

Labor Market Analysis: 0934.20/Industrial Electronics

Semi-Conductor Technician - Certificate requiring 30 to <60 semester units

Los Angeles Center of Excellence, October 2023

Summary

Program Endorsement:	Endorsed: All Criteria Met <input type="checkbox"/>	Endorsed: Some Criteria Met <input checked="" type="checkbox"/>	Not Endorsed <input type="checkbox"/>
Program Endorsement Criteria			
Supply Gap:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Living Wage: (Entry-Level, 25th)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Education:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Emerging Occupation(s)			
	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	

The Los Angeles Center of Excellence for Labor Market Research (LA COE) prepared this report to provide regional labor market supply and demand data related to five middle-skill occupations:

- **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.¹
- **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.²
- **Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)** Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas.³
- **Electrical and Electronic Equipment Assemblers (51-2022)** Assemble or modify electrical or electronic equipment, such as computers, test equipment telemetering systems, electric motors, and batteries.⁴
- **Semiconductor Processing Technicians (51-9141)** Perform any or all of the following functions in the manufacture of electronic semiconductors: load semiconductor material into furnace; saw formed ingots into segments; load individual segment into crystal growing chamber and monitor controls; locate crystal axis in ingot using x-ray equipment and saw

¹ [Electrical and Electronic Engineering Technologists and Technicians \(bls.gov\)](#)

² [Industrial Engineering Technologists and Technicians \(bls.gov\)](#)

³ [Electrical and Electronics Installers and Repairers \(bls.gov\)](#)

⁴ [Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers \(bls.gov\)](#)

ingots into wafers; and clean, polish, and load wafers into series of special purpose furnaces, chemical baths, and equipment used to form circuitry and change conductive properties.⁵

Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree.⁶ This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations.

Based on the available data, there appears to be a supply gap for these middle-skill occupations of interest in the region. While the majority of annual openings have entry-level wages that are lower than the self-sufficiency standard wage in both Los Angeles and Orange counties, more than one-third of current workers in the field have completed some college or an associate degree. **Therefore, due to some of the criteria being met, the LA COE endorses this proposed program.** Detailed reasons include:

Demand:

- **Supply Gap Criteria** – Over the next five years, **2,263 jobs are projected to be available annually** in the region due to retirements and workers leaving the field, **which is more than the three-year average of 963 awards conferred** by educational institutions in the region.
- **Living Wage Criteria** – Within Los Angeles County, the majority (64%) of annual job openings for these middle-skill occupations have **entry-level wages below the self-sufficiency standard hourly wage** (\$18.10/hour).⁷
- **Educational Criteria** – Within the greater LA/OC region, **67% of the annual job openings** for middle-skill occupations related to semi-conductors **typically require a high school diploma or equivalent.**
 - However, the national-level educational attainment data indicates **between 28% and 63% of workers in the field have completed some college or an associate degree.**

Supply:

- There are **22 community colleges** in the greater LA/OC region that issue awards related to semi-conductors, conferring an average of **842 awards annually** between 2019 and 2022.

⁵ [Semiconductor Processing Technicians \(bls.gov\)](https://www.bls.gov)

⁶ The COE classifies middle-skill jobs as the following:

- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

⁷ Self-Sufficiency Standard wage data was pulled from The Self-Sufficiency Standard Tool for California. For more information, visit: <http://selfsufficiencystandard.org/california>.

- Between 2019 and 2021, there was an average of **121 awards conferred annually** in related training programs by non-community college institutions throughout the greater LA/OC region.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for these middle-skill occupations related to semi-conductors. In the greater Los Angeles/Orange County region, the number of jobs related to these occupations is projected to decrease by 4% through 2026. However, there will be more than 2,200 job openings per year through 2027 due to retirements and workers leaving the field.

Exhibit 1: Occupational demand in Los Angeles and Orange Counties⁸

Geography	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	Annual Openings
Los Angeles	12,195	11,459	(736)	(6%)	1,306
Orange	8,602	8,501	(101)	(1%)	957
Total	20,797	19,961	(836)	(4%)	2,263

Wages

The labor market endorsement in this report considers the entry-level hourly wages for these middle-skill occupations related to semi-conductors in Los Angeles County as they relate to the county's self-sufficiency standard wage. Orange County wages are included below in order to provide a complete analysis of the greater LA/OC region. Detailed wage information, by county, is included in Appendix A.

