



# Engineering and Design Industry Sector

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.

## Engineering and Design Industry Sector Pathways:

- *Architectural and Structural Engineering*
- *Computer Hardware, Electrical, and Networking Engineering*
- *Engineering Design*
- *Engineering Technology*
- *Environmental and Natural Science Engineering*

### 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\*

### Education Level and Related Occupations\*\*

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> <li>▪ Exploring Technology</li> <li>▪ Introduction to Computers</li> <li>▪ Introduction to Drafting/CADD</li> <li>▪ Introduction to Electricity/Electronics</li> <li>▪ Introduction to Engineering Technology</li> <li>▪ Metal Technology</li> <li>▪ Technology Core</li> </ul>	<ul style="list-style-type: none"> <li>▪ Digital Logic Design</li> <li>▪ Electro-Mechanical Systems</li> <li>▪ Mechatronics/Robotics</li> </ul>	<ul style="list-style-type: none"> <li>▪ Electrical/Electronic Technology</li> <li>▪ Industrial Engineering Technology</li> <li>▪ Telecommunications</li> </ul>	<ul style="list-style-type: none"> <li>▪ Apprentice Technician</li> <li>▪ Electronic Mechanic Helper</li> <li>▪ HVAC Installer</li> <li>▪ Telecommunications/Security Equipment Installer</li> </ul>	<ul style="list-style-type: none"> <li>▪ Electronic Mechanic/Technician</li> <li>▪ Facilities Technician</li> <li>▪ Industrial Electronics Technician</li> <li>▪ Journeyman Engineer</li> <li>▪ Telecommunications Technician</li> </ul>	<ul style="list-style-type: none"> <li>▪ Electrical Engineer+</li> <li>▪ Facilities Maintenance Engineer</li> <li>▪ Industrial Engineer Instructor+</li> <li>▪ Telecommunications Engineer</li> </ul>

## Environmental and Natural Science Engineering Pathway Sample CTE Courses\*

### Education Level and Related Occupations\*\*

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> <li>▪ Essentials of Environmental Engineering</li> <li>▪ Exploring Technology</li> <li>▪ Introduction to Computers</li> <li>▪ Introduction to Drafting/CADD</li> <li>▪ Principles of Engineering</li> <li>▪ Technology Core</li> </ul>	<ul style="list-style-type: none"> <li>▪ Computer Technology</li> <li>▪ Drafting and Computer-aided Design</li> <li>▪ Hydrology</li> </ul>	<ul style="list-style-type: none"> <li>▪ Electrical/Electronic Technology</li> <li>▪ Environmental Science and Technology</li> <li>▪ Industrial Engineering Technology</li> <li>▪ Telecommunications</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Sampling Assistant</li> <li>▪ Hazardous Material Removal</li> <li>▪ Environmental Engineering Aide</li> <li>▪ Environmental Apprentice</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Engineering Technician</li> <li>▪ Environmental Planner Assistant</li> <li>▪ Environmental Sampling Technician</li> <li>▪ Journeyman Environmental Engineer</li> <li>▪ Survey-Mapping Technician</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Engineer+</li> <li>▪ Environmental Planner+</li> <li>▪ Instructor+</li> <li>▪ Survey-Mapping Engineer</li> </ul>

\*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](http://www2.assist.org/browseAreas.do)) for community college and UC/CSU information and California Career Zone ([www.cacareerzone.org](http://www.cacareerzone.org)) for occupation information.

+This occupation requires certification or licensure.

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

Additional Industry Sector information available through the California Industrial and Technology Education Consortium (<http://www.citeonline.org>).



