

# Programmable Logic Controller (PLC) Occupations

Labor Market Analysis: San Diego County

October 2019

## Summary



The brief provides labor market information about *Programmable Logic Controller (PLC) Occupations* to assist the San Diego and Imperial Counties Community Colleges with program development and strategic planning. *PLC Occupations* include “Electro-Mechanical Technicians,” “Engineering Technicians, Except Drafters, All Other,” and “Electrical and Electronics Repairers, Commercial and Industrial Equipment.” According to available labor market information, there is a supply gap for these occupations. *Programmable Logic Controller Occupations* in San Diego County have a labor market demand of 287 annual job openings, while average demand for an occupation in San Diego County is 277 annual job openings. Five educational institutions in San Diego County supply 174 awards for these occupations, suggesting that there is a supply gap. This occupation’s entry-level and median wages are above the living wage, suggesting that students who successfully complete a program and obtain employment in a related field may earn a living wage. Workers in this occupation typically have an educational requirement of an associate degree. According to online job postings, the top listed educational requirement for *PLC Occupations* is a high school degree or vocational training. This brief recommends to proceed with a new program, but to keep in mind that the labor market demand for three *PLC Occupations* is similar to the average demand for a single occupation in San Diego County.

## Introduction

This report provides labor market information in San Diego County for the following occupational codes in the Standard Occupational Classification (SOC)<sup>1</sup> system:

- **Electro-Mechanical Technicians** (SOC 17-3024): 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.
- **Engineering Technicians, Except Drafters, All Other** (SOC 17-3029): All engineering technicians, except drafters, not listed separately. "All Other" titles represent occupations with a wide range of characteristics which do not fit into one of the detailed SOC occupations. For this report, Engineering Technicians, Except Drafters, All Other include:
  - **Electrical Engineering Technologists** (SOC 17-3029.02): Assist electrical engineers in such activities as process control, electrical power distribution, or instrumentation design. May prepare layouts of electrical transmission or distribution systems, supervise the flow of work, estimate project costs, or participate in research studies.
  - **Manufacturing Engineering Technologists** (SOC 17-3029.06): Develop tools, implement designs, or integrate machinery, equipment, or computer technologies to ensure effective manufacturing processes.
  - **Mechanical Engineering Technologists** (SOC 17-3029.07): Assist mechanical engineers in such activities as generation, transmission, or use of mechanical or fluid energy. Prepare layouts of machinery or equipment or plan the flow of work. May conduct statistical studies or analyze production costs.
- **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.

For the purpose of this report, these occupations are referred to as *Programmable Logic Controller Occupations*.

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<sup>1</sup> The Standard Occupational Classification (SOC) system is used by federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating or disseminating data. [bls.gov/soc](https://www.bls.gov/soc).

## Projected Occupational Demand

Between 2018 and 2023, *Programmable Logic Controller Occupations* are projected to increase by 101 net jobs or three percent (Exhibit 1). Employers in San Diego County will need to hire 287 workers annually to fill new jobs and backfill jobs due to attrition caused by turnover and retirement, for example.