Los Angeles County

The majority (64%) of annual openings for these middle-skill occupations have entry-level wages below the self-sufficiency standard wage for one adult (\$18.10 in Los Angeles County). Typical entry-level hourly wages are in a range between \$15.18 and \$27.10. Three occupations have entry-level wages above the self-sufficiency standard wage: *electrical and electronic engineering technologists and technicians* (\$27.10), *industrial engineering technologists and technicians* (\$26.84), and *electrical and electronics repairers, commercial and industrial equipment* (\$23.79). Experienced workers can expect to earn wages between \$20.87 and \$47.32, which are higher than the self-sufficiency standard.

Exhibit 2: Earnings for Occupations in LA County

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)	Median Annual Earnings*
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	\$27.10	\$32.76	\$40.59	\$68,100

⁸ Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)	Median Annual Earnings*
Industrial Engineering Technologists and Technicians (17-3026)	\$26.84	\$36.19	\$47.32	\$75,300
Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)	\$23.79	\$32.30	\$47.31	\$67,200
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers (51-2028)	\$16.36	\$18.20	\$22.64	\$37,900
Semiconductor Processing Technicians (51-9141)	\$15.18	\$16.91	\$20.87	\$35,200

*Rounded to the nearest \$100

Orange County

The majority (72%) of annual openings for these middle-skill occupations have entry-level wages below the self-sufficiency standard wage for one adult (\$20.63 in Orange County). Typical entry-level hourly wages are in a range between \$17.45 and \$28.70. Three occupations have entry-level wages above the self-sufficiency standard wage: *electrical and electronic engineering technologists and technicians* (\$28.70), *industrial engineering technologists and technicians* (\$28.60), and *electrical and electronics repairers, commercial and industrial equipment* (\$24.13). Experienced workers can expect to earn wages between \$24.13 and \$49.93, which are higher than the self-sufficiency standard.

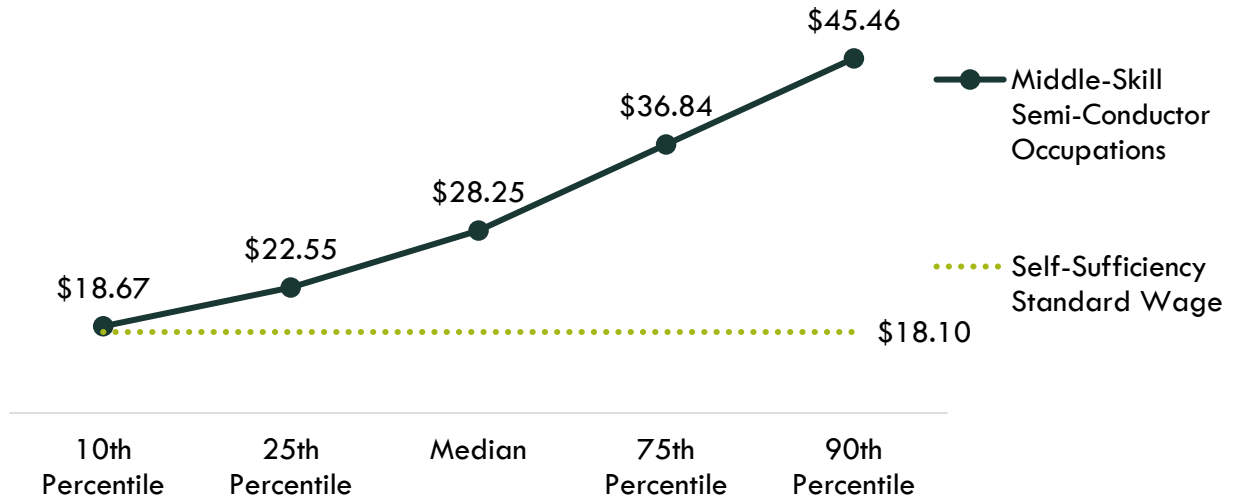
Exhibit 3: Earnings for Occupations in Orange County

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)	Median Annual Earnings*
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	\$28.70	\$34.49	\$42.51	\$71,700
Industrial Engineering Technologists and Technicians (17-3026)	\$28.60	\$38.39	\$49.93	\$79,800
Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)	\$24.13	\$32.76	\$47.94	\$68,100
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers (51-2028)	\$17.45	\$19.40	\$24.13	\$40,400
Semiconductor Processing Technicians (51-9141)	\$18.80	\$20.86	\$25.66	\$43,400

*Rounded to the nearest \$100

On average, the entry-level earnings for the occupations in this report are \$22.55; this is above the living wage for one single adult in Los Angeles County (\$18.10). Exhibit 4 shows the average wage for the occupations in this report, from entry-level to experienced workers.

