

Engineering Technology

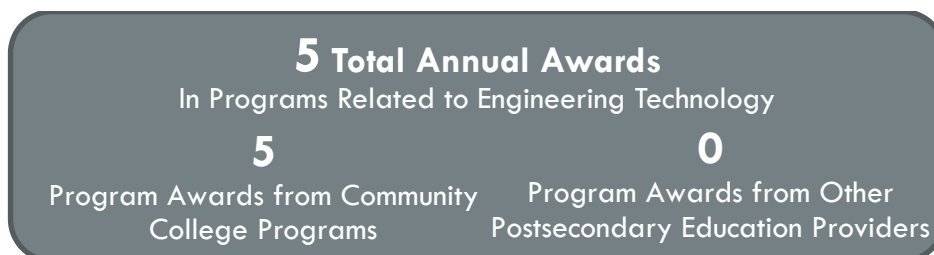
Inland Empire/Desert Region (Riverside and San Bernardino counties)

This workforce demand report uses state and federal job projection data developed before the economic impact of COVID-19. The COE is monitoring the situation and will provide more information as it becomes available. Please consult with local employers to understand their current employment needs.

Summary



Over the next five years (2020-2025), engineering technology employment is projected to




A green rounded rectangular box contains a thumbs-up icon followed by the text: 'The Inland Empire/Desert Centers of Excellence Recommends Engineering Technology Program Expansion to meet the need for more workers in the region'.

Introduction

This report provides labor market occupational demand and wage research and postsecondary programs outcomes related to engineering technology. California Community College engineering technology, general (requires trigonometry) (TOP 0924.00) programs prepare students for employment through the instruction of the technical support of engineering, including the use of civil and mechanical engineering principles, physical sciences, basic physics, mathematics, surveying, materials testing, hydraulics and pneumatics, and the preparation of plans, specifications, and engineering reports (Taxonomy of Programs, 2012). The knowledge, skills, and abilities trained by engineering technology programs lead to four distinct occupations, collectively referred to as the engineering technology occupational group in this report. The occupations included in the engineering technology occupational group are:

- Civil Engineering Technologists and Technicians (SOC 17-3022)
- Electrical and Electronic Engineering Technologists and Technicians (17-3023)
- Industrial Engineering Technologists and Technicians (17-3026)
- Mechanical Engineering Technologists and Technicians (17-3027)

Job Counts and Projections

In 2020, there were 1,971 total engineering technology jobs in the region. Employment for the engineering technology occupational group is projected to increase by 6% through 2025; 210 job openings are projected annually. Exhibit 1 displays the job counts, five-year projected job growth, job openings, and the share of incumbent workers aged 55 years and greater in the region.

Exhibit 1: Five-year projections for the engineering technology occupational group, 2020-2025

Occupation	2020 Jobs	2025 Jobs	5-Yr % Change	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Electrical and Electronic Engineering Technologists and Technicians	896	932	4%	456	91	30%
Civil Engineering Technologists and Technicians	677	724	7%	368	74	26%
Industrial Engineering Technologists and Technicians	227	245	8%	127	25	29%
Mechanical Engineering Technologists and Technicians	171	187	9%	98	20	29%
Total	1,971	2,087	6%	1,049	210	28%

Source: Emsi 2022.1

Exhibit 2 shows the number of job advertisements (ads) posted during the last 12 months and the statewide average time filling each occupation. Over the past 12 months, there were 59 job ads posted for the engineering technology occupational group in the region. The job ad search was expanded to include all ads posted in California to ensure that actionable job information is presented.

Over the previous 12 months, there were 808 job ads posted for the engineering technology occupational group in California. On average, employers throughout the state fill online job ads for the engineering technology occupational group in 36 days.

Exhibit 2: Job ads and time to fill

Occupation	Job Ads	Statewide Average Time to Fill (Days)
Electrical and Electronic Engineering Technologists and Technicians	482	36
Mechanical Engineering Technologists and Technicians	162	34
Civil Engineering Technologists and Technicians	128	39
Industrial Engineering Technologists and Technicians	36	34
Total	808	36