**Exhibit 1: Number of Jobs for Programmable Logic Controller Occupations (2008-2023)<sup>2</sup>**

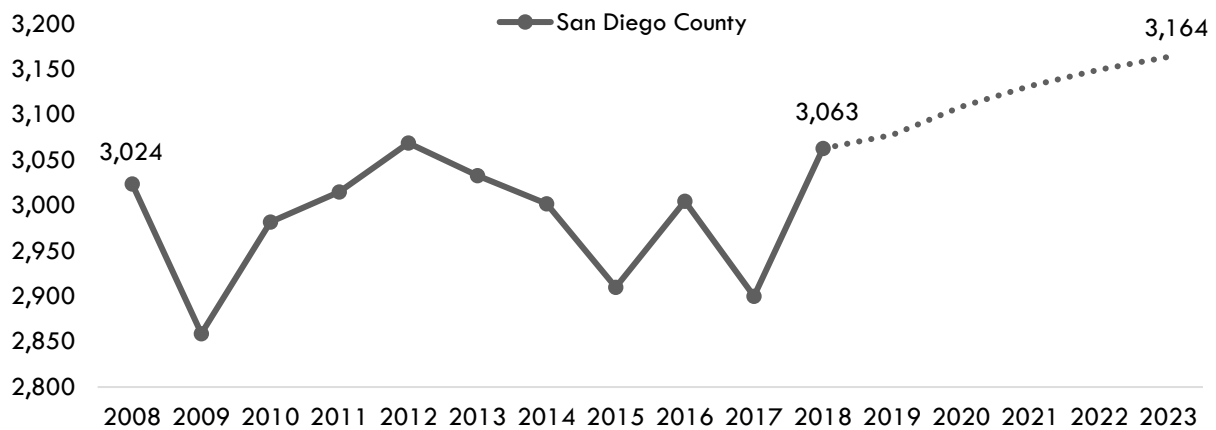


Exhibit 1b breaks down the projected number of jobs change by occupation more specifically. As Exhibit 1b shows, labor market demand for *Engineering Technicians, Except Drafters, All Other* is projected to increase by 71 total jobs between 2018 and 2023.

**Exhibit 1b: Number of Jobs for Programmable Logic Controller Occupations in San Diego County (2018-2023)**

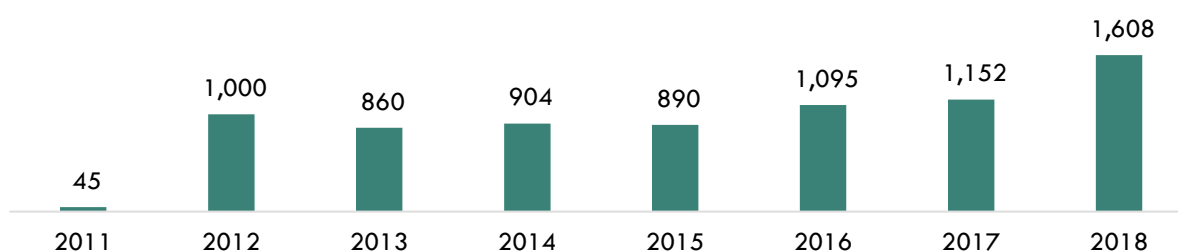
Occupational Title	2018 Jobs	2023 Jobs	2018 - 2023 Net Jobs Change	2018-2023 % Net jobs Change	Annual Openings (Demand)
Engineering Technicians, Except Drafters, All Other	2,172	2,243	71	3%	202
Electrical and Electronics Repairers, Commercial and Industrial Equipment	750	770	20	3%	71
Electro-Mechanical Technicians	141	150	9	6%	14
<b>Total</b>	<b>3,063</b>	<b>3,163</b>	<b>100</b>	<b>3%</b>	<b>287</b>

<sup>2</sup> Emsi 2019.04; QCEW, Non-QCEW, Self-Employed.

## Online Job Postings

This report analyzes not only historical and projected data (traditional labor market information), but also recent data from online job postings (real-time LMI). Online job postings may provide additional insight about recent changes in the labor market demand that are not captured by historical data. Between 2010 and 2018, there was an average of 839 online job postings per year for *Programmable Logic Controller Occupations* in San Diego County (Exhibit 2).

**Exhibit 2: Number of Online Job Postings for Programmable Logic Controller Occupations in San Diego County (2010-2018)<sup>3</sup>**



## Earnings

The median hourly earnings of *Programmable Logic Controller Occupations* range from \$28.56 to \$34.79 (Exhibit 3a). On average, the median hourly earnings for *Programmable Logic Controller Occupations* is \$31.41; this is more than the living wage for a single adult in San Diego County, which is \$15.99 per hour (Exhibit 3b).<sup>4</sup>

