

# 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: Electrical Engineering

The Electrical Engineering program of study focuses on occupational and educational opportunities associated with the design, development, testing, and supervision of electrical equipment and systems. Students will design, test, and evaluate projects related to electrical motors, radar, navigation systems, and communication systems. This program study includes applying scientific, mathematical, and empirical evidence to solve problems in electrical systems associated with instruments, facilities, components, and equipment.

### 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>Robotics I</li> <li>Programmable Logic Controller I</li> <li>Manufacturing Engineering Technology I</li> <li>AC/DC Electronics</li> <li>Intermediate Computer-Aided Design and Drafting</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Level 3</b> | <ul style="list-style-type: none"> <li>Robotics II</li> <li>Programmable Logic Controller II</li> <li>Engineering Design and Presentation I</li> <li>Engineering Mathematics</li> <li>Solid State Electronics</li> <li>Engineering Science</li> <li>Digital Electronics</li> <li>Computer Integrated Manufacturing (PLTW)</li> <li>Engineering Design and Development (PLTW)</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</li> <li>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 Physics 1  | IB Physics SL          |
|                    | AP Calculus BC                                             | AP Physics 2  | IB Physics HL          |
|                    | AP Computer Science Principles                             | AP Statistics | IB Computer Science SL |
|                    |                                                            |               | IB Computer Science HL |
| <b>Dual Credit</b> | 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 for a construction company and use computer-aided design (CAD) to draw electrical blueprints</li> <li>Shadow an electrical engineering professional</li> </ul> |
| <b>Expanded Learning Opportunities</b> | <ul style="list-style-type: none"> <li>Tour a telecommunications site</li> <li>Participate in TSA or SkillsUSA</li> <li>Join a local engineering association and attend meetings</li> </ul>                  |

### Aligned Industry-Based Certifications

- C-200 Certified Industry 4.0 Automation Systems Specialist I – 208 Programmable Controller Troubleshooting 1
- C-200 Certified Industry 4.0 Automation Systems Specialist I – 201 Electrical Systems 1
- Autodesk Associate (Certified User) Revit for Electrical
- Autodesk Certified Professional in Revit for Electrical Design
- Certified SOLIDWORKS Associate (CSWA) – Electrical
- NCCER Electrical Level I
- NCCER Electrical Level II
- Engineering Technology Foundations
- Pre-Engineering/Engineering Technology – Job Ready
- FANUC Robot Operator 1



### Example Postsecondary Opportunities

#### Apprenticeship

- Electrical Technician Apprenticeship



#### Associate Degrees

- Electrical, Electronic, and Communications Engineering Technology/Technician
- Electromechanical/Electromechanical Engineering Technology/Technician

#### Bachelor's Degrees

- Electrical and Electronics Engineering
- Systems Engineering

#### Master's, Doctoral, and Professional Degrees

- Electrical and Electronics Engineering
- Bioengineering and Biomedical Engineering

#### Additional Stackable IBCs/Licensures

- Professional Electrical Engineer (EE License)
- Electrical Apprenticeship Certificate Level 1 (520)



### Example Aligned Occupations

#### Electrical and Electronic Engineering Technologists and Technicians

Median Wage: \$62,968  
Annual Openings: 1,156  
10-Year Growth: 14%

#### Electrical and Electronics Drafters

Median Wage: \$58,987  
Annual Openings: 406  
10-Year Growth: 16%

#### Electrical Engineers

Median Wage: \$102,534  
Annual Openings: 1,271  
10-Year Growth: 21%

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: Electrical 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>Principles of Technology*</b><br>13037100 (1 credit)                  | <b>Prerequisites:</b> One credit of high school science and Algebra I<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>(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 |                                                                                                                                                                          |
| <b>Introduction to Engineering Design (PLTW)*</b><br>N1303742 (1 credit) | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                     |                                                                                                                                                                          |
| <b>Engineering Essentials (PLTW)*</b><br>N1303760 (1 credit)             | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                     |                                                                                                                                                                          |