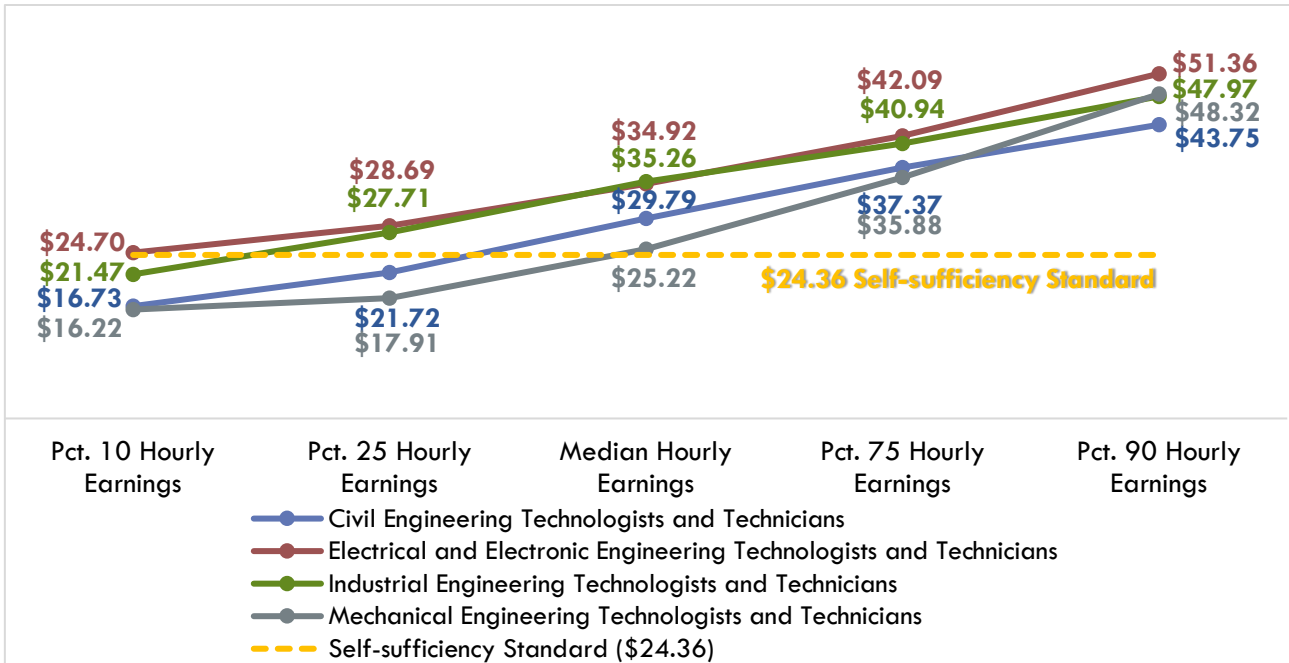
Source: Burning Glass – Labor Insights

Earnings and Benefits

Community colleges should ensure their training programs lead to employment opportunities that provide self-sustainable income. The University of Washington estimates that a self-sufficient hourly rate for a single adult with one school-age child is \$24.36 per hour or \$51,452 annually in Riverside County; \$23.73 per hour or \$50,119 annually in San Bernardino County (Pearce, 2021). For this study, the higher hourly earnings requirement in Riverside County is adopted as the self-sufficiency standard for the two-county region.

Exhibit 3 displays the hourly earnings for the engineering technology occupational group. The median hourly earnings for the engineering technology occupations are above the regional self-sufficiency standard, indicating that at least 50% of workers in this occupational group earn a self-sustainable wage. The hourly earnings for electrical and electronic engineering technologists and technicians exceed the self-sufficiency standard at the 10th percentile, indicating that at least 90% of workers in this occupation earn a self-sustainable wage.

Exhibit 3: Hourly earnings by percentile for the engineering technology occupational group



Source: Emsi 2022.1

Benefits information, typically provided by the occupational guides developed by the California Labor Market Information Division, is unavailable for civil engineering technologists and technicians and mechanical engineering technologists and technicians. Benefits for electrical and electronic engineering technologists and technicians and industrial engineering technologists and technicians generally include medical, dental, vision, retirement, and life insurance plans (Detailed Occupational Guides, 2022).

Advertised Salary from Online Job Ads

Exhibit 4 displays online job ad salary data for the engineering technology occupational group over the last 12 months. Online job ad salary information reveals that employers are willing to pay the engineering technology occupational group between \$53,000 and \$62,000 annually, above the region's \$51,452 annual (\$24.36 hourly) self-sufficiency standard. Consider the salary information with caution since only 56% (452 out of 808) of online job ads for these occupations provided salary information. The salary figures are prorated to reflect full-time, annual wage status.