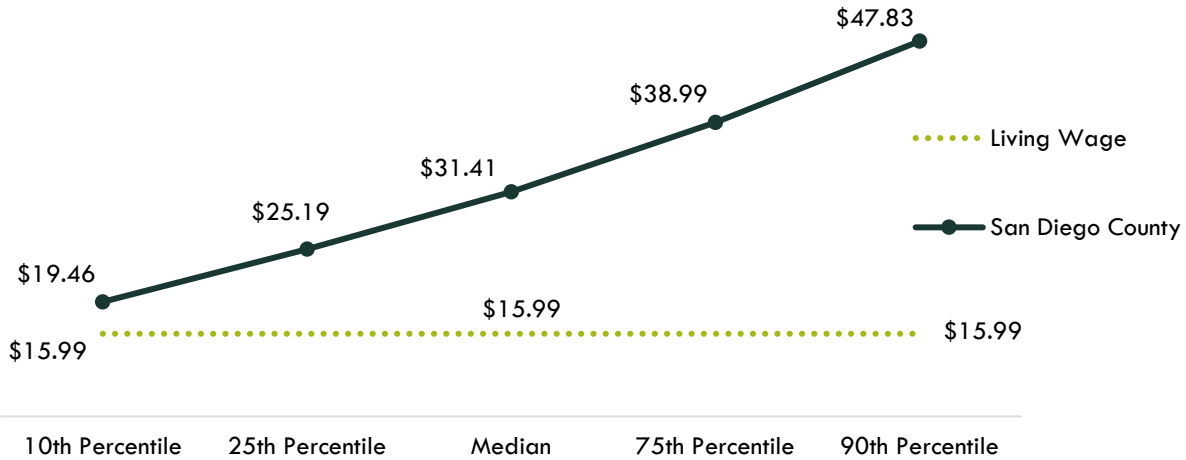
**Exhibit 3a: Hourly Earnings for Programmable Logic Controller Occupations in San Diego County**

Occupational Title	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)
Electrical and Electronics Repairers, Commercial and Industrial Equipment	\$26.80	\$30.90	\$37.17
Engineering Technicians, Except Drafters, All Other	\$26.74	\$34.79	\$43.01
Electro-Mechanical Technicians	\$22.02	\$28.56	\$36.78

<sup>3</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2010-2018.

<sup>4</sup> "California Family Needs Calculator (formerly the Self-Sufficiency Standard)," Insight: Center for Community Economic Development, last updated 2018. [insightccd.org/2018-self-sufficiency-standard](https://insightccd.org/2018-self-sufficiency-standard).

**Exhibit 3b: Hourly Earnings<sup>5</sup> for Programmable Logic Controller Occupations in San Diego County<sup>6</sup>**



## Educational Supply

Educational supply for an occupation can be estimated by analyzing the number of awards in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes.<sup>7</sup> There are **five** TOP codes and **18** CIP codes related to *PLC Occupations* (Exhibit 4).

**Exhibit 4: Related TOP and CIP Codes for Programmable Logic Controller Occupations**

<i>Programmable Logic Controller Occupations</i>
TOP 070100: Information Technology, General
TOP 092400: Engineering Technology, General
TOP 093400: Electronics and Electric Technology
TOP 095600: Manufacturing and Industrial Technology
TOP 099900: Other Engineering and Related Industrial Technologies
CIP 11.0101: Computer and Information Sciences, General
CIP 11.0199: Computer and Information Sciences, Other
CIP 15.0000: Engineering Technology, General
CIP 15.0201: Civil Engineering Technology/Technician

<sup>5</sup> 10th and 25th percentiles could be considered entry-level wages, and 75th and 90th percentiles could be considered experienced wages for individuals who may have been in the occupation longer, received more training than others, etc.

<sup>6</sup> Emsi 2019.04; QCEW, Non-QCEW, Self-Employed.

<sup>7</sup> TOP data comes from the California Community Colleges Chancellor's Office MIS Data Mart ([datamart.cccco.edu](http://datamart.cccco.edu)) and CIP data comes from the Integrated Postsecondary Education Data System ([nces.ed.gov/ipeds/use-the-data](http://nces.ed.gov/ipeds/use-the-data)).

