The Engineering and Design industry sector provides a strong foundation in engineering and design for students in California. The students are engaged in an instructional program that integrates academic and technical preparation and focuses on career awareness, career exploration, and career preparation in five pathways. To prepare students for the vast scope of job opportunities in this field, middle schools, high schools, regional occupational centers and programs, apprenticeship programs, community colleges, and four-year colleges and universities provide education and training in engineering-related occupations. The demand for engineers in a variety of specializations throughout the state and the nation will remain high.

The five pathways in this sector emphasize real-world, occupationally relevant experiences of significant scope and depth. To prepare students for continued training, advanced educational opportunities, and direct entry to a career, the engineering and design programs offer the following components: classroom, laboratory, and hands-on contextual learning; project-based and work-based instruction; internships, community classroom, and cooperative career technical education; work experience education; and leadership and interpersonal skills development.

**Entry Level Careers**  
(with high school diploma)

- Junior Drafter
- CAD Technician
- Construction Apprentice
- Engineering Aide
- Drafting Apprentice
- Apprentice Electrician
- Computer Equipment Installer
- Security Equipment Installer

**Technical Level Careers**  
(with AA or AS degree or certificate)

- Drafter/Designer
- Plan Checker
- Surveyor
- Estimator
- Electrical Engineering Technician
- Mechanical Engineering Technician
- Laboratory Technician
- Civil Engineering Technician
- Chemical Engineering Technician
- Aerospace Engineering Technician
- Architectural Drafters
- Telecommunications Technician
- Journeyman Electrician

**Professional Level Careers**  
(with BS or BA degree)

- Mechanical Engineer
- Aerospace Engineer
- Agricultural Engineer
- Electrical Engineer
- Computer Hardware Engineer
- Telecommunications Engineer
- Landscape Architect
- Materials Engineer
- Nuclear Engineer
- Architect
- Industrial Designer
- Civil Engineer
- Structural Engineer
### Engineering Technology Pathway

#### Sample CTE Courses*

<table>
<thead>
<tr>
<th>Introductory Courses</th>
<th>Concentration Courses</th>
<th>Capstone Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploring Technology</td>
<td>Digital Logic Design</td>
<td>Electrical/Electronic Technology</td>
</tr>
<tr>
<td>Introduction to Computers</td>
<td>Electro-Mechanical Systems</td>
<td>Drafting Technology</td>
</tr>
<tr>
<td>Introduction to Drafting/CADD</td>
<td>Mechatronics/Robotics</td>
<td>Communications</td>
</tr>
<tr>
<td>Introduction to Electricity/Electronics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Engineering Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology Core</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Education Level and Related Occupations**

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Certification and/or AA Degree</th>
<th>Bachelor’s Degree or Higher</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Diploma</td>
<td>Apprentice Technician</td>
<td>Electrical Engineer+</td>
</tr>
<tr>
<td></td>
<td>Electronic Mechanic/Technician</td>
<td>Facilities Maintenance Engineer</td>
</tr>
<tr>
<td></td>
<td>Facilities Technician</td>
<td>Industrial Engineer</td>
</tr>
<tr>
<td></td>
<td>HVAC Installer</td>
<td>Industrial Engineer Instructor+</td>
</tr>
<tr>
<td></td>
<td>Telecommunications/Security Equipment Installer</td>
<td>Telecommunications Engineer</td>
</tr>
</tbody>
</table>

### Environmental and Natural Science Engineering Pathway

#### Sample CTE Courses*

<table>
<thead>
<tr>
<th>Introductory Courses</th>
<th>Concentration Courses</th>
<th>Capstone Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essentials of Environmental Engineering</td>
<td>Computer Technology</td>
<td>Environmental Sampling Assistant</td>
</tr>
<tr>
<td>Exploring Technology</td>
<td>Drafting and Computer-aided Design</td>
<td>Environmental Engineering Technician</td>
</tr>
<tr>
<td>Introduction to Computers</td>
<td>Hydrology</td>
<td>Environmental Planner</td>
</tr>
<tr>
<td>Introduction to Drafting/CADD</td>
<td></td>
<td>Environmental Planner Instructor+</td>
</tr>
<tr>
<td>Principles of Engineering</td>
<td></td>
<td>Survey-Mapping Engineer</td>
</tr>
<tr>
<td>Technology Core</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Education Level and Related Occupations**

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<tr>
<th>Education Level</th>
<th>Certification and/or AA Degree</th>
<th>Bachelor’s Degree or Higher</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Diploma</td>
<td>Environmental Sampling Assistant</td>
<td>Environmental Engineer</td>
</tr>
<tr>
<td></td>
<td>Hazardous Material Removal</td>
<td>Environmental Engineering Technician</td>
</tr>
<tr>
<td></td>
<td>Environmental Engineering Aide</td>
<td>Environmental Planner</td>
</tr>
<tr>
<td></td>
<td>Environmental Apprentice</td>
<td>Environmental Planner Instructor+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Survey-Mapping Engineer</td>
</tr>
</tbody>
</table>

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*Sample CTE Courses are from the Career Technical Education Framework for California Public Schools (California Department of Education: 2007, http://www.cde.ca.gov/)

**Visit ASSIST (www2.assist.org/browseAreas.do) for community college and UC/CSU information and California Career Zone (www.cacareerzone.org) for occupation information.

