



# Engineering Technicians

March 2018

Prepared by the Los Angeles/Orange County Center of Excellence for Labor Market Research

## Program Recommendation

This report was compiled by the Los Angeles/Orange County Center of Excellence (COE) to provide regional labor market data for the program recommendation of engineering technicians. This report intends to determine whether there is demand in the local labor market that is not being met by the supply from programs of study.

Based on the data, the COE has determined an unmet need for an engineering technician program in Los Angeles County. Reasons include:

- Jobs related to engineering technician occupations are expected to experience a 5% increase through 2022.
- Over 7,500 annual job openings will be available for engineering technicians and related occupations.
- Between 28% and 55% of the workforce have completed some community college education as their highest level of education.
- Between 2013 and 2016, programs training for the occupations of interest conferred 682 awards (3-yr average).

## Occupation Codes and Descriptions

Currently, there are eleven occupations in the standard occupational classification (SOC) system related to engineering technicians (and related jobs). The occupation titles, descriptions, and reported job titles are included in Exhibit 1.

**Exhibit 1 – Occupations, descriptions, and sample job titles**

SOC Code	Title	Description	Sample of Reported Job Titles
17-3021	Aerospace Engineering and Operations Technicians	Operate, install, calibrate, and maintain integrated computer/communications systems, consoles, simulators, and other data acquisition, test, and measurement instruments and equipment, which are used to launch, track, position, and evaluate air and space vehicles. May record and interpret test data.	Avionics Technician, Avionics Test Technician, Calibration Technician, Communication Technician, Electronics Technician, Engineering Technician, Instrumentation Technician, Spacecraft Systems Engineer, Systems Test Technician, Test Technician

17-3022	Civil Engineering Technicians	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.	Civil Designer, Civil Engineering Assistant, Civil Engineering Designer, Civil Engineering Technician, Design Technician, Engineer Technician, Engineering Assistant, Engineering Specialist, Engineering Technician, Transportation Engineering Technician
17-3023	Electrical and Electronic Engineering Technicians	Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.	<p>Electronics Engineering Technicians (17-3023.01): Lay out, build, test, troubleshoot, repair, and modify developmental and production electronic components, parts, equipment, and systems, such as computer equipment, missile control instrumentation, electron tubes, test equipment, and machine tool numerical controls, applying principles and theories of electronics, electrical circuitry, engineering mathematics, electronic and electrical testing, and physics. Usually work under direction of engineering staff.</p> <p>Electrical Engineering Technicians (17-3023.03): Test or modify developmental or operational electrical machinery or electrical control equipment and circuitry in industrial or commercial plants or laboratories. Usually work under direction of engineers or technologists.</p>
17-3024	Electro-Mechanical Technicians	Operate, test, maintain, or calibrate unmanned, automated, servo-mechanical, or electromechanical equipment. May operate unmanned submarines, aircraft, or other equipment at worksites, such as oil rigs, deep ocean exploration, or hazardous waste removal. May assist engineers in testing and designing robotics equipment.	Electro-Mechanic, Electro-Mechanical Technician (E/M Technician), Electronic Technician, Engineering Technician, Laboratory Technician (Lab Technician), Maintenance Technician, Mechanical Technician, Product Test Specialist, Test Technician, Tester

17-3026	Industrial Engineering Technicians	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.	Engineering Technician, Industrial Engineering Analyst, Industrial Engineering Technician, Manufacturing Technician, Methods Engineer, Process Documentation and Methods Analyst, Process Engineer, Process Technician, Production Staff Worker, Quality Control Engineering Technician (QC Engineering Technician)
17-3027	Mechanical Engineering Technicians	Apply theory and principles of mechanical engineering to modify, develop, test, or calibrate machinery and equipment under direction of engineering staff or physical scientists.	Design Engineer, Designer, Engineering Lab Technician, Engineering Technical Analyst, Engineering Technician, Equipment Engineer, Lab Technician, Mechanical Designer, Process Technician, Research and Development Technician
49-2092	Electric Motor, Power Tool, and Related Repairers	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
51-2022	Electrical and Electronic Equipment Assemblers	Assemble or modify electrical or electronic equipment, such as computers, test equipment telemetering systems, electric motors, and batteries.	Assembler; Assembly Worker; Electrical Assembler; Electronic Assembler, Group Leader; Electronics Assembler; Factory Assembler; Factory Worker; Manufacturing Assembler; Production Worker; Transformer Assembler
47-2111	Electricians	Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems.	Chief Electrician; Control Electrician; Electrician; Industrial Electrician; Inside Wireman; Journeyman Electrician; Journeyman Wireman; Maintenance Electrician; Mechanical Trades Specialist, Electrician; Qualified Craft Worker, Electrician (QCW, Electrician)