*Programmable Logic Controller Occupations*

CIP 15.0303: Electrical, Electronic and Communications Engineering Technology/Technician

CIP 15.0399: Electrical and Electronic Engineering Technologies/Technicians, Other

CIP 15.0405: Robotics Technology/Technician

CIP 15.0406: Automation Engineer Technology/Technician

CIP 15.0611: Metallurgical Technology/Technician

CIP 15.0613: Manufacturing Engineering Technology/Technician

CIP 15.0699: Industrial Production Technologies/Technicians, Other

CIP 15.0803: Automotive Engineering Technology/Technician

CIP 15.0805: Mechanical Engineering/Mechanical Technology/Technician

CIP 15.1202: Computer Technology/Computer Systems Technology

CIP 15.9999: Engineering Technologies and Engineering-Related Fields, Other

CIP 47.0101: Electrical/Electronics Equipment Installation and Repair, General

CIP 47.0199: Electrical/Electronics Maintenance and Repair Technology, Other

CIP 50.0404: Industrial and Product Design

According to TOP data, [three](#) community colleges supply the region with awards for this occupation: [San Diego City College](#), [San Diego Continuing Education](#), and [Southwestern College](#). According to CIP data, [two](#) non-community colleges supply the region with awards: [Advanced Training Associates](#) and [National University](#) (Exhibit 5).

**Exhibit 5: Number of Awards (Certificates and Degrees) Conferred by Postsecondary Institutions (Program Year 2013-14 through PY2016-17 Average)**

TOP6 or CIP	TOP6 or CIP Title	3-Yr Annual Average CC Awards (PY14-15 to PY16-17)	Other Educational Institutions 3-Yr Annual Average Awards (PY13-14 to PY15-16)	3-Yr Total Average Supply (PY13-14 to PY16-17)
071000	Information Technology, General	<b>7</b>	<b>0</b>	<b>7</b>
	• Southwestern	7	0	
093400	Electronics and Electric Technology	<b>123</b>	<b>0</b>	<b>123</b>
	• San Diego City	3	0	

	• San Diego Cont. Ed	120	0	
095600	Manufacturing and Industrial Technology	8	0	8
	• San Diego Cont. Ed	0	0	
	• San Diego City	8	0	
099900	Other Engineering and Related Industrial Technologies	4	0	4
	• San Diego City	4	0	
11.0101	Computer and Information Sciences, General	0	31	31
	• Advanced Training Associates	0	31	
15.0000	Engineering Technology, General	0	1	1
	• National University	0	1	
			Total	174

## Demand vs. Supply

Comparing labor demand (annual openings) with labor supply<sup>8</sup> suggests that there is a **supply gap** for these occupations in San Diego County, with **287** annual openings and **174** awards. Comparatively, there are **1,954** annual openings in California and **2,802** awards, demonstrating that there is a potential oversupply across the state<sup>9</sup> (Exhibit 6).

### Exhibit 6: Labor Demand (Annual Openings) Compared with Labor Supply (Average Annual Awards)

Community Colleges and Other Postsecondary Educational Institutions	Demand (Annual Openings)	Supply (Total Annual Average Supply)	Supply Gap or Oversupply
San Diego	287	174	113
California	1,954	2,802	848

**Please note:** This is a basic analysis of supply and demand of labor. The data does not include workers currently in the labor force who could fill these positions or workers who are not captured by publicly available data. This data should be used to discuss the potential gaps or oversupply of workers; however, it should not be the only basis for determining whether or not a program should be developed.

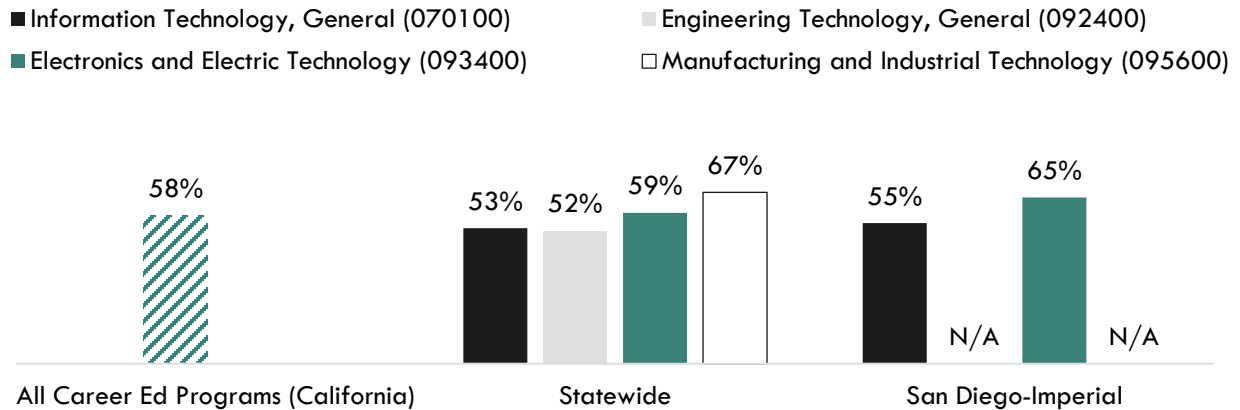
<sup>8</sup> Labor supply can be found from two different sources: EMSI or the California Community Colleges Chancellor's Office MIS Data Mart. EMSI uses CIP codes while MIS uses TOP codes. Different coding systems result in differences in the supply numbers.