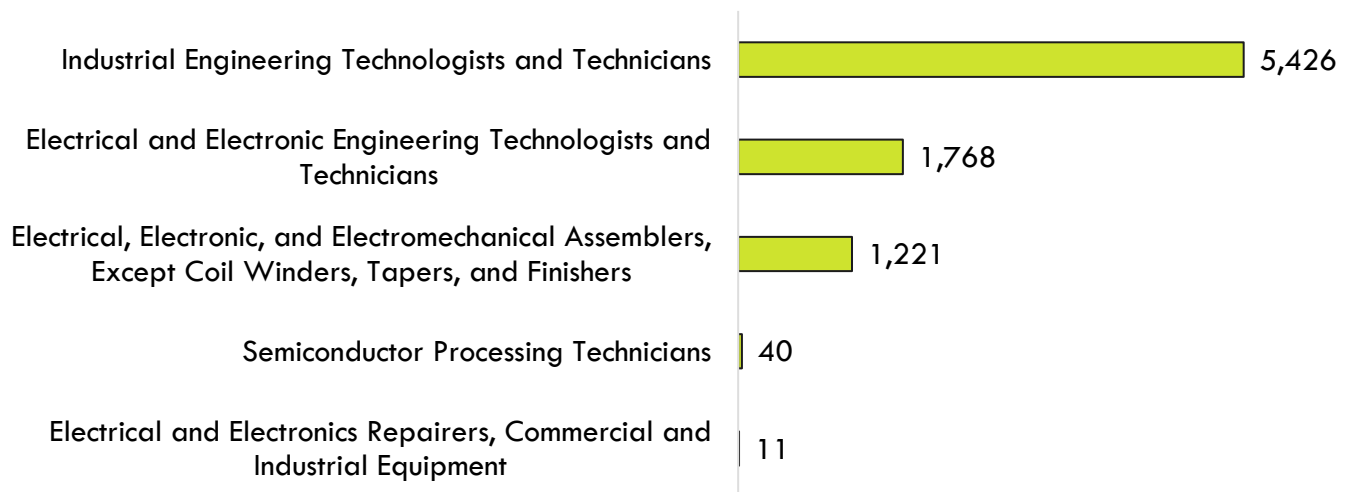
Exhibit 4: Average Hourly Earnings for Middle-Skill Semi-Conductor Occupations in LA/OC



Job Postings

There were 8,466 online middle-skill job postings related to semi-conductors listed in the past 12 months. Exhibit 5 displays the number of job postings by occupation. The majority of job postings (64%) were for *industrial engineering technologists and technicians*, followed by *electrical and electronic engineering technologists and technicians* (21%) and *electrical, electronic and electromechanical assemblers, except coil winders, tapers, and finishers* (14%). The highest number of job postings were for maintenance technicians, manufacturing technicians, mechanical assemblers, production technicians, and maintenance workers. The top skills were machinery, blueprinting, soldering, power tool operation, and test equipment. The top three employers, by number of job postings, in the region were Aerotek, Acara Solutions, and ManpowerGroup.

Exhibit 5: Job postings by occupation (last 12 months)



Educational Attainment

The Bureau of Labor Statistics (BLS) lists the following typical entry-level education levels for the occupations in this report:

- **Associate degree:** *Electrical and electronic engineering technologists and technicians; industrial engineering technologist and technicians*
- **Postsecondary non-degree award:** *Electrical and electronics repairers, commercial and industrial equipment*
- **High school diploma or equivalent:** *Electrical, electronic, and electromechanical assemblers, except coil winders, tapers, and finishers; semiconductor processing technicians*

In the greater LA/OC region, the majority of annual job openings (67%) typically require a high school diploma or equivalent. Furthermore, the national-level educational attainment data indicates between 28% and 63% of workers in the field have completed some college or an associate degree. Of the 51% of middle-skill job postings listing a minimum education requirement in the greater Los Angeles/Orange County region, 86% (3,696) requested high school or vocational training, and 14% (622) requested an associate degree.

Educational Supply

Community College Supply

Exhibit 6 shows the annual and three-year average number of awards conferred by community colleges in programs that have historically trained for the occupations of interest. The colleges with the most completions in the region are Pasadena, Mt. San Antonio, and LA Trade-Tech.