49-9071	Maintenance and Repair Workers, General	Perform work involving the skills of two or more maintenance or craft occupations to keep machines, mechanical equipment, or the structure of an establishment in repair. Duties may involve pipe fitting; boiler making; insulating; welding; machining; carpentry; repairing electrical or mechanical equipment; installing, aligning, and balancing new equipment; and repairing buildings, floors, or stairs.	Building Maintenance Mechanic, Building Mechanic, Equipment Engineering Technician, Facilities Manager, Maintenance Engineer, Maintenance Man, Maintenance Mechanic, Maintenance Supervisor, Maintenance Technician, Maintenance Worker
47-2231	Solar Photovoltaic Installers	Assemble, install, or maintain solar photovoltaic (PV) systems on roofs or other structures in compliance with site assessment and schematics. May include measuring, cutting, assembling, and bolting structural framing and solar modules. May perform minor electrical work such as current checks.	Installer, Photovoltaic Installer (PV Installer), PV Design and Installation Technician, Solar Designer/Installer, Solar Installer, Solar Installer Technician, Solar Photovoltaic Installer (Solar PV Installer), Solar Technician

Source: O\*NET Online

## Current and Future Employment

In Los Angeles County, the number of jobs related to engineering technicians and related occupations are expected to increase by 5% over the next five years. Over 7,500 job opportunities will be available annually for the occupations through 2022 due to new job growth and replacement need (e.g., retirements). Exhibit 2 contains detailed employment projections data for the occupations.

**Exhibit 2 – Five-year projections for engineering technicians and related occupations**

SOC	Occupation	2017 Jobs	2022 Jobs	2017-2022 Change	2017-2022 % Change	Annual Openings
49-9071	Maintenance and Repair Workers, General	36,149	39,086	2,937	8%	4,189
47-2111	Electricians	15,029	16,121	1,092	7%	1,909
51-2022	Electrical and Electronic Equipment Assemblers	5,571	5,263	(308)	(6%)	629
17-3023	Electrical and Electronics Engineering Technicians	3,791	3,677	(114)	(3%)	321
17-3022	Civil Engineering Technicians	1,906	1,823	(83)	(4%)	158
17-3027	Mechanical Engineering Technicians	1,248	1,173	(75)	(6%)	103
17-3026	Industrial Engineering Technicians	974	974	0	0%	83
17-3021	Aerospace Engineering and Operations Technicians	681	625	(56)	(8%)	56
49-2092	Electric Motor, Power Tool, and Related Repairers	490	482	(8)	(2%)	44
17-3024	Electro-Mechanical Technicians	300	291	(9)	(3%)	25
47-2231	Solar Photovoltaic Installers	253	284	31	12%	34
	<b>Total</b>	<b>66,392</b>	<b>69,799</b>	<b>3,407</b>	<b>5%</b>	<b>7,551</b>

Source: Economic Modeling Specialists International (EMSI)

## Earnings

In Los Angeles County, the entry-level average wage for engineering technicians and related occupations is between \$10.38 and \$24.00 per hour. The entry-level wage for nine of the 11 occupations is above the MIT Living Wage<sup>1</sup> estimate of \$13.54 per hour for a single adult. The average annual earnings for the occupation group in the region is between \$32,427 and \$79,119 per year, assuming full-time employment.

<sup>1</sup> MIT Living Wage Calculator. <http://livingwage.mit.edu/>

Exhibit 3 contains hourly wages and annual average earnings for the occupations. Entry-level hourly earnings is represented by the 10<sup>th</sup> percentile of wages, median hourly earnings is represented by the 50<sup>th</sup> percentile of wages, and experienced hourly earnings is represented by the 90<sup>th</sup> percentile of wages, demonstrating various levels of employment.