<sup>9</sup> "Supply and Demand," Centers of Excellence Student Outcomes, [coecc.net/Supply-and-Demand.aspx](http://coecc.net/Supply-and-Demand.aspx).

## Student Outcomes and Regional Comparisons

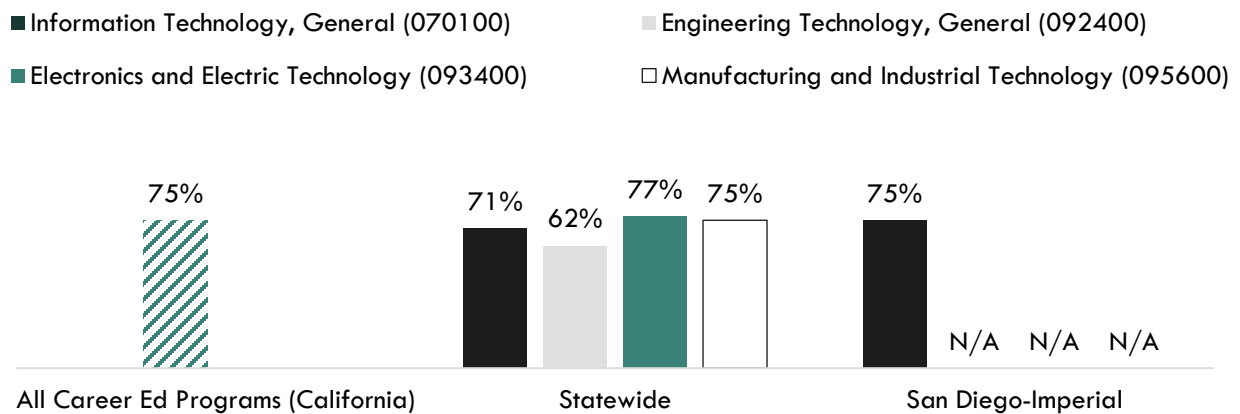
According to the California Community Colleges LaunchBoard, between 52 and 67 percent of students earned a living wage in programs related to *Programmable Logic Controller Occupations*, compared to 58 percent of students who earned a living wage in Career Education programs across the state (Exhibit 7a).

**Exhibit 7a: Proportion of Students Who Earned a Living Wage, PY2015-16<sup>10</sup>**



According to the California Community Colleges LaunchBoard, 75 percent of students in the San Diego-Imperial region obtained a job closely related to their field of study after completing a related program, compared to 62 to 71 percent statewide and 75 percent of students in Career Education programs in general across the state (Exhibit 7b).

**Exhibit 7b: Percentage of Students in a Job Closely Related to Field of Study, PY2014-15<sup>11</sup>**



<sup>10</sup> Among completers and skills builders who exited, the proportion of students who attained a living wage.

<sup>11</sup> Most recent year with available data is Program Year 2014-15. Percentage of Students in a Job Closely Related to Field of Study: Among students who responded to the CTEOS, the percentage reporting employment in the same or similar field as their program of study.



## Top Employers and Work Locations

Between January 1, 2016 and December 31, 2018, the top five employers in San Diego County for these occupations were [Epsilon Systems Solutions](#), [Northrop Grumman](#), [General Atomics](#), [Danaher Corporation](#), and [ATK](#) (Exhibit 8).

