

Electronics and Electric 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

- Community college electronics and electric technology programs provide the knowledge, skills, and abilities that prepare students for employment in four community college-level occupations and two bachelor's degree-level occupations.
- The community college-level occupations are projected to have 169 annual job openings through 2025, increasing employment by 2% in the region.
- The 10th percentile hourly earnings for the community college-level occupations are between \$24.80 and \$35.59 per hour, above the regional \$24.36 per hour self-sustainable wage standard for a single adult with one child.
- Regional community colleges have issued an annual average of 38 awards annually in electronics and electric technology programs over the last three academic years.
- The COE recommends expanding electronics and electric technology programs. See the [recommendation section](#) for further detail.

Introduction

This report aims to quantify regional supply and demand related to electronics and electric technology. California Community College electronics and electric technology (TOP 0934.00) programs prepare students for employment through the instruction of the theory and application of electric and electronic systems and components, including circuits, electro-magnetic fields, energy sources, communication devices, radio, and television circuits, computers, and other electric and electronic components and devices (Taxonomy of Programs, 2012).

The knowledge, skills, and abilities trained by electronics and electric technology programs lead to six distinct occupations, collectively referred to as the electronics occupational group in this report. The electronics occupational group is separated into community college-level and bachelor's degree-level occupations to illuminate job opportunities for individuals with varying education levels.

The **community college-level occupations** in this report either require an associate degree or a postsecondary nondegree award. Between 48% and 63% of incumbent workers in this occupation have a

community college-level education, some college or an associate degree, as their highest level of educational attainment. The community college-level occupations included in the electronics occupational group are:

- Electrical and Electronic Engineering Technologists and Technicians (SOC 17-3023)
- Electrical and Electronics Installers and Repairers, Transportation Equipment (49-2093)
- Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)
- Electrical and Electronics Repairers, Powerhouse, Substation, and Relay (49-2095)

This report's bachelor's degree-level occupations typically require workers to obtain a four-year degree before entering employment. Approximately 13% of workers in these occupations have a community college-level education, some college or an associate degree, as their highest level of educational attainment. The bachelor's degree-level occupations included in the electronics occupational group are:

- Electrical Engineers (SOC 17-2071)
- Electronics Engineers, Except Computer (17-2072)

This report's educational supply and employment demand portions focus solely on the community college-level jobs students are likely to obtain after completing a community college electronics and electric technology program in the Inland Empire/Desert Region.

Job Counts and Projections

In 2020, there were 3,683 total electronics and electric technology jobs in the region. Employment for the community college-level electronics occupational group is projected to increase by 2% through 2025; 169 job openings are projected annually. The bachelor's degree-level occupations are expected to have 137 annual job openings, increasing employment by 5% over the next five years. Exhibit 1 displays the job counts, five-year projected job growth, job openings, and the share of incumbent workers age 55 years and greater in the region.

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

Occupation	2020 Jobs	2025 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Electrical Engineers	1,079	1,141	6%	418	84	30%
Electronics Engineers, Except Computer	742	769	4%	268	54	29%
Bachelor's Degree-level Total	1,821	1,910	5%	687	137	30%
Electrical and Electronic Engineering Technologists and Technicians	882	903	2%	435	87	30%

Occupation	2020 Jobs	2025 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Electrical and Electronics Repairers, Commercial and Industrial Equipment	586	605	3%	255	51	17%
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	234	225	(4%)	91	18	16%
Electrical and Electronics Installers and Repairers, Transportation Equipment	160	160	(0%)	65	13	11%
Community College-level Total	1,862	1,893	2%	846	169	23%
Total	3,683	3,803	3%	1,532	306	26%

Source: Emsi 2021.4

Exhibit 2 shows the number of job ads posted during the last 12 months and the regional and statewide average time filling each occupation. Over the previous 12 months, there were 571 job ads posted for the electronics occupational group in the region. The job advertisement searches for electronics engineers, except computer; electrical and electronics repairers, powerhouse, substation, and relay; electrical and electronics repairers, commercial and industrial equipment; and electrical and electronics installers and repairers, transportation equipment workers were expanded to California to ensure there were sufficient advertisements from which to obtain reliable job advertisement information. There were no advertisements for electrical and electronics installers and repairers, transportation equipment in the region or California.

