

January 2020

Labor Market Analysis

Electronics and Electric Technology



California
Community
Colleges



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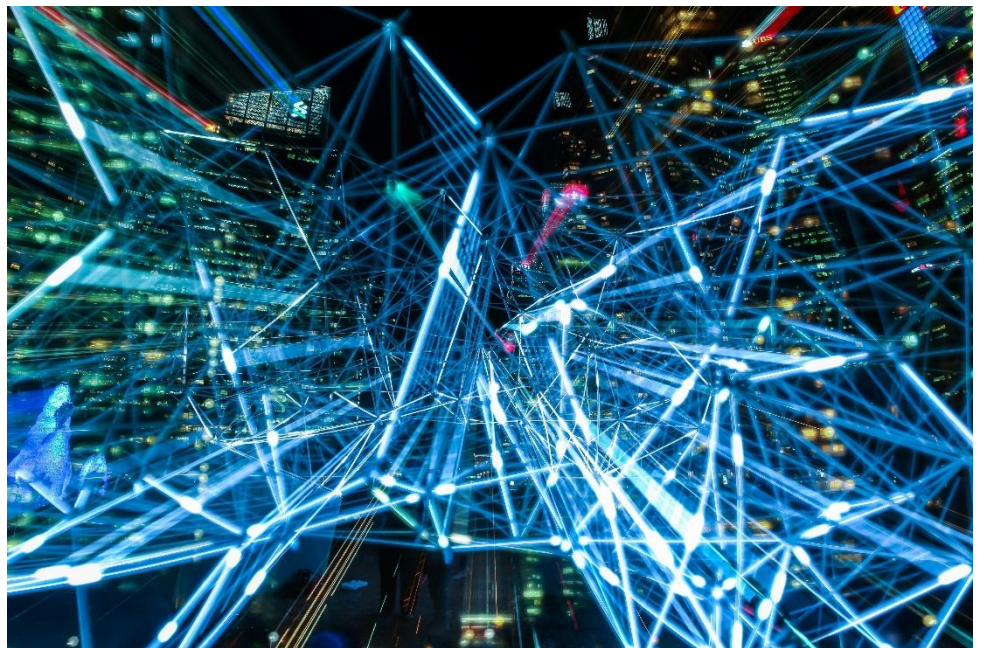


Table of Contents

Summary.....	3
Key findings.....	3
Introduction.....	4
Occupational Demand.....	7
Wages.....	8
Job Postings.....	9
Job Titles.....	9
Salaries.....	10
Education.....	11
Baseline and Specialized Skills.....	11
Software Skills.....	12
Skill Cluster Projections.....	12
Certifications.....	13
Education, Work Experience & Training.....	14
Supply.....	14
Program-level analysis.....	15
Gap Analysis.....	16
Student Outcomes.....	17
Conclusion.....	17
Recommendation.....	18
Appendix A: Methodology & Data Sources.....	19

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Summary

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for electronics and electric technology. Six occupations related to electronics and electric technology were identified for Fresno City College:

- Telecommunications Equipment Installers and Repairers, Except Line Installers (SOC 49-2022)
- First-Line Supervisors of Mechanics, Installers, and Repairers (SOC 49-1011)
- Electrical and Electronics Engineering Technicians (SOC 17-3023)
- Electronics Engineers, Except Computer (SOC 17-2072)
- Electrical and Electronics Repairers, Commercial and Industrial Equipment (SOC 49-2094)
- Electric Motor, Power Tool, and Related Repairers (SOC 49-2092)

Key findings:

- **Occupational demand** — Nearly 7,650 workers were employed in jobs related to electronics and electric technology in 2018 in the South Central Valley/Southern Mother Lode (SCV/SML) subregion. The largest occupation is telecommunications equipment installers and repairers, except line installers with 2,831 workers in 2018, a projected employment decline of 5% over the next five years, and 307 annual openings.
- **Wages** — The occupation earning the highest median wages is electronics engineers, except computer, \$55.60/hour in the subregion and \$54.67/hour in the region.
- **Employers** — Top employers in the subregion are the United States Census Bureau, Lockheed Martin Corporation, and Jones Lang Lasalle Incorporated.
- **Job titles** — The most common occupational title in job postings in the subregion is first-line supervisors of mechanics, installers, and repairers. The most common job title is maintenance supervisor.
- **Skills and certifications** — The top baseline skill is communication, the top specialized skill is repair, and the top software skill is Microsoft Excel. The most in-demand certification is a driver's license.
- **Education** — Five of the six occupations require less education than a bachelor's degree and are considered middle-skill occupations that are relevant to community college education. The exception is electronics engineers, except computer.
- **Supply** — Analysis of postsecondary completions in the region shows that on average 337 awards were conferred in the Central Valley/Mother Lode region each year.