Exhibit 6: Regional community college awards (certificates and degrees), 2019-2022

TOP	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
0924.00	Engineering Technology, General (requires Trigonometry)	Cerritos	15	6	15	12
		East LA	1	1	-	1
		Glendale	7	14	3	8
		Mt San Antonio	2	-	6	3
		Pasadena	216	238	211	222
		LA Subtotal	241	259	235	245
		Santa Ana	3	5	-	3
		OC Subtotal	3	5	-	3
Supply Subtotal/Average			244	264	235	248
0934.00	Electronics and Electric Technology	East LA	1	2	4	2
		El Camino	8	5	2	5
		Glendale	5	-	2	2
		LA City	4	-	-	1
		LA Pierce	4	17	14	12
		LA Southwest	9	-	4	4

TOP	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
		LA Valley	14	21	34	23
		Long Beach	50	42	79	57
		Mt San Antonio	48	39	152	80
		Pasadena	24	23	27	25
		Rio Hondo	-	1	2	1
		LA Subtotal	167	150	320	212
		Coastline	58	53	44	52
		Irvine	37	9	16	21
		Orange Coast	12	12	6	10
		Saddleback	14	22	19	18
		Santa Ana	8	-	-	3
		OC Subtotal	129	96	85	103
		Supply Subtotal/Average	296	246	405	316
0934.10	Computer Electronics	East LA	34	7	24	22
		El Camino	6	10	9	8
		LA Trade-Tech	10	14	16	13
		Mt San Antonio	12	7	18	12
		LA Subtotal	62	38	67	56
		Orange Coast	5	4	2	4
		Saddleback	13	22	10	15
		OC Subtotal	18	26	12	19
		Supply Subtotal/Average	80	64	79	74
0934.20	Industrial Electronics	LA Valley	-	23	-	8
		LA Subtotal	-	23	-	8
		Supply Subtotal/Average	-	23	-	8
0934.40	Electrical Systems and Power Transmission	Santiago Canyon	56	33	-	30
		OC Subtotal	56	33	-	30
		Supply Subtotal/Average	56	33	-	30
0945.00	Industrial Systems Technology and Maintenance	LA Harbor	1	-	-	0
		LA Southwest	9	-	-	3
		LA Trade-Tech	61	59	88	69
		West LA	20	3	13	12
		LA Subtotal	91	62	101	85
		Santiago Canyon	16	2	-	6

TOP	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
		OC Subtotal	16	2	-	6
Supply Subtotal/Average			107	64	101	91
0956.00	Manufacturing and Industrial Technology	Cerritos	-	1	1	1
		El Camino	-	-	4	1
		Glendale	2	-	1	1
		LA Trade-Tech	9	9	15	11
		LA Valley	9	7	-	5
		Mt San Antonio	14	4	13	10
		LA Subtotal	34	21	34	30
		Fullerton	38	20	18	25
		Irvine	-	4	2	2
		Saddleback	7	4	8	6
		Santa Ana	3	2	4	3
		Santiago Canyon	10	12	7	10
		OC Subtotal	58	42	39	46
Supply Subtotal/Average			92	63	73	76
Supply Total/Average			875	757	893	842

Non-Community College Supply

For a comprehensive regional supply analysis, it is important to consider the supply from other institutions in the region that provide training programs for middle-skill occupations related to semi-conductors. Exhibit 7 shows the annual and three-year average number of awards conferred by these institutions in relevant programs. Due to different data collection periods, the most recent three-year period of available data is from 2019 to 2021. Between 2019 and 2021, non-community college institutions in the region conferred an average of 121 sub-baccalaureate awards. Sub-baccalaureate awards include associate degrees, postsecondary awards, and other academic awards.