On average, regional employers fill online job advertisements for electronics workers in 34 days, five days shorter than the statewide time to fill. Job advertisements indicate that regional employers face fewer challenges filling open positions than other employers in California.

Exhibit 2: Job ads and time to fill

Occupation	Job Ads	Regional Average Time to Fill (Days)	Statewide Average Time to Fill (Days)
Electrical Engineers	137	39	40
Electronics Engineers, Except Computer*	4,011	-	39
Bachelor's Degree-level Total	4,148	39	40
Electrical and Electronic Engineering Technologists and Technicians	357	32	35
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay*	115	-	31

Occupation	Job Ads	Regional Average Time to Fill (Days)	Statewide Average Time to Fill (Days)
Electrical and Electronics Repairers, Commercial and Industrial Equipment*	16	-	-
Electrical and Electronics Installers and Repairers, Transportation Equipment*	0	-	-
Community College-level Total	488	32	35
Total	4,636	34	39

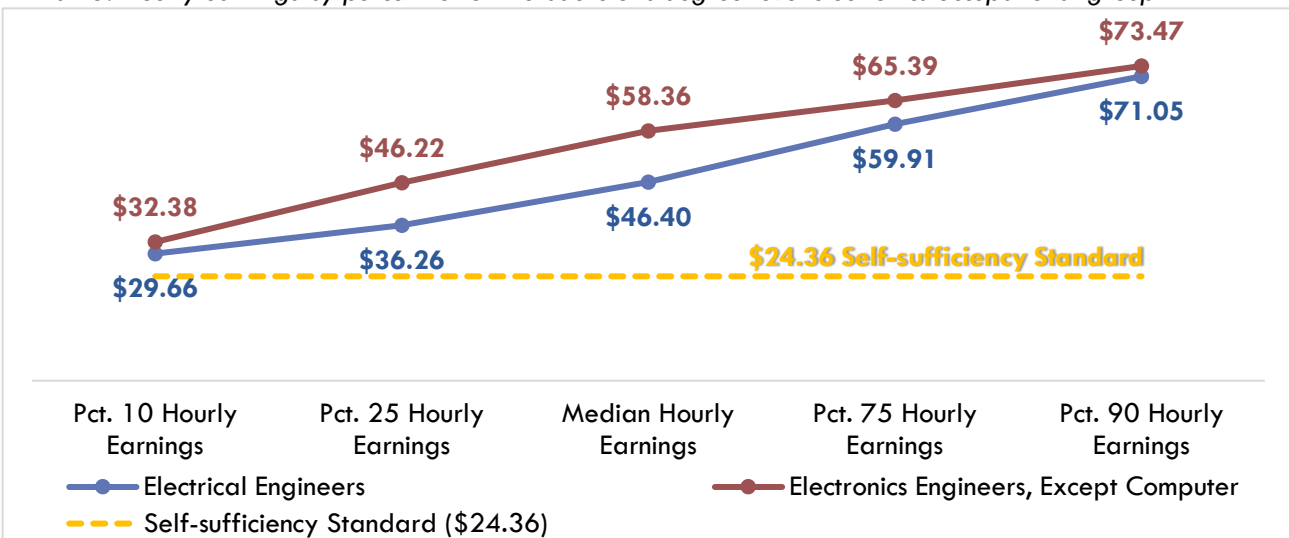
Source: Burning Glass – Labor Insights
 *California job advertisements

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 bachelor's degree-level electronics occupational group. The 10th percentile hourly earnings for these occupations exceed the regional self-sufficiency standard, indicating that at least 90% of workers in the field earn a self-sustainable wage.