Based on a comparison of occupational demand and supply, there is an undersupply of 453 trained workers in the subregion and 830 workers in the region. The Center of Excellence recommends that Fresno City College work with the Energy, Construction and Utilities Regional Director, the college's advisory board, and local industry in the expansion of programs to address the shortage of electronics and electric technology workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Fresno City College to provide labor market information for electronics and electric technology. Review of the Taxonomy of Programs (TOP) found the following programs are appropriate for this analysis:

- Electro-Mechanical Technology-093500
- Electronics and Electric Technology-093400
- Industrial Electronics-093420
- Industrial Systems Technology and Maintenance-094500
- Manufacturing and Industrial Technology-095600
- Telecommunications Technology-093430

The geographical focus for this report is the South Central Valley/Southern Mother Lode (SCV/SML) subregion, but regional demand and supply data has been included for broader applicability and use. Analysis of the program and occupational data related to electronics and electric technology resulted in the identification of electronics and electric technology applicable occupations. The Standard Occupational Classification (SOC) System titles and codes used in this report are:

- Telecommunications Equipment Installers and Repairers, Except Line Installers (SOC 49-2022)
- First-Line Supervisors of Mechanics, Installers, and Repairers (SOC 49-1011)
- Electrical and Electronics Engineering Technicians (SOC 17-3023)
- Electronics Engineers, Except Computer (SOC 17-2072)
- Electrical and Electronics Repairers, Commercial and Industrial Equipment (SOC 49-2094)
- Electric Motor, Power Tool, and Related Repairers (SOC 49-2092)

The SOC codes, occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown in Exhibit 1. O*NET data was not available for Electrical and Electronics Engineering Technicians.

Exhibit 1. SOC titles, job descriptions, sample job titles, and knowledge and skills for electronics and electric technology

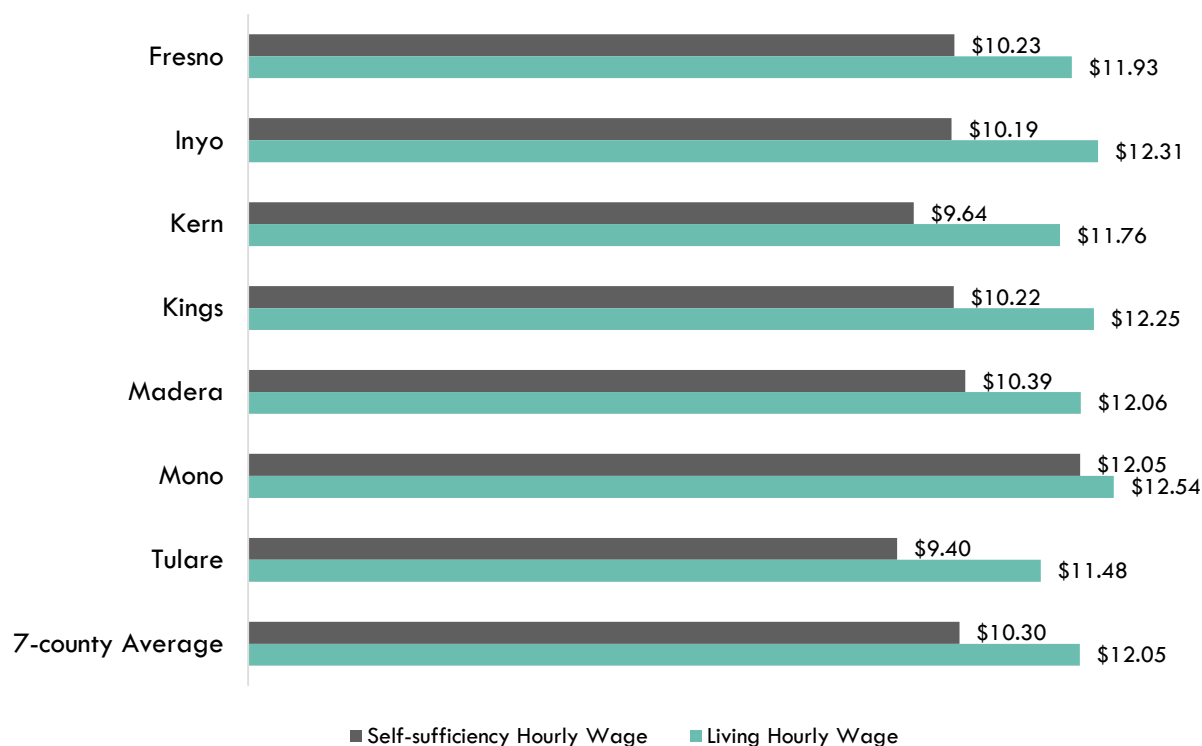
SOC Title & Code	Description	Sample Job Titles	Knowledge & Skills
Telecommunications Equipment Installers and Repairers, Except Line Installers (SOC 49-2022)	Install, set-up, rearrange, or remove switching, distribution, routing, and dialing equipment used in central offices or headends. Service or repair telephone, cable television, Internet, and other communications equipment on customers' property. May install communications	Broadband Technician, Central Office Technician, Combination Technician, Customer Service Technician (CST), Field Technician, Install and Repair Technician, Installer, Outside Plant Technician, Service Technician,	Knowledge Customer and Personal Service Telecommunications Computers and Electronics English Language Mathematics Skills Repairing Troubleshooting