Exhibit 4: Advertised salary information

Occupation	Number of job ads	Real-Time Salary Information				Average Annual Salary
		Less than \$35,000	\$35,000 to \$49,999	\$50,000 to \$74,999	More than \$75,000	
Electrical and Electronic Engineering Technologists and Technicians	268	2%	45%	44%	9%	\$56,000

Occupation	Number of job ads	Real-Time Salary Information				Average Annual Salary
		Less than \$35,000	\$35,000 to \$49,999	\$50,000 to \$74,999	More than \$75,000	
Mechanical Engineering Technologists and Technicians	104	1%	47%	46%	6%	\$53,000
Civil Engineering Technologists and Technicians	66	1%	15%	70%	14%	\$62,000
Industrial Engineering Technologists and Technicians	14	7%	22%	57%	14%	\$57,000

Source: Burning Glass – Labor Insights

Employers, Skills, Education, and Work Experience

Exhibit 5 displays the employers that posted the most job ads during the last 12 months. Displaying employer names provides insight into where students may find employment after completing a program. Peak Technical Services posted the most job ads for the engineering technology occupational group in California. Anheuser-Busch Companies posted the most online job ads for the engineering technology occupational group in the Inland Empire/Desert Region.

Exhibit 5: Employers posting the most job ads for the engineering technology occupational group

Occupation	Top Employers
Electrical and Electronic Engineering Technologists and Technicians (n=911)	<ul style="list-style-type: none"> Peak Technical Services Tesla Moore & Associates Anheuser-Busch Companies ABM Industries
Mechanical Engineering Technologists and Technicians (n=162)	<ul style="list-style-type: none"> National Computing Group Kennedy Jenks Consultants AMRO Fabricating Corporation Ryzen Solutions
Civil Engineering Technologists and Technicians (n=128)	<ul style="list-style-type: none"> BSK Associates Kier & Wright Leidos Pavement Engineering Incorporated Mead Hunt Incorporated Eastern Municipal Water District El Dorado County
Industrial Engineering Technologists and Technicians (n=36)	<ul style="list-style-type: none"> Jabil, Inc. Integrated Resources Inc. ASK Consulting

Source: Burning Glass – Labor Insights

Exhibit 6 lists a sample of specialized, employability, and software and programming skills employers seek when looking for workers to fill positions in the engineering technology occupational group. Specialized skills are occupation-specific skills that employers request for industry or job competency. Employability skills are

foundational skills that transcend industries and occupations; this category is often referred to as "soft skills." The skills requested in job ads may be utilized to guide curriculum development.

Exhibit 6: Sample of in-demand skills from employer job ads

Occupation	Specialized skills	Employability skills
Electrical and Electronic Engineering Technologists and Technicians (n=473)	<ul style="list-style-type: none"> • Schematic Diagrams • Test Equipment • Oscilloscopes • Soldering • Calibration 	<ul style="list-style-type: none"> • Troubleshooting • Detail-Oriented • Communication Skills • Physical Abilities • Planning
Mechanical Engineering Technologists and Technicians (n=153)	<ul style="list-style-type: none"> • Micrometers • Calipers • Coordinate Measuring Machine (CMM) • Quality Assurance and Control • Repair 	<ul style="list-style-type: none"> • Communication Skills • Detail-Oriented • Organizational Skills • Teamwork/Collaboration • Physical Abilities
Civil Engineering Technologists and Technicians (n=127)	<ul style="list-style-type: none"> • Project Management • Calculation • Land Development • Construction Inspection • Cost Estimation 	<ul style="list-style-type: none"> • Communication Skills • Research • Planning • Organizational Skills • Writing
Industrial Engineering Technologists and Technicians (n=36)	<ul style="list-style-type: none"> • Manufacturing Processes • Test Equipment • Quality Assurance and Control • Machinery 	<ul style="list-style-type: none"> • Troubleshooting • Organizational Skills • Problem Solving • Communication Skills • Detail-Oriented

Source: Burning Glass – Labor Insights

Exhibit 7 displays the typical entry-level education, educational attainment, and minimum advertised education requirements for the engineering technology occupational group. According to the Bureau of Labor Statistics, between 51%-63% of incumbent workers in this field hold a community college-level of educational attainment; "some college, no degree," and an "associate degree." Between 10% and 30% of job ads for the engineering technology occupational group sought candidates with an associate degree.