Exhibit 3: Hourly earnings by percentile for the bachelor's degree-level electronics occupational group



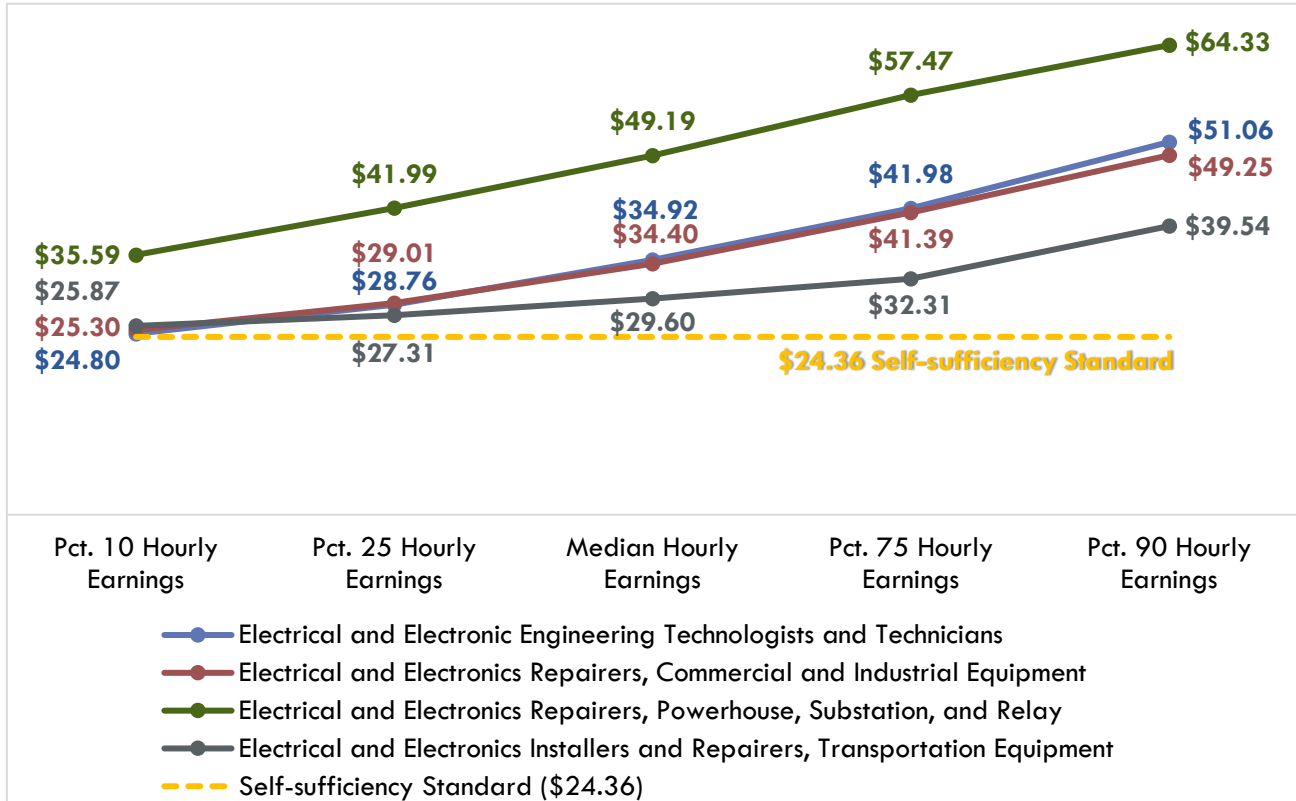
Source: Emsi 2021.4

Benefits information, typically provided by the occupational guides developed by the California Labor Market Information Division, is not available for electronics engineers, except computer. Benefits for electrical

engineers generally include health and life insurance, vacation, sick leave, and pension plans (Detailed Occupational Guides, 2021).