SOC Title & Code	Description	Sample Job Titles	Knowledge & Skills
	equipment or communications wiring in buildings.	Telecommunications Technician	Critical Thinking Operation Monitoring Quality Control Analysis
First-Line Supervisors of Mechanics, Installers, and Repairers (SOC 49-1011)	Directly supervise and coordinate the activities of mechanics, installers, and repairers.	Crew Leader, Electrical Foreman, Facilities Manager, Facility Maintenance Supervisor, Maintenance Foreman, Maintenance Manager, Maintenance Planner, Maintenance Supervisor, Production Crew Supervisor, Superintendent	Knowledge Mechanical Customer and Personal Service Administration and Management Public Safety and Security English Language Skills Management of Personnel Resources Monitoring Critical Thinking Coordination Speaking
Electronics Engineers, Except Computer (SOC 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.	Design Engineer, Electronics Design Engineer, Engineering Manager, Evaluation Engineer, Integrated Circuit Design Engineer (IC Design Engineer), Product Engineer, Radio Frequency Engineer (RF Engineer), Research and Development Engineer (R&D Engineer), Test Engineer, Test Engineering Manager	Knowledge Engineering and Technology Computers and Electronics Mathematics Design Physics Skills Complex Problem Solving Critical Thinking Reading Comprehension Speaking Systems Analysis
Electrical and Electronics Repairers, Commercial and Industrial Equipment (SOC 49-2094)	Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas.	Control Technician, Electrical and Instrument Mechanic, Electrical and Instrument Technician (E&I Tech), Electrical Maintenance Technician, Electrical Technician, I&C Tech (Instrument and	Knowledge Computers and Electronics Engineering and Technology Mechanical English Language Mathematics Skills

SOC Title & Code	Description	Sample Job Titles	Knowledge & Skills
		Control Technician), Instrument and Electrical Technician (I&E Tech), Repair Technician, Service Technician, Technical Support Specialist	Operation Monitoring Quality Control Analysis Repairing Troubleshooting Critical Thinking
Electric Motor, Power Tool, and Related Repairers (SOC 49-2092)	Repair, maintain, or install electric motors, wiring, or switches.	Electric Motor Mechanic, Electric Motor Repairman, Electric Motor Winder, Electro Mechanic, Maintenance Technician, Power Tool Repair Technician, Repair Technician, Service Technician, Tool Repair Technician, Tool Technician	Knowledge Mechanical English Language Production and Processing Administration and Management Customer and Personal Service Skills Repairing Equipment Maintenance Troubleshooting Critical Thinking Equipment Selection

The average self-sufficiency wage for a single adult in the South Central Valley/Southern Mother Lode (SCV/SML) subregion is \$10.30/hour, and the current average living wage for a single adult is \$12.05/hour. Self-sufficiency and living wage data by county and the overall seven-county average are shown in Exhibit 2. In the wages sections of this report, the 25th percentile denotes entry-level wages, and median represents experienced wages.

Exhibit 2. Self-sufficiency and living wages in the SCV/SML subregion



Occupational Demand

The South Central Valley/Southern Mother Lode subregion employed 7,646 workers in electronics and electric technology occupations in 2018 (Exhibit 3). The largest occupation is telecommunications equipment installers and repairers, except line installers with 2,831 workers in 2018. This occupation is projected to decline by 5% over the next five years and has the greatest number of projected annual openings, 307.

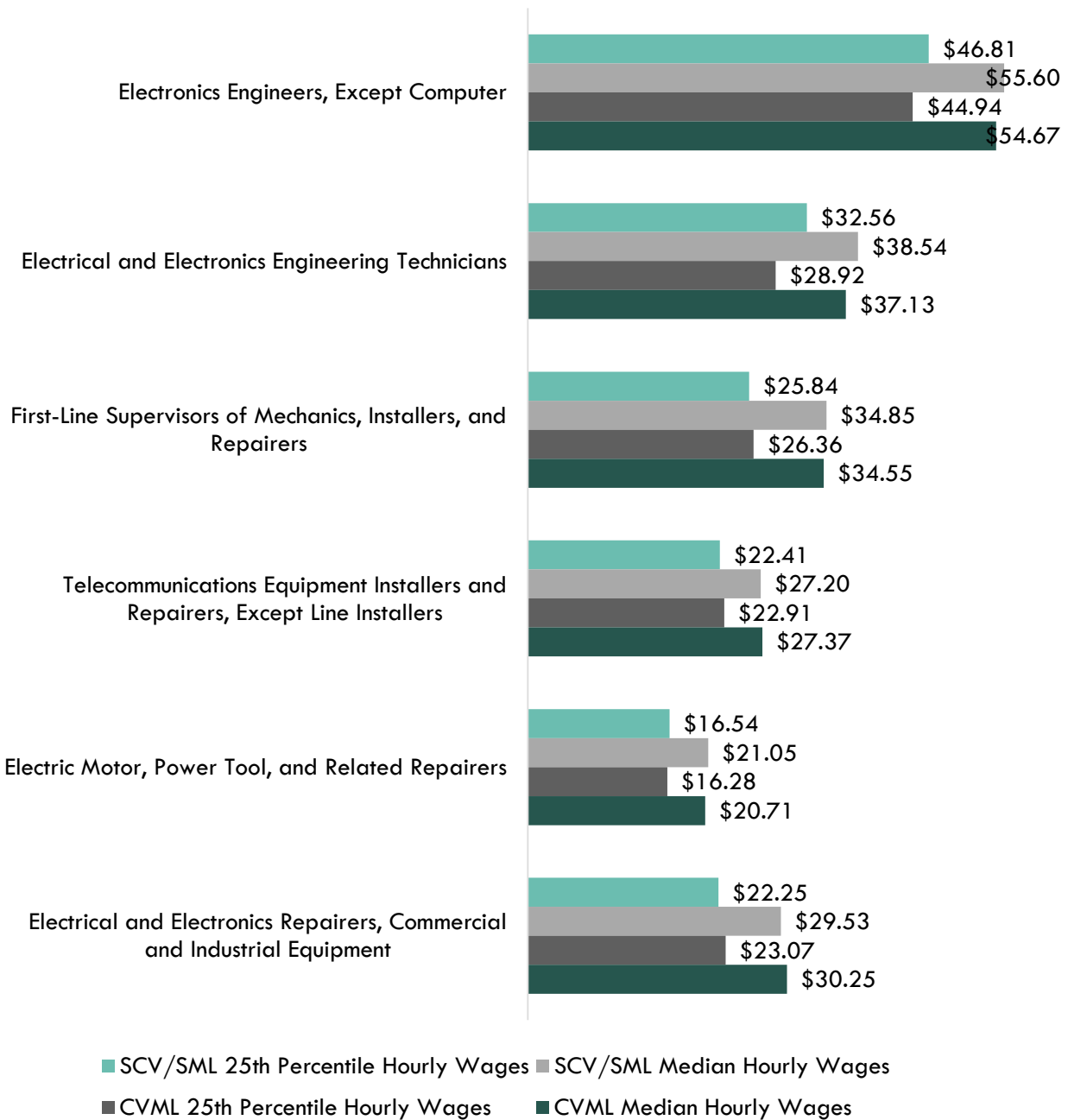
Exhibit 3. Electronics and electric technology employment and occupational projections in the SCV/SML subregion