**Exhibit 3 – Earnings for engineering technicians and related occupations**

SOC	Occupation	Entry-Level Hourly Earnings	Median Hourly Earnings	Experienced Hourly Earnings	Average Annual Earnings
17-3021	Aerospace Engineering and Operations Technicians	\$24.00	\$34.06	\$43.36	\$69,645
17-3022	Civil Engineering Technicians	\$22.24	\$39.46	\$51.34	\$79,119
17-3026	Industrial Engineering Technicians	\$19.67	\$33.58	\$50.32	\$71,560
17-3027	Mechanical Engineering Technicians	\$19.08	\$31.75	\$42.66	\$64,684
17-3023	Electrical and Electronics Engineering Technicians	\$18.06	\$31.16	\$45.57	\$65,343
17-3024	Electro-Mechanical Technicians	\$15.62	\$24.94	\$44.77	\$57,003
49-2092	Electric Motor, Power Tool, and Related Repairers	\$15.52	\$23.11	\$39.50	\$52,549
47-2111	Electricians	\$14.81	\$27.81	\$45.71	\$60,193
47-2231	Solar Photovoltaic Installers	\$14.36	\$18.67	\$28.04	\$41,844
49-9071	Maintenance and Repair Workers, General	\$11.96	\$19.46	\$30.93	\$43,424
51-2022	Electrical and Electronic Equipment Assemblers	\$10.38	\$13.97	\$23.80	\$32,427

Source: Economic Modeling Specialists International (EMSI)

**Employer Job Postings**

In this research brief, real-time labor market information is used to provide a more nuanced view of the current job market, as it captures job advertisements for occupations relevant to the field of study. Employer job postings are consulted to understand who is employing in the field of engineering technicians, and what they are looking for in potential candidates. To identify job postings related to engineering technicians, the occupation codes listed in exhibit 1 were used.

In 2017, there were 7,668 ads for engineering technicians and related jobs. There were 9,200 job postings for the same occupations in 2016, and 9,516 job postings in 2015.

*Top Titles*

The most common job titles for engineering technicians and related jobs are listed in Exhibit 4. Maintenance technician is the job title mentioned in 17% of all relevant job postings (1,268 out of 7,668 postings).

#### Exhibit 4 –Job titles (n=7,668)

Title	Job Postings, Full Year 2017
Maintenance Technician	1,268
Electrician	585
Service Technician	547
Field Service Technician	356
Maintenance Engineer	292
Maintenance Worker	232
Test Technician	190
Journeyman Electrician	172
Repair Technician	168
Engineering Technician	146
Electronics Technician	126
Mechanic	121
Facilities Technician	119

Source: Labor Insight/Jobs (Burning Glass)

#### Top Employers

Exhibit 5 lists the major employers hiring engineering technicians and related workers. Top employers posting job ads included Marriott International Incorporated, Northrop Grumman and The Home Depot Incorporated. The top worksite cities in the region for the occupations were Los Angeles, Long Beach, Torrance, Hawthorne, Pasadena, El Segundo, Glendale, Santa Fe Springs, Santa Monica, and Burbank.

#### Exhibit 5 – Top employers (n=4,993)

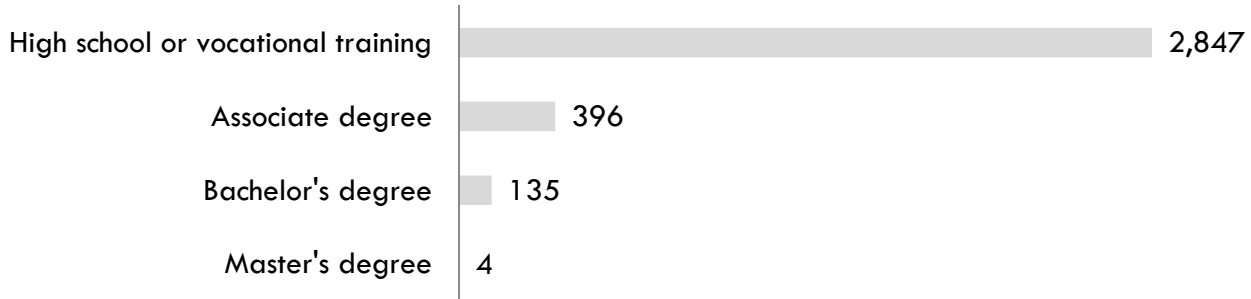
Employer	Job Postings, Full Year 2017
Marriott International Incorporated	135
Northrop Grumman	122
The Home Depot Incorporated	80
ABM	47
Space Exploration Technologies Corp	46
CBRE	38
Raytheon	23
JT3 LLC	35
SpaceX	77
Tesla Motors	23
County of Los Angeles	22

Source: Labor Insight/Jobs (Burning Glass)

### Advertised Education Levels

Exhibit 6 displays the education level requested by employers in online job ads. The majority of employers were looking for a candidate with high school or vocational training. Approximately 56% of job postings did not specify a level of education.