Exhibit 4 displays the hourly earnings for the community college-level electronics occupational group. The 10th percentile hourly earnings for the community college-level occupations are between \$24.80 and \$35.59 per hour, above the regional \$24.36 per hour self-sustainable wage standard for a single adult with one child.

Exhibit 4: Hourly earnings by percentile for the community college-level electronics occupational group



Source: Emsi 2021.4

According to the occupational guides developed by the California Labor Market Information Division, benefits for electrical and electronic engineering technologists and technicians typically include medical, dental, vision, retirement, and life insurance, as well as holidays. Benefits information is not available for electrical and electronics repairers, commercial and industrial equipment, electrical and electronics repairers, powerhouse, substation, and relay, and electrical and electronics installers and repairers, transportation equipment (Detailed Occupational Guides, 2021).

Advertised Salary from Online Job Ads

Exhibit 5 displays online job ad salary data for the electronics occupational group over the last 12 months. Online advertised salary information reveals that employers are willing to pay the bachelor's degree-level occupational group between \$91,000 and \$95,000, well above the region's \$51,452 annual (\$24.36 hourly)

self-sufficiency standard. The advertised wages for the community college-level occupational group are between \$56,000 and \$79,000, above the regional self-sufficiency standard. There were insufficient advertisements for electrical and electronics installers and repairers, transportation equipment and electrical and electronics repairers, commercial and industrial equipment to obtain reliable salary information. Consider the salary information with caution since only 15% (685 out of 4,636) of online job ads for these occupations provided salary information. The salary figures are prorated to reflect full-time, annual wage status.

Exhibit 5: 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	
Bachelor's Degree-level						
Electrical Engineers	31	-	10%	13%	77%	\$91,000
Electronics Engineers, Except Computer*	459	12%	7%	20%	61%	\$95,000
Community College-level						
Electrical and Electronic Engineering Technologists and Technicians	169	7%	34%	49%	10%	\$56,000
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay*	20	10%	25%	25%	40%	\$79,000
Electrical and Electronics Repairers, Commercial and Industrial Equipment*	6	N/A	N/A	N/A	N/A	N/A
Electrical and Electronics Installers and Repairers, Transportation Equipment*	0	N/A	N/A	N/A	N/A	N/A

Source: Burning Glass – Labor Insights

*California job advertisements

Employers, Skills, Education, and Work Experience

Exhibit 6 displays the employers that posted the most job ads during the last 12 months. Displaying employer names provides some insight into where students may find employment after completing a program. Raytheon posted the most job advertisements for the region's bachelor's degree-level electronics occupational group. Amazon posted the most job advertisements for community college-level occupational group in the region. Since there were no job advertisements for electrical and electronics installers and repairers, transportation equipment posted in the state, employer information is not available.

Exhibit 6: Employers posting the most job ads for the electronics occupational group

Occupation	Top Employers	
Bachelor's Degree-level		
Electrical Engineers (n=137)	<ul style="list-style-type: none"> Raytheon Tiger Electric Spark Power Corp 	<ul style="list-style-type: none"> Goliath Construction Consulting Danaher Corporation
Electronics Engineers, Except Computer* (n=4,011)	<ul style="list-style-type: none"> Raytheon The Boeing Company Northrop Grumman Lucid Motors, Inc. 	<ul style="list-style-type: none"> Apple, Inc. Lockheed Martin Corporation Qualcomm General Atomics
Community College-level		
Electrical and Electronic Engineering Technologists and Technicians (n=357)	<ul style="list-style-type: none"> Amazon Cushman and Wakefield Services Honeywell RPO International 	<ul style="list-style-type: none"> Nordstrom Anheuser-Busch Companies, Inc. Cemex California Steel Industries
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay* (n=115)	<ul style="list-style-type: none"> Eaton Corporation US Department of Energy – Western Area Power Administration 	
Electrical and Electronics Repairers, Commercial and Industrial Equipment* (n=16)	<ul style="list-style-type: none"> Mr. Electric 	
Electrical and Electronics Installers and Repairers, Transportation Equipment* (n=0)	<ul style="list-style-type: none"> N/A 	