Occupation	2018 Jobs	2023 Jobs	5-year Change	5-year % Change	Annual Openings
Telecommunications Equipment Installers and Repairers, Except Line Installers	2,831	2,695	(136)	(5%)	307
First-Line Supervisors of Mechanics, Installers, and Repairers	2,703	2,884	181	7%	293
Electrical and Electronics Engineering Technicians	864	876	12	1%	88
Electronics Engineers, Except Computer	789	807	18	2%	57
Electrical and Electronics Repairers, Commercial and Industrial Equipment	406	423	17	4%	40
Electric Motor, Power Tool, and Related Repairers	52	55	3	6%	6
Total	7,646	7,740	94	1%	790

Wages

Exhibit 4 compares the entry-level and experienced wages of the electronics and electric technology occupations. All occupations exceed the region's average living wage and self-sufficiency wage. The occupation earning the highest median wages is electronics engineers, except computer, \$55.60/hour in the subregion and \$54.67/hour in the region.

Exhibit 4. Entry-level and experienced wage comparison for electronics and electric technology in the SCV/SML subregion and region



Job Postings

There were 1,382 job postings for the six occupations in the SCV/SML subregion from January 2019 through December 2019. The top employers advertising these job postings are listed in Exhibit 5.

Exhibit 5. Top employers of electronics and electric technology by number of job postings

Employer	Job Postings
United States Census Bureau	27
Lockheed Martin Corporation	17
Jones Lang Lasalle Incorporated	16
Army National Guard	14
Halliburton	14
US Air Force	14
DynCorp International	13
US Government	13
Grimmway Farms	12
US Department of Commerce	12

Job posting analysis also included the top industries hiring positions related to electronics and electric technology (Exhibit 6).

Exhibit 6. Top industries for electronics and electric technology by number of job postings

Industry	Job Postings
National Security and International Affairs	49
Activities Related to Real Estate	47
Employment Services	40
Administration of Economic Program	39
Aerospace Product and Parts Manufacturing	37
Building Equipment Contractors	28
Executive, Legislative, and Other General Government Support	25
Automotive Repair and Maintenance	21
Colleges, Universities, and Professional Schools	19
Support Activities for Mining	19

Job Titles

Exhibit 7 shows how job postings for the targeted occupations in the SCV/SML subregion are distributed across eight O*NET OnLine occupations. The occupational title first-line supervisors of mechanics, installers, and repairers is listed in the most job postings, 869, followed by electronics engineering technicians, 218 job postings.

Exhibit 7. Top occupational titles in job postings for electronics and electric technology

Occupational Title	Job Postings
First-Line Supervisors of Mechanics, Installers, and Repairers	869
Electronics Engineering Technicians	218
Telecommunications Equipment Installers and Repairers, Except Line Installers	186
Electronics Engineers, Except Computer	62
Radio Frequency Identification Device Specialists	21
Electric Motor, Power Tool, and Related Repairers	16
Electrical Engineering Technicians	9
Electrical and Electronics Repairers, Commercial and Industrial Equipment	1

Analysis of the 1,382 advertised job titles for the targeted occupations reveals the top title is maintenance supervisor, occurring in 250 job postings, followed by maintenance manager, 137 job postings (Exhibit 8).