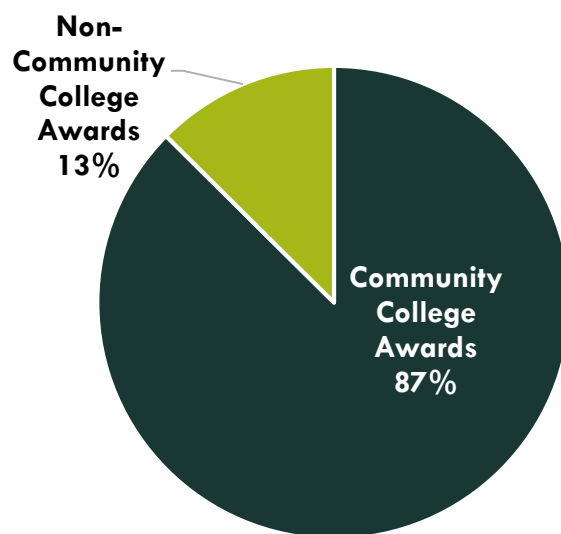
Exhibit 7: Regional non-community college awards, 2019-2021

CIP	Program	Institution	2019-20 Awards	2020-21 Awards	2-Year Average
15.0399	Electrical/Electronic Engineering Technologies/Technicians, Other	Southern California Institute of Technology	1	-	1
15.0803	Automotive Engineering Technology/Technician	Hacienda La Puente Adult Education	25	31	28

CIP	Program	Institution	2019-20 Awards	2020-21 Awards	2-Year Average
47.0104	Computer Installation and Repair Technology/Technician	ABC Adult School	1	8	5
		ABCO Technology	70	83	77
		Hacienda La Puente Adult Education	18	-	9
		United Education Institute-West Covina	5	-	3
Supply Total/Average			120	122	121

Exhibit 8 shows the proportion of community college awards conferred in LA/OC compared to the number of non-community college awards for the programs in this report. The majority of awards conferred in these programs are awarded by community colleges in the LA/OC region.

Exhibit 8: Community College Awards Compared to Non-Community College Awards in LA/OC Region, 3-Year Average



Appendix A: Occupational demand and wage data by county

Exhibit 9. Los Angeles County

Occupation (SOC)	2022 Jobs	2027 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	2,890	2,761	(129)	(4%)	304	\$27.10	\$32.76	\$40.59
Industrial Engineering Technologists and Technicians (17-3026)	628	653	25	4%	68	\$26.84	\$36.19	\$47.32
Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)	1,055	1,026	(29)	(3%)	96	\$23.79	\$32.30	\$47.31
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers (51-2028)	7,300	6,709	(591)	(8%)	802	\$16.36	\$18.20	\$22.64
Semiconductor Processing Technicians (51-9141)	323	311	(12)	(4%)	36	\$15.18	\$16.91	\$20.87
Total	12,195	11,459	(736)	(6%)	1,306	-	-	-

Exhibit 10. Orange County

Occupation (SOC)	2022 Jobs	2027 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	1,689	1,667	(22)	(1%)	181	\$28.70	\$34.49	\$42.51
Industrial Engineering Technologists and Technicians (17-3026)	380	413	33	9%	45	\$28.60	\$38.39	\$49.93
Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)	466	467	1	0%	43	\$24.13	\$32.76	\$47.94
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers (51-2028)	5,648	5,533	(115)	(2%)	639	\$17.45	\$19.40	\$24.13
Semiconductor Processing Technicians (51-9141)	419	421	2	1%	48	\$18.80	\$20.86	\$25.66
Total	8,602	8,501	(101)	(1%)	957	-	-	-

Exhibit 11. Los Angeles and Orange Counties

Occupation (SOC)	2022 Jobs	2027 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	% Age 55 and older*	Typical Entry-Level Education
Electrical and Electronic Engineering Technologists and Technicians (17-3023)	4,579	4,428	(151)	(3%)	485	37%	Associate degree
Industrial Engineering Technologists and Technicians (17-3026)	1,008	1,065	58	6%	113	34%	Associate degree
Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)	1,521	1,493	(28)	(2%)	139	24%	Postsecondary non-degree award
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers (51-2028)	12,948	12,242	(706)	(5%)	1,441	38%	HS diploma or equivalent
Semiconductor Processing Technicians (51-9141)	742	732	(9)	(1%)	85	36%	HS diploma or equivalent
Total	20,797	19,961	(836)	(4%)	2,263	-	-

*The average percentage of workers age 55 and older across all occupations in the greater LA/OC region is 27%. *Electrical and electronics repairers, commercial and industrial equipment* have a smaller share of older workers, which typically indicates fewer replacement needs to offset the amount of impending retirements. The other four occupations have a larger share of older workers, likely yielding greater replacement needs.

Appendix B: Sources

- O*NET Online
- Lightcast (formerly Emsi)
- Bureau of Labor Statistics (BLS)
- California Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- Self-Sufficiency Standard at the Center for Women's Welfare, University of Washington
- Chancellor's Office Curriculum Inventory (COCI 2.0)

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