Exhibit 7: Typical entry-level education, educational attainment, and minimum advertised education requirements

Occupation	Typical Entry-Level Education Requirement	CC-Level Educational Attainment*	Number of Job Ads	Real-Time Minimum Advertised Education Requirement		
				High school or vocational training	Associate degree	Bachelor's degree or higher
Electrical and Electronic Engineering Technologists and Technicians	Associate degree	63%	312	56%	26%	18%
Mechanical Engineering Technologists and Technicians	Associate degree	51%	112	79%	10%	11%
Civil Engineering Technologists and Technicians	Associate degree	51%	90	47%	23%	30%
Industrial Engineering Technologists and Technicians	Associate degree	51%	23	57%	30%	13%

Source: Emsi 2022.1, Burning Glass – Labor Insights

*Percentage of incumbent workers with a Community College Award or Some Postsecondary Coursework

Exhibit 8 displays the work experience typically required to enter each occupation and the real-time work experience requirements from employer job ads. Between 31% and 54% of employers sought engineering technology workers with zero and two years of previous work experience.

Exhibit 8: Work experience required and real-time work experience requirements

Occupation	Work Experience Typically Required	Real-Time Work Experience			
		Number of job ads	0 – 2 years	3 – 5 years	6+ years
Electrical and Electronic Engineering Technologists and Technicians	None	279	54%	39%	7%
Mechanical Engineering Technologists and Technicians	None	92	31%	58%	11%
Civil Engineering Technologists and Technicians	None	104	53%	37%	10%
Industrial Engineering Technologists and Technicians	None	16	50%	38%	12%

Source: Emsi 2022.1, Burning Glass – Labor Insights

Student Completions and Programs Outcomes

Exhibit 9 displays student completions for engineering technology, general (TOP 0924.00) programs over the last three academic years (2018-21). Over the last three academic years, regional community colleges have

issued five awards annually in engineering technology, general programs. Program completion and student outcome methodologies are found in the appendix.

Exhibit 9: 2018-21, Annual average community college awards for engineering technology, general programs in the region

TOP 0924.00 – Engineering Technology, General	Academic Year 2018-19	Academic Year 2019-20	Academic Year 2020-21	Total CC Annual Average Awards, Academic Years 2018-21
Chaffey				4
Associate Degree	6	2	2	3
Certificate 30 < 60 semester units	2	1	0	1
Norco				0
Associate Degree	0	0	1	0
Total	8	3	3	5

Source: MIS Data Mart

California program outcome data may provide a useful insight into the likelihood of success for the proposed program. Community college student outcome information based on the selected TOP code and region is provided in Exhibit 10. Approximately 72% of engineering technology, general program completers, and skills-builders students attained a living wage.

Exhibit 10: 0924.00 – Engineering technology, general strong workforce program outcomes

Strong Workforce Program Metrics: 0924.00 – Engineering Technology, General Academic Year 2018-19, unless noted otherwise	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2019-20)	396	3,988
Completed 9+ career education units in one year (2019-20)	19%	16%
Perkins Economically disadvantaged students (2019-20)	77%	66%
Students who attained a noncredit workforce milestone in a year (2019-20)	-	59%
Students who earned a degree, certificate, or attained apprenticeship (2019-20)	-	221
Transferred to a four-year institution (transfers)	26	504
Job closely related to the field of study (2017-18)	62%	67%
Median annual earnings (all exiters)	\$35,520	\$3,492
Median change in earnings (all exiters)	17%	33%
Attained a living wage (completers and skills-builders)	72%	59%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Summary of Findings

The knowledge, skills, and abilities trained by engineering technology (0924.00) programs lead to four distinct occupations, collectively referred to as the engineering technology occupational group. The engineering technology occupational group is expected to have 210 annual job openings and increase employment by 6% over the next five years. The median hourly earnings for the engineering technology occupations are above the regional self-sufficiency standard (\$24.36 per hour), indicating that at least 50% of workers in this occupational group earn a self-sustainable wage.

Community college engineering technology, general (0924.00) programs have issued five awards annually over the last three academic years. Approximately 72% of engineering technology, general program completers and skills-builders students attained a living wage.

The Centers of Excellence recommends expanding programs related to engineering technology to meet the demand for these workers in the region. Colleges considering this program should have a strong partnership with engineering employers and document their demand for workers and the skills needed for students to work in this field shortly after exiting the program.

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Appendix: Occupation definitions, sample job titles, five-year projections, and earnings for engineering technology occupations

Occupation Definitions (SOC code), Education and Training Requirement, Community College Education Attainment

Civil Engineering Technologists and Technicians (17-3022)

Apply theory and principles of civil engineering in planning, designing, and overseeing construction and maintenance of structures and facilities under the direction of engineering staff or physical scientists.