Exhibit 8. Top job titles by number of job postings for electronics and electric technology

Job Title	Job Postings
Maintenance Supervisor	250
Maintenance Manager	137
Electronics Technician	66
Field Technician	58
Electrical Technician	57
Service Manager	48
Electronics Engineer	28
Field Manager	27
Staff Services Manager	25
Service Supervisor	23

Salaries

Exhibit 9 shows the “Market Salaries” for electronics and electric technology occupations that are calculated by Burning Glass which uses a machine learning model built off of millions of job postings every year, and accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

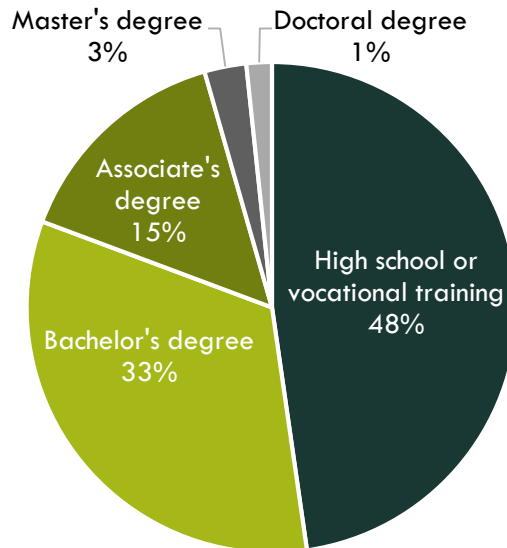
Exhibit 9. Salaries for electronics and electric technology

Market Salary Percentile	Salary Amount
10th Percentile	33,746
25th Percentile	41,554
50th Percentile	54,794
75th Percentile	68,915
90th Percentile	82,383

Education

Of the 1,382 job postings, 692 listed an education level preferred for the positions being filled. Of those, 33% requested a bachelor's degree, 48% requested a high school diploma or vocational training, and 15% requested an associate degree (Exhibit 10).

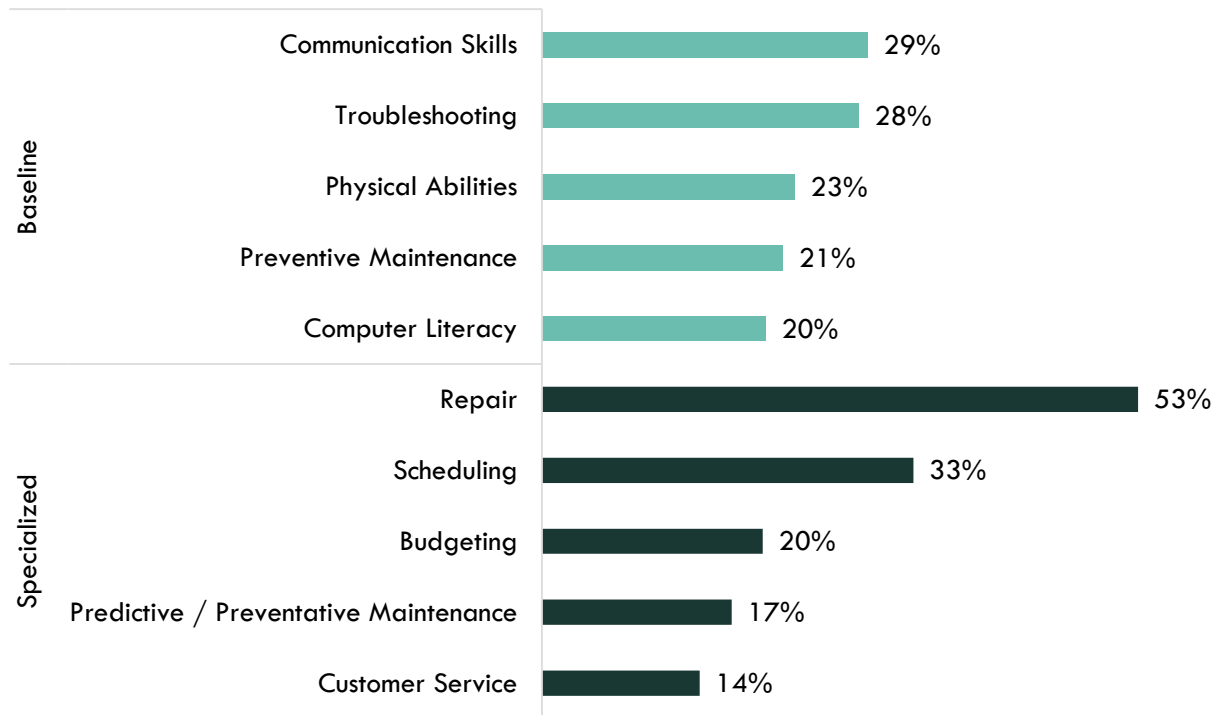
Exhibit 10. Education levels requested in job postings for electronics and electric technology



Baseline and Specialized Skills

Exhibit 11 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are communication, 29% of job postings, troubleshooting, 28%, and physical abilities, 23%. The top three specialized skills are repair, 53% of job postings, scheduling, 33%, and budgeting, 20%.