Source: Burning Glass – Labor Insights

*California job advertisements

Exhibit 7 lists a sample of specialized and employability skills employers seek when looking for workers to fill positions in the electronics 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. Since there were no job advertisements for electrical and electronics installers and repairers, transportation equipment posted in the state, skills information is not available.

Exhibit 7: Sample of in-demand skills from employer job ads

Occupation	Specialized skills	Employability skills
Bachelor's Degree-level		

Occupation	Specialized skills	Employability skills
Electrical Engineers (n=134)	<ul style="list-style-type: none"> • Project Management • Budgeting • Scheduling • Repair • Wiring 	<ul style="list-style-type: none"> • Communication Skills • Troubleshooting • Planning • Teamwork/Collaboration • Problem Solving
Electronics Engineers, Except Computer* (n=3,873)	<ul style="list-style-type: none"> • Systems Engineering • Test Equipment • Physics • Oscilloscopes • Circuit Design 	<ul style="list-style-type: none"> • Communication Studies • Teamwork/Collaboration • Troubleshooting • Problem Solving • Research
Community College-level		
Electrical and Electronic Engineering Technologists and Technicians (n=323)	<ul style="list-style-type: none"> • Repair • Wiring • Schematic Diagrams • Test Equipment • Electrical Systems 	<ul style="list-style-type: none"> • Troubleshooting • Communication Skills • Physical Abilities • Preventative Maintenance • Problem Solving
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay* (n=109)	<ul style="list-style-type: none"> • Test Equipment • Electrical Power Distribution Equipment • Equipment Operation • Technical Assistance • Calibration 	<ul style="list-style-type: none"> • Computer Literacy • Troubleshooting • Communication Skills • Teamwork/Collaboration • Research
Electrical and Electronics Repairers, Commercial and Industrial Equipment* (n=15)	<ul style="list-style-type: none"> • Hand Tools • Transformers • Electrical Systems • Wire Pulling • Customer Service 	<ul style="list-style-type: none"> • Troubleshooting • Physical Abilities • Problem Solving • Communication Skills • Research
Electrical and Electronics Installers and Repairers, Transportation Equipment* (n=0)	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A

Source: Burning Glass – Labor Insights
*California job advertisements

Exhibit 8 displays the typical entry-level education, educational attainment, and minimum advertised education requirements for the electronics occupational group. According to the Bureau of Labor Statistics, between 13% and 63% of incumbent workers in this field hold a community college-level of educational attainment; "some college, no degree" and an "associate degree." All employers posting job advertisements for the bachelor's degree-level occupational group sought candidates with a bachelor's degree or higher. The majority, 67% to 87%, of employers posting job advertisements for the community college-level occupational group sought candidates with a high school diploma or vocational training. Minimum advertised education requirement information is not available for electrical and electronics installers and repairers, transportation equipment since there were no job advertisements posted in the state.

Exhibit 8: 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
Bachelor's Degree-level						
Electrical Engineers	Bachelor's degree	13%	92	-	-	100%
Electronics Engineers, Except Computer**	Bachelor's degree	13%	3,206	-	-	100%
Community College-level						
Electrical and Electronic Engineering Technologists and Technicians	Associate degree	63%	239	76%	19%	5%
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay**	Postsecondary nondegree award	48%	102	87%	7%	6%
Electrical and Electronics Repairers, Commercial and Industrial Equipment**	Postsecondary nondegree award	48%	12	67%	-	33%
Electrical and Electronics Installers and Repairers, Transportation Equipment**	Postsecondary nondegree award	48%	0	N/A	N/A	N/A

Source: Emsi 2021.4, Burning Glass – Labor Insights

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

**California job advertisements

Exhibit 9 displays the work experience typically required to enter each occupation and the real-time work experience requirements from employer job ads. The majority of advertisements for the bachelor's degree-level occupations sought candidates with three years or more of previous work experience. Approximately half of the employers posting job advertisements for the community college-level occupational group sought candidates with three to five years of previous work experience. Advertised work experience information is not available for electrical and electronics installers and repairers, transportation equipment since there were no advertisements posted for this occupation in the state over the last 12 months.