**Exhibit 6 – Education requirements for engineering technicians and related jobs (n=3,382)**



Source: Labor Insight/Jobs (Burning Glass)

### Education and Training

Exhibit 7 shows the typical entry-level education requirement for the occupations of interest, along with the typical on-the-job training, and percentage of workers in the field who hold a community college award or have completed some postsecondary courses. Between 28% and 55% of the workforce have completed some community college education as their highest level of education.

**Exhibit 7 – Education and training requirements**

SOC	Occupation	Typical entry-level education	Typical on-the-job training	% of Community College Award Holders or Some Postsecondary Coursework
17-3021	Aerospace Engineering and Operations Technicians	Associate degree	None	55%
17-3022	Civil Engineering Technicians	Associate degree	None	55%
17-3023	Electrical and Electronics Engineering Technicians	Associate degree	None	55%
17-3024	Electro-Mechanical Technicians	Associate degree	None	55%
17-3026	Industrial Engineering Technicians	Associate degree	None	55%
17-3027	Mechanical Engineering Technicians	Associate degree	None	55%
47-2111	Electricians	HS diploma/equivalent	Apprenticeship	47%



SOC	Occupation	Typical entry-level education	Typical on-the-job training	% of Community College Award Holders or Some Postsecondary Coursework
49-2092	Electric Motor, Power Tool, and Related Repairers	HS diploma/equivalent	Long-term	42%
49-9071	Maintenance and Repair Workers, General	HS diploma/equivalent	Long-term	38%
51-2022	Electrical and Electronic Equipment Assemblers	HS diploma/equivalent	Moderate	30%
47-2231	Solar Photovoltaic Installers	HS diploma/equivalent	Moderate	28%

Source: Economic Modeling Specialists International, Bureau of Labor Statistics Employment Projections (Educational Attainment)

In Los Angeles County, 18 community colleges have programs training for the occupations studied in this report. Exhibit 8 displays the annual awards conferred for each of the colleges training in these fields. It is important to note that an award is not equivalent to a single person in search of a job opening, since a student may earn more than one award (e.g. an associate degree and a certificate).

Between 2013 and 2016, the total annual average community college awards conferred was 682 across the 10 programs shown below.

**Exhibit 8 – CCC Student Awards (by TOP and College)**

TOP Code	Program	College	2013-2016 Annual Average			
			2013-14 Awards	2014-15 Awards	2015-2016 Awards	Total Average CC Awards
0924.00	Engineering Technology, General	Cerritos	34	27	19	27
		East LA	0	2	5	2
		LA Harbor	0	0	0	0
		Pasadena	66	89	127	94
<b>Total</b>			<b>100</b>	<b>118</b>	<b>151</b>	<b>123</b>
0934.00	Electronics and Electric Technology	East LA	58	7	21	29
		El Camino	1	2	2	2
		Glendale	2	7	3	4
		LA City	2	1	2	2
		LA Pierce	7	15	33	18
		LA Southwest	2	5	6	4
		LA Valley	6	12	25	14
		Long Beach	53	50	51	51
		Mt San Antonio	40	67	42	50
		Pasadena	11	19	3	11
		Citrus	0	0	0	0
<b>Total</b>			<b>182</b>	<b>185</b>	<b>188</b>	<b>185</b>