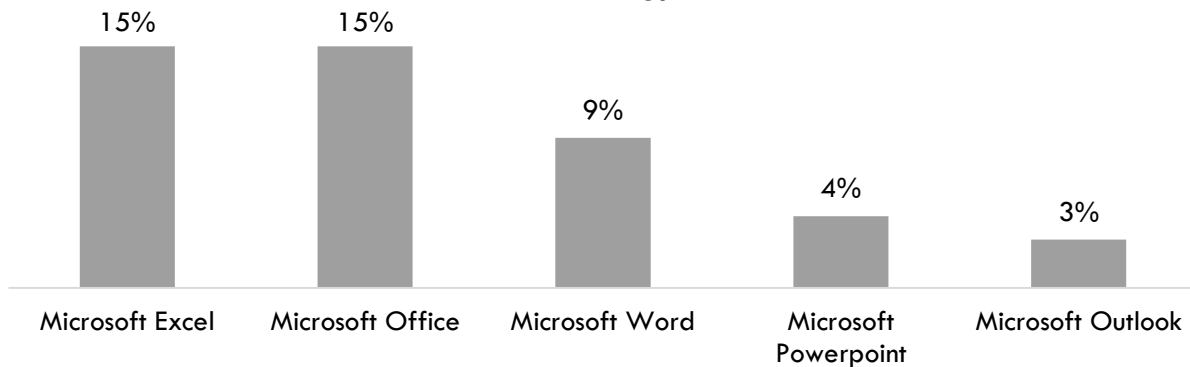
Exhibit 11. In-demand electronics and electric technology baseline and specialized skills



Software Skills

Analysis also included the software skills most in demand by employers. Microsoft Excel and Office rank first and second (Exhibit 12).

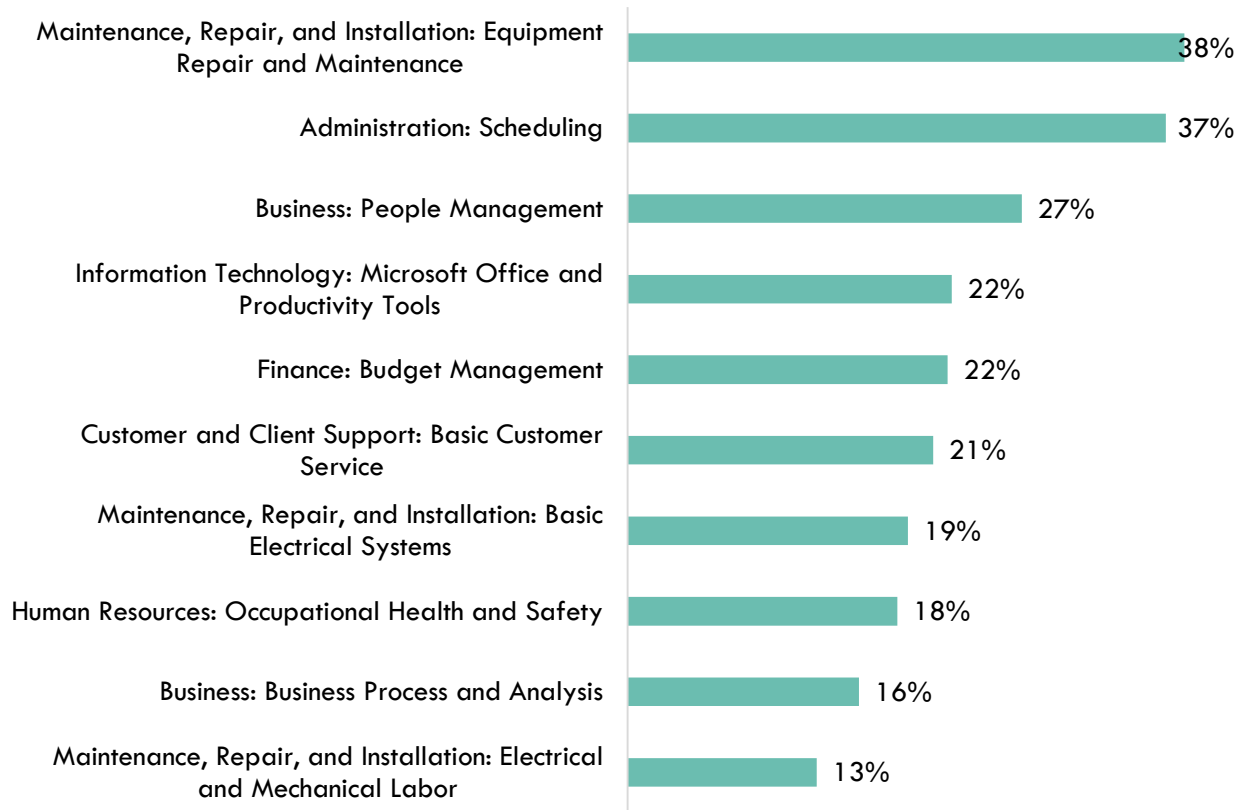
Exhibit 12. In-demand electronics and electric technology software skills



Skill Cluster Projections

Of the 1,382 job postings, 1,106 postings contained skill projections. An evaluation of the skill clusters that will have the greatest gains in level of importance shows that the top areas are maintenance, repair, and installation: equipment repair and maintenance, 38%; administration: scheduling, 37%; and business: people management, 27% (Exhibit 13).