Sample job titles: Civil Designer, Civil Engineering Assistant, Civil Engineering Technician, Design Technician, Engineer Technician, Engineering Assistant, Engineering Technician, Transportation Engineering Technician

Entry-Level Educational Requirement: Associate degree

Training Requirement: None

Work Experience: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 51%

Electrical and Electronic Engineering Technologists and Technicians (17-3023)

Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, adjust, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.

Sample job titles: Communications Technologist, Electrical Engineering Technician, Electrical Technician, Electronics Engineering Technician, Electronics Technician, Engineering Technician (Engineering Tech), Engineering Technologist, System Technologist, Technologist

Entry-Level Educational Requirement: Associate degree

Training Requirement: None

Work Experience: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 63%

Industrial Engineering Technologists and Technicians (17-3026)

Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May perform time and motion studies on worker operations in a variety of industries for purposes such as establishing standard production rates or improving efficiency.

Sample job titles: Business Process Analyst, Engineering Technician, Industrial Engineering Analyst, Industrial Engineering Technician, Manufacturing Coordinator, Manufacturing Technology Analyst, Quality Control Engineering Technician (QC Engineering Technician), Quality Management Coordinator, Quality Technician, Service Technician

Entry-Level Educational Requirement: Associate degree

Training Requirement: None

Work Experience: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 51%

Mechanical Engineering Technologists and Technicians (17-3027)

Apply theory and principles of mechanical engineering to modify, develop, test, or adjust machinery and equipment under the direction of engineering staff or physical scientists.

Sample job titles: Engineering Lab Technician, Engineering Technical Analyst, Engineering Technologist, Laboratory Technician, Maintenance Technician, Mechanical Designer, Mechanical Technician, Process Engineering Technician, Process Technician, Research and Development Technician

Entry-Level Educational Requirement: Associate degree

Training Requirement: None

Work Experience: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 51%

Appendix: Methodology

Exhibit 9 displays the average annual California Community College (CCC) awards conferred during the three academic years between 2018 and 2021 from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. Awards are the combined total of associate degrees and certificates issued during the timeframe, divided by three in this case to calculate an annual average. This is done to minimize the effect of atypical variations that might be present in a single year.

Community college student outcome information is from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges Chancellor's Office Management Information Systems (MIS) by community colleges, which come from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from California's Employment Development Department's Unemployment Insurance database records. When available, outcomes for completers are reported to demonstrate the impact that earning a degree or certificate can have on employment and earnings. For more information on the types of students included for each metric, please see the web link for LaunchBoard's Strong Workforce Program Metrics Data Element Dictionary in the References section (LaunchBoard, 2021 a). Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS), administered by Santa Rosa Junior College (LaunchBoard, 2021 a).

Job postings data is limited to the information provided by employers and the ability of artificial intelligence search engines to identify this information. Additionally, preliminary calculations by Georgetown Center on Education and the Workforce found that "just 30 to 40 percent of openings for candidates with some college or an associate degree, and only 40 to 60 percent of openings for high school diploma holders appear online" (Carnevale et al., 2014). Online job postings often do not reveal employers' hiring intentions; it is unknown if employers plan to hire one or multiple workers from a single online job posting or collecting resumes for future hiring needs. A closed job posting may not be the result of a hired worker.

Table 1. 2020 to 2025 job growth, wages, entry-level education, training, and work experience required for the engineering technology occupational group in the Inland Empire/Desert Region (Riverside and San Bernardino Counties combined)

Occupation (SOC)	2020 Jobs	5-Year Change	5-Year % Change	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage (10 th to 90 th percentile)	Median Hourly Wage (50 th percentile)	Average Annual Earnings	Entry-Level Education & On-The-Job-Training	Work Experience Required
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	896	35	4%	91	\$24.70 to \$51.36	\$34.92	\$75,600	Associate degree & None	None
Civil Engineering Technologists and Technicians (17-3022)	677	46	7%	74	\$16.73 to \$43.75	\$29.79	\$62,900	Associate degree & None	None
Industrial Engineering Technologists and Technicians (17-3026)	227	18	8%	25	\$21.47 to \$47.97	\$35.26	\$72,300	Associate degree & None	None
Mechanical Engineering Technologists and Technicians (17-3027)	171	16	9%	20	\$16.22 to \$48.32	\$25.22	\$59,600	Associate degree & None	None
Total	1,971	116	6%	210	-	-	-	-	-

Source: Emsi 2022.1