Exhibit 9: 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
Bachelor's Degree-level					
Electrical Engineers	None	98	17%	52%	31%
Electronics Engineers, Except Computer*	None	2,900	16%	44%	40%
Community College-level					
Electrical and Electronic Engineering Technologists and Technicians	None	221	44%	49%	7%
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay*	Less than five years	99	31%	67%	2%
Electrical and Electronics Repairers, Commercial and Industrial Equipment*	None	14	50%	50%	-
Electrical and Electronics Installers and Repairers, Transportation Equipment*	None	0	N/A	N/A	N/A

Source: Emsi 2021.4, Burning Glass – Labor Insights

*California job advertisements

Programs Completions and Student Outcomes

Exhibit 10 displays student completions for regional electronics and electric technology (TOP 0934.00) programs over the last three academic years. Regional community colleges have issued 38 awards annually in electronics and electric technology programs in the previous three academic years. Program completion and student outcome methodologies can be found in the appendix.

Exhibit 10: 2017-20, Annual average community college awards for electronics and electric technology programs in the region

TOP 0934.00 – Electronics and Electric Technology	Associate Degree	Certificate requiring 30 to < 60-semester units	Certificate requiring 18 < 30-semester units	Certificate requiring 16 < 30-semester units	Certificate requiring 6 < 18-semester units	Total CC Annual Average Awards, Academic Years 2017-20
Barstow	-	-	-	-	1	1
Norco	3	-	3	1	0	8
San Bernardino	8	21	-	-	-	29
Victor Valley	-	0	-	-	-	0
Total	11	22	3	1	1	38

Source: MIS Data Mart

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 11. Among the students exiting electronics and electric technology programs in the region, 71% of students reported working in their field of study. The median annual earnings were \$36,316, and 74% attained a living wage. The outcome methodology is available in the appendix section of this report.

Exhibit 11: 0934.00 – Electronics and electric technology strong workforce program outcomes

Strong Workforce Program Metrics: 0934.00 – Electronics and Electric Technology Academic Year 2018-19, unless noted otherwise	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2019-20)	495	8,644
Completed 9+ career education units in one year (2019-20)	43%	31%
Perkins Economically disadvantaged students (2019-20)	80%	75%
Students who attained a noncredit workforce milestone in a year (2019-20)	-	87%
Students who earned a degree, certificate, or attained apprenticeship (2019-20)	17	518
Transferred to a four-year institution (transfers)	11	233
Job closely related to the field of study (2017-18)	71%	78%
Median annual earnings (all exiters)	\$36,316	\$37,820
Median change in earnings (all exiters)	47%	31%
Attained a living wage (completers and skills-builders)	74%	60%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Recommendation

Community college electronics and electric technology programs provide the knowledge, skills, and abilities that prepare students for employment in four community college-level occupations and two bachelor's degree-level occupations. This report's educational supply and employment demand portions focus solely on the community college-level jobs students will likely obtain after completing a community college electronics and electric technology program in the Inland Empire/Desert Region.

The community college-level electronics occupational group is expected to have 169 annual job openings and increase employment by 2% over the next five years in the region. The 10th percentile hourly earnings for the community college-level occupations are between \$24.80 and \$35.59 per hour, below the regional \$24.36 per hour self-sustainable wage standard for a single adult with one child.