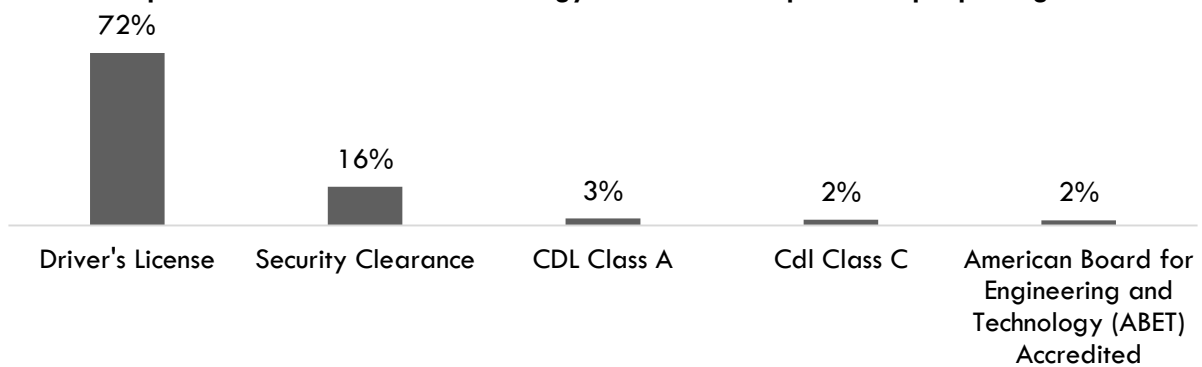
Exhibit 13. Skill cluster projections for electronics and electric technology



Certifications

Of the 1,382 job postings, 545 contained certification data. Of those, 72% indicated a need for a driver's license. The next top certifications are Security Clearance and CDL Class A (Exhibit 14). (Due to the low number of job postings with certifications listed, the chart below may not be representative of the full sample.)

Exhibit 14. Top electronics and electric technology certifications requested in job postings



Education, Work Experience & Training

Five of the six occupations require less education than a bachelor's degree and are considered middle-skill occupations that are relevant to community college education (Exhibit 15). A bachelor's degree is typically required for electronics engineers, except computer. Only 16.6% workers in this occupation have less than a bachelor's degree.

Exhibit 15. Education, work experience, training and Current Population Survey results for electronics and electric technology occupations¹

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Electronics Engineers, Except Computer	Bachelor's degree	None	None	16.6%
Electrical and Electronics Engineering Technicians	Associate degree	None	None	53.6%
First-Line Supervisors of Mechanics, Installers, and Repairers	High school diploma or equivalent	Less than 5 years	None	43.8%
Telecommunications Equipment Installers and Repairers, Except Line Installers	Postsecondary nondegree award	None	Moderate-term	52.0%
Electric Motor, Power Tool, and Related Repairers	High school diploma or equivalent	Less than 5 years	Moderate-term	46.0%
Electrical and Electronics Repairers, Commercial and Industrial Equipment	Postsecondary nondegree award	None	Long-term	51.8%

Supply

Analysis of program data from the California Community Colleges Chancellor's Office Data Mart included the TOP codes:

- Electro-Mechanical Technology-093500
- Electronics and Electric Technology-093400
- Industrial Electronics-093420
- Industrial Systems Technology and Maintenance-094500
- Manufacturing and Industrial Technology-095600
- Telecommunications Technology-093430

Analysis of the last three years of TOP code data shows that, on average, 337 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 16).

¹ "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

Exhibit 16. Postsecondary supply for electronics and electric technology occupations in the region

College	Bachelor's	Certificates	Degrees	Non-credit	Other	Subtotal
<i>Bakersfield</i>	2					2
<i>San Joaquin Delta</i>		2	1			3
<i>Bakersfield</i>		65	9			74
<i>Fresno City</i>		10	16			26
<i>Merced</i>		1	1			2
<i>San Joaquin Delta</i>		14				14
<i>Sequoias</i>		3			4	7
<i>Fresno City</i>		20				20
<i>Merced</i>		0	1			1
<i>Modesto Junior</i>		6	8			14
<i>Fresno City</i>				13		13
<i>Merced</i>		1	1			2
<i>Modesto Junior</i>			0			0
<i>San Joaquin Delta</i>		3	0			3
<i>Sequoias</i>		37	4		3	43
<i>Bakersfield</i>		1	4			4
<i>Cerro Coso</i>		1	1			2
<i>Fresno City</i>		4	2	20		25
<i>Modesto Junior</i>		5				5
<i>Porterville</i>		28				28
<i>Fresno City College</i>		29				29
<i>Fresno City</i>		19				19
Total	2	248	47	33	7	337

Program-level analysis

Exhibit 17 shows awards by program in the region. Electronics and Electric Technology-093400 shows 25 degrees conferred each year on average, but most programs are dominated by certificates.

Exhibit 17. Postsecondary supply by program in the region

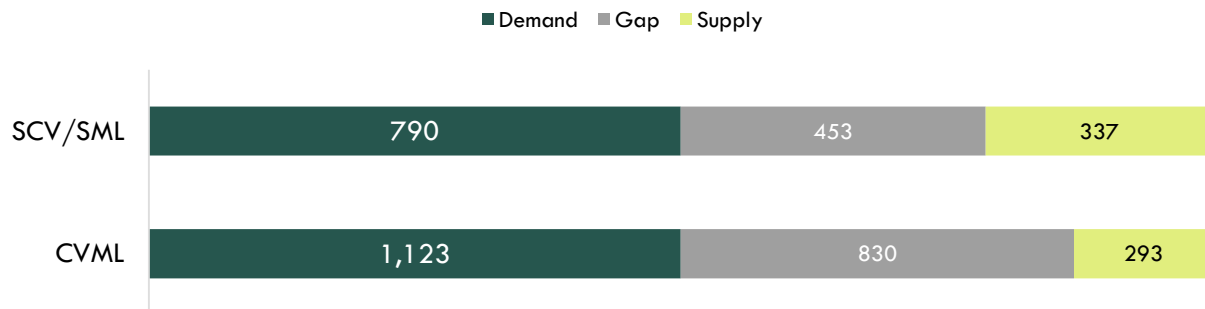
Program	Awards
Electro-Mechanical Technology-093500	
Associate of Science (A.S.) degree	1
Baccalaureate of Science (B.S.) degree	2
Certificate requiring 18 to < 30 semester units	2
Program Subtotal	5
Electronics and Electric Technology-093400	
Associate of Arts (A.A.) degree	1
Associate of Science (A.S.) degree	25
Certificate requiring 18 to < 30 semester units	2
Certificate requiring 30 to < 60 semester units	36
Certificate requiring 6 to < 18 semester units	55