### Exhibit 8: Top Employers in San Diego County for Programmable Logic Controller Occupations<sup>12</sup>

Top Employers	
<ul style="list-style-type: none"> <li>• Epsilon Systems Solutions Incorporated</li> <li>• Northrop Grumman</li> <li>• General Atomics</li> <li>• Danaher Corporation</li> <li>• ATK</li> </ul>	<ul style="list-style-type: none"> <li>• AECOM Technology Corporation</li> <li>• Illumina Incorporated</li> <li>• General Dynamics</li> <li>• Thermo Fisher Scientific Inc.</li> <li>• Serco</li> </ul>

## Skills, Education, and Certifications

*Programmable Logic Controller Occupations* have a national educational requirement ranging from a [postsecondary nondegree award](#) to an [associate degree](#) (Exhibit 9a).

### Exhibit 9a: National Educational Attainment for Programmable Logic Controller Occupations<sup>13</sup>

Occupational Title	Typical Entry-Level Education
Electro-Mechanical Technicians	Associate degree
Engineering Technicians, Except Drafters, All Other	Associate degree
Electrical and Electronics Repairers, Commercial and Industrial Equipment	Postsecondary nondegree award

Based on online job postings between January 1, 2016 and December 31, 2018, in San Diego County, the top listed educational requirement for *Programmable Logic Controller Occupations* is a [high school degree](#) or [vocational training](#) (Exhibit 9b).<sup>14</sup>

<sup>12</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2016-2018.

<sup>13</sup> Emsi 2019.04; QCEW, Non-QCEW, Self-Employed.

<sup>14</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2016-2018.

**Exhibit 9b: Educational Requirements for Programmable Logic Controller Occupations in San Diego County<sup>15</sup>**

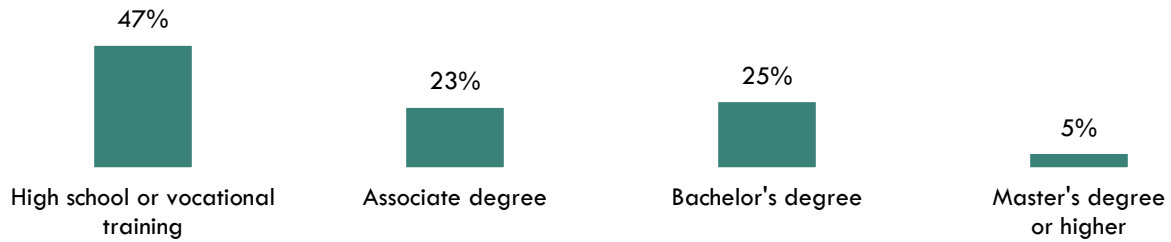


Exhibit 10 lists the top specialized, soft, and software skills that appeared in online job postings between January 1, 2016 and December 31, 2018.

**Exhibit 10: Top Skills for Programmable Logic Controller Occupations in San Diego County<sup>16</sup>**

Specialized Skills	Soft Skills	Software Skills
<ul style="list-style-type: none"> <li>• Repair</li> <li>• Good Manufacturing Practices</li> <li>• Test Equipment</li> <li>• Calibration</li> <li>• Scheduling</li> </ul>	<ul style="list-style-type: none"> <li>• Troubleshooting</li> <li>• Communication Skills</li> <li>• Physical Abilities</li> <li>• Microsoft Excel</li> <li>• Computer Literacy</li> </ul>	<ul style="list-style-type: none"> <li>• Microsoft Excel</li> <li>• Microsoft Word</li> <li>• Microsoft PowerPoint</li> <li>• Microsoft Windows</li> <li>• SAP</li> </ul>

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<sup>15</sup> "Educational Attainment for Workers 25 Years and Older by Detailed Occupation," Bureau of Labor Statistics, last modified October 18, 2018. [bls.gov/emp/tables/educational-attainment.htm](https://bls.gov/emp/tables/educational-attainment.htm).

<sup>16</sup> Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool." 2016-2018.

**Important Disclaimers**

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.