Regional community college electronics and electric technology (TOP 0934.00) programs have issued 38 awards annually over the last three academic years. Among the students exiting electronics and electric technology programs in the region, 71% of students reported working in their field of study. The median annual earnings were \$36,316, and 74% attained a living wage.

The Centers of Excellence recommends expanding electronics and electric technology programs. The hourly earnings for the electronics occupations are strong. A comprehensive program may qualify students to enter each community college occupation detailed in this report or transfer to a four-year institution. Colleges considering this program should partner with applicable employers to document their demand for electronics and electric technology workers and the skills needed for students to earn self-sustainable earnings after exiting the program.

Contact

Michael Goss

Paul Vaccher

Centers of Excellence, Inland Empire/Desert Region

michael.goss@chaffey.edu

December 2021

References

Burning Glass Technologies. (2021). *Labor Insights/Jobs*. Retrieved from <https://www.burning-glass.com/>

California Community Colleges Chancellor's Office. LaunchBoard. (2021). *California Community Colleges LaunchBoard*. Retrieved from <https://www.calpassplus.org/Launchboard/Home.aspx>

California Community Colleges Chancellor's Office. LaunchBoard. (2021a). *Strong Workforce Program Metrics Data Element Dictionary*. Pg. 3. Retrieved from <https://www.calpassplus.org/MediaLibrary/calpassplus/launchboard/Documents/SWP-DED.PDF>

California Community Colleges Chancellor's Office. (2021). *Chancellor's Office Curriculum Inventory (COCI), version 3.0*. Retrieved from <https://coci2.ccctechcenter.org/programs>

California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. (2021). *Data Mart*. Retrieved from <https://datamart.cccco.edu/datamart.aspx>

California Community Colleges Chancellor's Office, Curriculum and Instructional Unit, Academic Affairs Division. (2012). *Taxonomy of Programs, 6th Edition, Corrected Version*. Retrieved from <https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Digital-Innovation-and-Infrastructure/Research/Files/TOPmanual6200909corrected12513.ashx?la=en&hash=94C709CA83C0380828415579395A5F536736C7C1>

Carnevale, A. P., Jayasundera, T., & Repnikov, D. (n.d.). *Understanding Online Job Ads Data*. Retrieved from https://cew.georgetown.edu/wp-content/uploads/2014/11/OCLM.Tech_Web.pdf

Economic Modeling Specialists International (Emsi). (2021). *Datarun 2021.4*. Retrieved from <https://www.economicmodeling.com/>

Labor Market Information Division. Employment Development Department of California. (2021). *Detailed Occupational Guides*. Retrieved from <https://www.labormarketinfo.edd.ca.gov/OccGuides/Search.aspx>

National Center for O*NET Development. (2021). *O*NET OnLine*. Retrieved from <https://www.onetonline.org/>

Pearce, D. University of Washington. (2021). *Self Sufficiency Standard – California*. Retrieved from <http://www.selfsufficiencystandard.org/california>

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

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

Bachelor's Degree-level

Electrical Engineers (17-2071)

Research, design, develop, test, or supervise the manufacturing and installation of electrical equipment, components, or systems for commercial, industrial, military, or scientific use.

Sample job titles: Circuits Engineer, Design Engineer, Electrical Controls Engineer, Electrical Design Engineer, Electrical Engineer, Electrical Project Engineer, Instrumentation and Electrical Reliability Engineer (I&E Reliability Engineer), Power Systems Engineer, Project Engineer, Test Engineer

Entry-Level Educational Requirement: Bachelor's degree

Training Requirement: None

Work Experience: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 13%

Electronics Engineers, Except Computer (17-2072)

Research, design, develop, or test electronic components and systems for commercial, industrial, military, or scientific use employing knowledge of electronic theory and materials properties. Design electronic circuits and components for use in fields such as telecommunications, aerospace guidance and propulsion control, acoustics, or instruments and controls.