## Architectural and Structural Engineering Pathway

Sample CTE Courses\*

### Education Level and Related Occupations\*\*

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> <li>▪ Introduction to CAD</li> <li>▪ Introduction to Design Drafting</li> <li>▪ Principles of Engineering</li> <li>▪ Technology Core</li> </ul>	<ul style="list-style-type: none"> <li>▪ Architectural Design</li> <li>▪ Design Drafting</li> <li>▪ Engineering Technology</li> <li>▪ Mechanical Drawing</li> <li>▪ Technical Drafting</li> </ul>	<ul style="list-style-type: none"> <li>▪ Advanced Architectural Design</li> <li>▪ Computer-aided Design (CAD/CAM)</li> <li>▪ Engineering Design</li> </ul>	<ul style="list-style-type: none"> <li>▪ CAD Technician</li> <li>▪ Construction Apprentice</li> <li>▪ Drafting Apprentice</li> <li>▪ Engineering Aide</li> <li>▪ Junior Drafter</li> </ul>	<ul style="list-style-type: none"> <li>▪ Drafter/Designer</li> <li>▪ Engineering Technician</li> <li>▪ Estimator</li> <li>▪ Plan Checker</li> <li>▪ Surveyor</li> </ul>	<ul style="list-style-type: none"> <li>▪ Architect+</li> <li>▪ Industrial Designer+</li> <li>▪ Civil Engineer+</li> <li>▪ Structural Engineer+</li> <li>▪ Instructor+</li> </ul>

## Computer Hardware, Electrical, and Networking Engineering Pathway

Sample CTE Courses\*

### Education Level and Related Occupations\*\*

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> <li>▪ Computer Fundamentals</li> <li>▪ Electricity/Electronics</li> <li>▪ Exploring Technology</li> <li>▪ Technical Core</li> </ul>	<ul style="list-style-type: none"> <li>▪ Computer and Communications Networking</li> <li>▪ Computer Systems Design/Maintenance</li> <li>▪ Electrical Codes and Systems</li> </ul>	<ul style="list-style-type: none"> <li>▪ Computer Networking and Administration</li> <li>▪ Electrical/Electronic Technology</li> <li>▪ Essentials of Information Technology (A Plus)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Apprentice Electrician</li> <li>▪ Computer Equipment Installer</li> <li>▪ Computer Repairer</li> <li>▪ Electrician's Helper</li> <li>▪ Telecommunications/Security Equipment Installer</li> </ul>	<ul style="list-style-type: none"> <li>▪ Computer Networking Technician+</li> <li>▪ Computer Technician+</li> <li>▪ Electrician+</li> <li>▪ Journeyman Electrician</li> <li>▪ Telecommunications Technician</li> </ul>	<ul style="list-style-type: none"> <li>▪ Computer Engineer</li> <li>▪ Electrical Engineer+</li> <li>▪ Instructor+</li> <li>▪ Network Administrator</li> <li>▪ Telecommunications Engineer</li> </ul>

## Engineering Design Pathway

Sample CTE Courses\*

### Education Level and Related Occupations\*\*

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> <li>▪ Exploring Technology</li> <li>▪ Introduction to CAD</li> <li>▪ Introduction to Drafting</li> <li>▪ Principles of Technology</li> </ul>	<ul style="list-style-type: none"> <li>▪ Architectural Design</li> <li>▪ Design Drafting</li> <li>▪ Engineering Technology</li> <li>▪ Mechanical Drawing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Advanced Architectural Design</li> <li>▪ Computer-aided Design (CAD)</li> <li>▪ Electrical/Mechanical Technology</li> <li>▪ Engineering Design</li> </ul>	<ul style="list-style-type: none"> <li>▪ CAD Technician</li> <li>▪ Construction Apprentice</li> <li>▪ Design/Drafting Apprentice</li> <li>▪ Engineering Aide</li> <li>▪ Junior Drafter/Trainee</li> </ul>	<ul style="list-style-type: none"> <li>▪ CAD/CAM Specialist</li> <li>▪ Drafter/Designer</li> <li>▪ Engineering Technician</li> <li>▪ Journeyman Drafter</li> </ul>	<ul style="list-style-type: none"> <li>▪ Architect+</li> <li>▪ Civil Engineer+</li> <li>▪ Industrial Designer+</li> <li>▪ Instructor+</li> <li>▪ Structural Engineer+</li> </ul>

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