Program	Awards
Other Credit Award, < 6 semester units	4
Program Subtotal	123
Industrial Electronics-093420	
Associate of Arts (A.A.) degree	1
Associate of Science (A.S.) degree	7
Certificate requiring 12 to < 18 units	20
Certificate requiring 30 to < 60 semester units	5
Certificate requiring 6 to < 18 semester units	1
Program Subtotal	34
Industrial Systems Technology and Maintenance-094500	
Associate of Arts (A.A.) degree	1
Associate of Science (A.S.) degree	4
Certificate requiring 18 to < 30 semester units	1
Certificate requiring 30 to < 60 semester units	40
Noncredit award requiring from 192 to < 288 hours	13
Other Credit Award, < 6 semester units	3
Program Subtotal	62
Manufacturing and Industrial Technology-095600	
Associate of Science (A.S.) degree	6
Certificate requiring 18 to < 30 semester units	41
Certificate requiring 30 to < 60 semester units	5
Certificate requiring 6 to < 18 semester units	21
Noncredit award requiring from 480 to < 960 hours	20
Telecommunications Technology-093430	
Certificate requiring 12 to < 18 units	19
Program Subtotal	112
Total	337

Gap Analysis

There is an undersupply of 453 electronics and electric technology workers in the SCV/SML subregion and 830 workers in the region (Exhibit 18).

Exhibit 18. Electronics and electric technology workforce annual demand and supply in the SCV/SML subregion and region



Student Outcomes

Exhibit 19 summarizes employment and wage outcomes from the California Community College Chancellor's Cal-PASS Plus LaunchBoard for the TOP codes related to electronics and electric technology. Across the region, 161 manufacturing and industrial technology students received a degree or certificate, and 34 electronics and electric technology students transferred. A higher percentage of industrial systems technology and maintenance students reported obtaining a job closely related to their field of study while a higher percentage of industrial electronics students reported a median change in earnings.

Exhibit 19: Regional metrics for the TOP codes related to electronics and electric technology

Metric	Electronics & Electric Technology 093400	Industrial Electronics 093420	Electro-Mechanical Technology 093500
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	54	43	11
Number of Students Who Transferred	34	*	*
Job Closely Related to Field of Study	88%	79%	*
Median Change in Earnings	41%	67%	*
Attained a Living Wage	65%	61%	*
* denotes data not available.			

Metric	Industrial Systems Technology & Maintenance 094500	Manufacturing & Industrial Technology 095600
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	58	161
Number of Students Who Transferred	*	13
Job Closely Related to Field of Study	93%	82%
Median Change in Earnings	61%	54%
Attained a Living Wage	82%	77%
* denotes data not available.		

Conclusion

The entry-level wages of the six occupations exceed the SCV/SML subregion's self-sufficiency and living wages for one adult. There were 1,382 job postings in the past 12 months for occupations related to electronics and electric technology in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is communication, and the top specialized skill is repair.
- The top software skill is Microsoft Excel.
- The top certification is a driver's license.

There is an undersupply of trained workers, a shortage of 453 in the SCV/SML subregion and 830 in the region.

Recommendation

Based on these findings, it is recommended that Fresno City College work with the Energy, Construction and Utilities Regional Director, the college's advisory board, and local industry in the expansion of programs to address the shortage of electronics and electric technology in the region.

Appendix A: Methodology & Data Sources

Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor’s Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: economicmodeling.com .
Living Wage	A living wage calculator that estimates the cost of living in a specific community or region: livingwage.mit.edu .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: https://www.bls.gov/emp/tables/educational-attainment.htm .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov .
Job Posting and Skills Data	Burning Glass: burning-glass.com/ .
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: onetonline.org .

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

Living Wage: The cost of living in a specific community or region for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs, or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.

Wages Family Compositions: The living wage calculator estimates the living wage needed to support families. For single adult families, the adult is assumed to be employed full time. For two adult families where both adults are in the labor force, both adults are assumed to be employed full time. For two adult families where one adult is not in the labor force, one of the adults is assumed to be employed full time while the other non-wage-earning adult provides full-time child care for the family's children. Full-time work is assumed to be year-round, 40 hours per week for 52 weeks, per adult. Families with one child are assumed to have a 'young child' (4 years old). Families with two children are assumed to have a 'young child' and a 'child' (9 years old). Families with three children are assumed to have a 'young child,' a 'child,' and a 'teenager' (15 years old).