Sample job titles: Design Engineer, Electronics Design Engineer, Evaluation Engineer, Integrated Circuit Design Engineer (IC Design Engineer), Product Engineer, Radio Frequency Engineer (RF Engineer), Research and Development Engineer (R and D Engineer), Test Engineer

Entry-Level Educational Requirement: Bachelor's degree

Training Requirement: None

Work Experience: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 13%

Community College-level

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%

Electrical and Electronics Installers and Repairers, Transportation Equipment (49-2093)

Install, adjust, or maintain mobile electronics communication equipment, including sound, sonar, security, navigation, and surveillance systems on trains, watercraft, or other mobile equipment.

Sample job titles: Critical Systems Technician, Electronic Bench Technician, Electronics Mechanic, Locomotive Electrician, Power Technician (Power Tech), Ship Yard Electrical Person

Entry-Level Educational Requirement: Postsecondary nondegree award

Training Requirement: More than twelve months on-the-job training

Work Experience: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 48%

Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)

Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas.

Sample job titles: Control Technician, E and I Mechanic (Electrical and Instrument Mechanic), E and I Mechanic (Electrical and Instrumentation Mechanic), Electrical and Instrument Technician (E and I Tech), Electrical Maintenance Technician, Electronic Technician, I and C Tech (Instrument and Control Technician), Instrument and Electrical Technician (I and E Tech), Repair Technician, Scale Technician

Entry-Level Educational Requirement: Postsecondary nondegree award

Training Requirement: More than twelve months on-the-job training

Work Experience: None

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 48%

Electrical and Electronics Repairers, Powerhouse, Substation, and Relay (49-2095)

Inspect, test, repair, or maintain electrical equipment in generating stations, substations, and in-service relays.

Sample job titles: Electrical and Instrumentation Technician (E and I Technician), Electrical Technician, Instrument and Control Technician (I and C Technician), Instrumentation and Control Technician (I and C Technician), Relay Technician, Substation Electrician, Substation Mechanic, Substation Technician, Substation Wireman, Wireman

Entry-Level Educational Requirement: Postsecondary nondegree award

Training Requirement: Between one and twelve months on-the-job training

Work Experience: Less than five years

Incumbent workers with a Community College Award or Some Postsecondary Coursework: 48%

Appendix: Methodology

Exhibit 10 displays the average annual California Community College (CCC) awards conferred during the three academic years between 2017 and 2020 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 electronics occupational group in the Inland Empire/Desert Region (Riverside and San Bernardino Counties combined)

Occupation (SOC)	2020 Jobs	5-Year Change (New Jobs)	5-Year % Change (New Jobs)	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 Engineers (17-2071)	1,079	62	6%	84	\$29.66 to \$71.05	\$46.40	\$101,400	Bachelor's degree & None	None
Electronics Engineers, Except Computer (17-2072)	742	27	4%	54	\$32.38 to \$73.47	\$58.36	\$115,900	Bachelor's degree & None	None
Bachelor's Degree-level Total	1,821	89	5%	137	-	-	-	-	-
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	882	22	2%	87	\$24.80 to \$51.06	\$34.92	\$74,800	Associate's degree & None	None
Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)	586	19	3%	51	\$25.30 to \$49.25	\$34.40	\$74,100	Postsecondary nondegree award & More than 12 months	None
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay (49-2095)	234	(9)	(4%)	18	\$35.59 to \$64.33	\$49.19	\$101,500	Postsecondary nondegree award & 1-12 months	Less than five years
Electrical and Electronics Installers and Repairers, Transportation Equipment (49-2093)	160	(1)	(0%)	13	\$25.87 to \$39.54	\$29.60	\$64,100	Postsecondary nondegree award & More than 12 months	None
Community College-level Total	1,862	31	2%	169	-	-	-	-	-
Total	3,683	120	3%	306	-	-	-	-	-

Source: Emsi 2021.4