Level 2

| Course                                                                | Prerequisites   Corequisites                                                                                                                                                                                       | Career Clusters                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Robotics I*</b><br>13037000 (1 credit)                             | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Principles of Applied Engineering<br><b>Recommended Corequisites:</b> None                                            |    |
| <b>Programmable Logic Controller I*</b><br>N1303689 (1 credit)        | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Principles of Applied Engineering or Principles of Manufacturing<br><b>Recommended Corequisites:</b> None             |                                                                                         |
| <b>Manufacturing Engineering Technology I*</b><br>13032900 (1 credit) | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Algebra I<br><b>Recommended Corequisites:</b> None                                                                    |                                                                                         |
| <b>AC/DC Electronics*</b> 13036800<br>(1 credit)                      | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Principles of Applied Engineering<br><b>Recommended Corequisites:</b> None                                            |                                                                                         |
| <b>Intermediate Computer-Aided Design and Drafting*</b> (1 credit)    | <b>Prerequisites:</b> Architectural Design I or Introduction to Computer-Aided Design and Drafting<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><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>

# Engineering Career Cluster

## Statewide Program of Study: Electrical Engineering

### Course Information

Level 3

| Course                                                                   | Prerequisites   Corequisites                                                                                                                                                                                                                      | Career Clusters |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Robotics II*</b><br>13037050 (1 credit)                               | <b>Prerequisites:</b> Robotics I <b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                     |                 |
| <b>Programmable Logic Controller II*</b><br>N1303690 (1 credit)          | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Principles of Applied Engineering or Principles of Manufacturing and Programmable Logic Controllers (PLC) I<br><b>Recommended Corequisites:</b> None |                 |
| <b>Engineering Design and Presentation I*</b><br>13036500 (1 credit)     | <b>Prerequisites:</b> Algebra I and at least one credit in a course from the STEM 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>Solid State Electronics*</b><br>13036900 (1 credit)                   | <b>Prerequisites:</b> AC/DC Electronics<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                           |                 |
| <b>Engineering Science*</b><br>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<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> Geometry<br><b>Recommended Corequisites:</b> None      |                 |
| <b>Digital Electronics*</b> 13037600<br>(1 credit)                       | <b>Prerequisites:</b> Algebra I and Geometry<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                      |                 |
| <b>Computer Integrated Manufacturing (PLTW)*</b><br>N1303748 (1 credit)  | <b>Prerequisites:</b> None<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                                        |                 |
| <b>Engineering Design and Development (PLTW)*</b><br>N1303749 (1 credit) | <b>Prerequisites:</b> None<br><b>Corequisites:</b> College preparatory mathematics and science courses<br><b>Recommended Prerequisites:</b> Engineering Design<br><b>Recommended Corequisites:</b> None                                           |                 |























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# Engineering Career Cluster

## Statewide Program of Study: Electrical Engineering Course Information

Level 4

| Course                                                                                                                                                                                                                                      | Prerequisites   Corequisites                                                                                                                                                                                                                | Career Clusters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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 STEM Career Cluster<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Engineering Design and Presentation II*</b><br>13036600 (2 credits)                                                                                                                                                                      | <b>Prerequisites:</b> Principles of Applied Engineering or Engineering Design and Presentation I, Algebra I, and Geometry<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Practicum in Science, Technology, Engineering, and Mathematics*</b><br>First Time Taken: 13037400 (2 credits)<br>Second Time Taken: 13037410 (2 credits)                                                                                 | <b>Prerequisites:</b> Algebra I and Geometry<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                |  <br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Practicum in Science, Technology, Engineering, and Mathematics + Extended Practicum in Science, Technology, Engineering, and Mathematics*</b><br>First Time Taken:<br>13037405 (3 credits)<br>Second Time Taken:<br>13037415 (3 credits) | <b>Prerequisites:</b> Algebra I and Geometry<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                                                                |  <br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Practicum in Engineering*</b><br>TBD (TBD credit)                                                                                                                                                                                        | <b>Prerequisites:</b> TBD<br><b>Corequisites:</b> TBD<br><b>Recommended Prerequisites:</b> TBD<br><b>Recommended Corequisites:</b> TBD                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <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 Career and Technical Education course<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                  |       <br>       |
| <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 Career and Technical Education course<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                  |       <br>       |
| <b>Scientific Research and Design</b> 13037200 (1 credit)                                                                                                                                                                                   | <b>Prerequisites:</b> Biology, Chemistry, Integrated Physics, Chemistry (IPC), or Physics<br><b>Corequisites:</b> None<br><b>Recommended Prerequisites:</b> None<br><b>Recommended Corequisites:</b> None                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <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                                                                                                  |     <br>                                                                                                                                                                                                                                                                                                                                                                                                                                                |

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Electrical Engineering