science <b>Recommended Prerequisites:</b> Introduction to Engineering Design <b>Recommended Corequisites:</b> None	
<b>Computer Integrated Manufacturing (PLTW)*</b> N1303748 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> College Prep Math and Science <b>Recommended Prerequisites:</b> Introduction to Engineering Design <b>Recommended Corequisites:</b> None	
<b>Engineering Design and Development (PLTW)*</b> N1303749 (1 credit)	<b>Prerequisites:</b> None <b>Corequisites:</b> None <b>Recommended Prerequisites:</b> At least two courses in engineering with at least one being a Level 2 or higher course <b>Recommended Corequisites:</b> None	
<b>Introduction to Fluids</b> TBD (credit TBD)	<b>Prerequisites:</b> TBD <b>Corequisites:</b> TBD <b>Recommended Prerequisites:</b> TBD <b>Recommended Corequisites:</b> None	
<b>Introduction to Mechanics of Materials</b> TBD (TBD credit)	<b>Prerequisites:</b> TBD <b>Corequisites:</b> TBD <b>Recommended Prerequisites:</b> TBD <b>Recommended Corequisites:</b> None	
<b>Introduction to Statics</b> TBD (TBD credit)	<b>Prerequisites:</b> TBD <b>Corequisites:</b> TBD <b>Recommended Prerequisites:</b> TBD <b>Recommended Corequisites:</b> TBD	
<b>Programming for Engineers*</b> TBD (TBD credit)	<b>Prerequisites:</b> TBD <b>Corequisites:</b> TBD <b>Recommended Prerequisites:</b> TBD <b>Recommended Corequisites:</b> 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](mailto:cte@tea.texas.gov) or visit <https://tea.texas.gov/cte>

# Engineering Career Cluster

## Statewide Program of Study: Engineering Foundations

### Course Information

Level 4

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

*Continued on next page*

\* 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: Engineering Foundations

### 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 CTE 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 CTE 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	

\* 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>