+This occupation requires certification or licensure.

Related Career Technical Student Organization: SkillsUSA (http://www.skillsusaca.com)

## Architectural and Structural Engineering Pathway

**Sample CTE Courses**

<table>
<thead>
<tr>
<th>Introductory</th>
<th>Concentration</th>
<th>Capstone</th>
</tr>
</thead>
</table>
| - Introduction to CAD  
- Introduction to Design Drafting  
- Principles of Engineering  
- Technology Core | - Architectural Design  
- Design Drafting  
- Engineering Technology  
- Mechanical Drawing  
- Technical Drafting | - Advanced Architectural Design  
- Computer-aided Design (CAD/CAM)  
- Engineering Design |

**Education Level and Related Occupations**

<table>
<thead>
<tr>
<th>High School Diploma</th>
<th>Certification and/or AA Degree</th>
<th>Bachelor's Degree or Higher</th>
</tr>
</thead>
</table>
| - CAD Technician  
- Construction Apprentice  
- Drafting Apprentice  
- Engineering Aide  
- Junior Drafter | - Drafter/Designer  
- Engineering Technician  
- Estimator  
- Plan Checker  
- Surveyor | - Architect  
- Industrial Designer  
- Civil Engineer  
- Structural Engineer  
- Instructor |

*Sample CTE Courses are from the Career Technical Education Framework for California Public Schools (California Department of Education: 2007, http://www.cde.ca.gov/re/pn/fd/)

**Visit ASSIST (www2.assist.org/browseAreas.do) for community college and UC/CSU information and California Career Zone (www.cacareerzone.org) for occupation information.

+This occupation requires certification or licensure.

Related Career Technical Student Organization: SkillsUSA (http://www.skillsusaca.com)


## Computer Hardware, Electrical, and Networking Engineering Pathway

**Sample CTE Courses**

<table>
<thead>
<tr>
<th>Introductory</th>
<th>Concentration</th>
<th>Capstone</th>
</tr>
</thead>
</table>
| - Computer Fundamentals  
- Electricity/Electronics  
- Exploring Technology  
- Technical Core | - Computer and Communications Networking  
- Computer Systems Design/Maintenance  
- Electrical Codes and Systems | - Computer Networking and Administration  
- Electrical/Electronic Technology  
- Essentials of Information Technology (A Plus) |

**Education Level and Related Occupations**

<table>
<thead>
<tr>
<th>High School Diploma</th>
<th>Certification and/or AA Degree</th>
<th>Bachelor's Degree or Higher</th>
</tr>
</thead>
</table>
| - Apprentice Electrician  
- Computer Equipment Installer  
- Computer Repairer  
- Electrician's Helper  
- Telecommunications/Security Equipment Installer | - Computer Networking Technician  
- Computer Technician  
- Electrician  
- Journeyman Electrician  
- Telecommunications Technician | - Computer Engineer  
- Electrical Engineer  
- Instructor  
- Network Administrator  
- Telecommunications Engineer |

## Engineering Design Pathway

**Sample CTE Courses**

<table>
<thead>
<tr>
<th>Introductory</th>
<th>Concentration</th>
<th>Capstone</th>
</tr>
</thead>
</table>
| - Exploring Technology  
- Introduction to CAD  
- Introduction to Drafting  
- Principles of Technology | - Architectural Design  
- Design Drafting  
- Engineering Technology  
- Mechanical Drawing | - Advanced Architectural Design  
- Computer-aided Design (CAD)  
- Electrical/Mechanical Technology  
- Engineering Design |

**Education Level and Related Occupations**

<table>
<thead>
<tr>
<th>High School Diploma</th>
<th>Certification and/or AA Degree</th>
<th>Bachelor's Degree or Higher</th>
</tr>
</thead>
</table>
| - CAD Technician  
- Construction Apprentice  
- Design/Drafting Apprentice  
- Engineering Aide  
- Junior Drafter/Trainee | - CAD/CAM Specialist  
- Drafter/Designer  
- Engineering Technician  
- Journeyman Drafter | - Architect  
- Civil Engineer  
- Industrial Designer  
- Instructor  
- Structural Engineer |