TOP Code	Program	College	2013-2016 Annual Average			
			2013-14 Awards	2014-15 Awards	2015-2016 Awards	Total Average CC Awards
0934.20	Industrial Electronics	Cerritos	0	0	0	0
		El Camino	0	1	1	1
		LA Valley	0	0	0	0
		Mt San Antonio	0	0	0	0
<b>Total</b>			<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>
0934.10	Computer Electronics	El Camino	16	11	8	12
		LA City	0	2	3	2
		LA Harbor	1	2	3	2
		LA Trade	33	16	16	22
		Mt San Antonio	5	8	5	6
<b>Total</b>			<b>55</b>	<b>39</b>	<b>35</b>	<b>44</b>
0945.00	Industrial Systems Technology and Maintenance	LA Harbor	3	1	0	1
		LA Trade	67	52	98	72
		Long Beach	3	3	0	2
<b>Total</b>			<b>73</b>	<b>56</b>	<b>98</b>	<b>75</b>
0946.10	Energy Systems Technology	LA Trade	6	30	20	19
		LA Valley	0	0	5	2
		Mt San Antonio	8	4	1	4
		Rio Hondo	15	12	16	14
		Santa Monica	9	4	5	6
<b>Total</b>			<b>38</b>	<b>50</b>	<b>47</b>	<b>45</b>
0950.00	Aeronautical and Aviation Technology	Long Beach	37	4	0	14
		Mt San Antonio	4	8	2	5
		West LA	5	4	4	4
<b>Total</b>			<b>46</b>	<b>16</b>	<b>6</b>	<b>23</b>
0952.00	Construction Crafts Technology	Compton	1	0	0	0
		El Camino	9	9	17	12
		Pasadena	4	3	0	2
<b>Total</b>			<b>14</b>	<b>12</b>	<b>17</b>	<b>14</b>
0952.20	Electrical	LA Trade	143	131	142	139
<b>Total</b>			<b>143</b>	<b>131</b>	<b>142</b>	<b>139</b>
0956.00	Manufacturing and Industrial Technology	Cerritos	0	21	4	8
		El Camino	1	2	1	1
		LA Valley	6	9	3	6
		Long Beach	0	0	0	0
		Mt San Antonio	23	18	12	18
<b>Total</b>			<b>30</b>	<b>50</b>	<b>20</b>	<b>33</b>
<b>Grand Total</b>			<b>681</b>	<b>658</b>	<b>705</b>	<b>682</b>

## Student Outcomes

The CTE LaunchBoard provides student outcome data on the effectiveness of CTE programs. The following student outcome information was collected from exiters of the Engineering Technology, General Taxonomy of Program (TOP) code (0924.00) in Los Angeles County for the 2015-16 academic year.

- 44% of students are earning a living wage
- 32% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Electronics and Electric Technology Taxonomy of Program (TOP) code (0934.00) in Los Angeles County for the 2015-16 academic year.

- 50% of students are earning a living wage
- 70% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Computer Electronics Taxonomy of Program (TOP) code (0934.10) in Los Angeles County for the 2015-16 academic year.

- 51% of students are earning a living wage
- 67% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Industrial Electronics Taxonomy of Program (TOP) code (0934.20) in Los Angeles County for the 2014-15 academic year. Data for the academic year 2015-16 is not available.

- Percentage not available for students earning a living wage
- 67% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Industrial Systems Technology and Maintenance Taxonomy of Program (TOP) code (0945.00) in Los Angeles County for the 2015-16 academic year.

- 62% of students are earning a living wage
- 77% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Energy Systems Technology Taxonomy of Program (TOP) code (0946.10) in Los Angeles County for the 2015-16 academic year.

- 67% of students are earning a living wage
- 73% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Aeronautical and Aviation Technology Taxonomy of Program (TOP) code (0950.00) in Los Angeles County for the 2013-14 academic year. Data for the academic years 2014-15 and 2015-16 is not available.

- 45% of students are earning a living wage
- 73% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Construction Crafts Technology Taxonomy of Program (TOP) code (0952.00) in Los Angeles County for the 2015-16 academic year.

- 58% of students are earning a living wage
- 61% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Electrical Taxonomy of Program (TOP) code (0952.20) in Los Angeles County for the 2015-16 academic year.

- 63% of students are earning a living wage
- 76% of students are employed within six months after completing a program

The following student outcome information was collected from exiters of the Manufacturing and Industrial Technology Taxonomy of Program (TOP) code (0956.00) in Los Angeles County for the 2015-16 academic year.

- 60% of students are earning a living wage
- 71% of students are employed within six months after completing a program

Source: CTE LaunchBoard

## Sources

O\*Net Online, Labor Insight/Jobs (Burning Glass), Economic Modeling Specialists International (EMSI), MIT Living Wage Calculator, Bureau of Labor Statistics (BLS) Education Attainment, California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, CTE LaunchBoard, Statewide CTE Outcomes Survey, Employment Development Department Unemployment Insurance Dataset

## Notes

Data included in this analysis represents the labor market demand for positions most closely related to engineering technicians. Standard occupational classification (SOC) codes were chosen based on the national education level required for employment (associate degree and postsecondary certificate) as well as the proportion of current workers who hold a community college award or have had some community college training. This selection process narrows the labor market analysis to the most relevant employment opportunities for students with community college education and/or training.

Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study and should not be used to establish current job openings, because the numbers may include duplicate job postings or postings intended to gather a pool of applicants. Real-time labor market information can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.