



# Labor Market Analysis: 0707.10 – Computer Programming Applied Data Science – Certificate requiring 16 to fewer than 30 semester units Los Angeles Center of Excellence, May 2025

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

## SUMMARY

This report analyzes whether local labor market demand is being met by community college programs aligned with the identified target occupations<sup>1</sup> or whether a shortage of workers exists. Labor market demand is measured by annual job openings while education supply is measured by the number of awards (degrees and certificates) conferred on average each year.

Based on the available data, there does not appear to be a supply gap for the four identified occupations in the region. However, there are several complicating factors regarding this. One complicating factor within this labor market analysis is that there is no dedicated TOP code for the emerging fields of Data Science or Data Analytics. When there is not a dedicated TOP code for a specific program area, it is challenging to accurately gauge relevant completions, which increases the margin of error in the supply side analysis (overestimating the supply estimates as these computer science program prepare students for employment across a variety of computer occupations beyond the four included in this report). In order to provide a more nuanced view of the regional job market for the fields of data science and data analytics, real-time labor market data is included in this report as well as traditional labor market information. In the past 12 months, there were 13,971 online job postings for these target occupations, signaling that there may be local demand in the labor market not captured by traditional labor market information. While entry-level wages for these occupations are above the self-sufficiency standard in Los Angeles and Orange County, the Bureau of Labor Statistics (BLS) lists a bachelor’s degree as the typical entry-level education for all four target occupations, which positions this proposed program ideally as an up-skilling or re-skilling certificate for students that have already obtained

<sup>1</sup> Middle-skill occupations typically require some postsecondary education, but less than a bachelor’s degree. 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.

a bachelor's degree, since this stand-alone certificate will likely not be sufficient on its own for employment.

**Recommendation:** Due to one program endorsement criteria being met, the Los Angeles Center of Excellence for Labor Market Research (LA COE) endorses this proposed program.

## Key Findings

### Supply Gap

- 1,933 annual job openings are projected in the region through 2028. This number is less than the three-year average of 5,202 awards conferred by educational institutions in the region.
  - There is no dedicated TOP code for the emerging fields of Data Science or Data Analytics, making it challenging to accurately gauge relevant completions. Therefore, supply data may be overestimated.
  - Over the past 12 months, there were **13,971 online job postings for these occupations related to data science and analytics**. The highest number of job postings were for data analysts, data engineers, business systems analysts, data scientists, and data architects.

### Living Wage

- All four occupations have entry-level wages **above** Los Angeles County's self-sufficiency standard hourly wage (\$24.03/hour).<sup>2</sup>

### Educational Attainment

- A bachelor's degree is the typical entry-level education for the target occupations according to the Bureau of Labor Statistics (BLS).
- 13%-27% of workers in the field have completed associate degree or less education, according to national educational attainment data.
  - 73%-87% of current workers in the field hold a bachelor's degree or more education.

### Community college supply

- 27 community colleges issued awards related to information technology, data science and/or analytics in the greater LA/OC region.
- 1,398 awards (degrees and certificates) were conferred on average each year between 2022 and 2024.

### Other postsecondary supply

- 32 educational institutions in the LA/OC region have conferred awards in programs related to information technology, data science, and/or analytics over the past three years.
- 3,804 awards were conferred on average each year by other postsecondary institutions throughout the greater LA/OC region between 2021 and 2023.

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<sup>2</sup> Center for Women's Welfare, University of Washington. (2024). *The self-sufficiency standard for California 2024*. <http://selfsufficiencystandard.org/California>.

## TARGET OCCUPATIONS

LA COE prepared this report to provide regional labor market and postsecondary supply data related to four target occupations and one emerging occupation. Currently, there is not a standard occupational classification (SOC) code for a middle-skill occupation in the field of data science and analytics. While the occupations in this report typically require a bachelor’s degree and are not traditionally considered middle-skill, these occupations are most closely aligned with the knowledge, skills, and abilities required for an entry-level job seeker in the emerging field of data science and analytics. [For full occupation descriptions, please see Appendix.](#)

- **Computer Systems Analysts (15-1211)**<sup>3</sup>
- **Database Administrators (15-1242)**<sup>4</sup>
- **Database Architects (15-1243)**<sup>5</sup>
- **Data Scientists (15-2051)**<sup>6</sup>
  - **Business Intelligence Analysts (15-2051.01)**<sup>7</sup>

## OCCUPATIONAL DEMAND

Exhibit 1 shows the five-year occupational demand projections for these occupations related to data science and analytics. In the greater Los Angeles/Orange County region, the number of jobs related to these occupations is projected to increase by 4% through 2028. There will be nearly 2,000 job openings per year through 2028 due to job growth and replacements. The majority of jobs in 2023 for these occupations related to data science and analytics (70%) were located in Los Angeles County.

**Exhibit 1: Current employment and occupational demand, Los Angeles and Orange counties**<sup>8</sup>

Geography	2023 Jobs	2028 Jobs	2023-2028 Change	2023-2028 % Change	Annual Openings
Los Angeles	20,049	20,819	771	4%	1,353
Orange	8,756	9,047	291	3%	580
<b>Total</b>	<b>28,805</b>	<b>29,866</b>	<b>1,061</b>	<b>4%</b>	<b>1,933</b>

## Detailed Occupation Data

Exhibit 2 displays the current employment and projected occupational demand for each of the target occupations in Los Angeles County. Positive scores for automation resilience<sup>9</sup> reflect a lower-than-average threat of the occupation(s) being replaced by automation, while negative scores reflect a greater-than-average risk of automation. The average percentage of workers aged 55+ across all occupations in the Los Angeles/Orange County region is 26%; occupations

<sup>3</sup> [Computer Systems Analysts \(bls.gov\)](https://www.bls.gov)

<sup>4</sup> [Database Administrators and Architects \(bls.gov\)](https://www.bls.gov)

<sup>5</sup> [Database Administrators and Architects \(bls.gov\)](https://www.bls.gov)

<sup>6</sup> [Data Scientists \(bls.gov\)](https://www.bls.gov)

<sup>7</sup> [Business Intelligence Analysts \(onetonline.org\)](https://www.onetonline.org)

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

<sup>9</sup> Automation risk is calculated based on the percentage of time spent on high-risk compared to low-risk work, the number of high-risk jobs in compatible occupations, and the overall industry automation risk.

with a larger share of workers aged 55 and older typically have greater replacement needs to offset the amount of impending retirements. On average, 81% of workers across all occupations in California are employed full-time.

**Exhibit 2: Detailed employment and occupational demand, Los Angeles County<sup>10</sup>**

Occupation	2023 Jobs	2028 Jobs	5-Yr % Change	Annual Openings	Automation Resilience	% Aged 55 and older	% Full Time Workers
Computer Systems Analysts	10,380	10,462	1%	631	18.3	20%	100%
Database Administrators	1,968	1,987	1%	118	11.9	21%	100%
Database Architects	1,289	1,288	(0%)	75	11.9	21%	100%
Data Scientists	6,412	7,083	10%	528	16.6	14%	Data unavail.
<b>Total</b>	<b>20,049</b>	<b>20,819</b>	<b>4%</b>	<b>1,353</b>	<b>-</b>	<b>-</b>	<b>-</b>

## WAGES

The labor market endorsement in this report considers the entry-level hourly wages for these occupations related to data science and analytics 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 Los Angeles/Orange County region.

### Los Angeles County

All four occupations have entry-level wages above the self-sufficiency standard wage for one adult (\$24.03 in Los Angeles County). Typical entry-level hourly wages are in a range between \$37.60 and \$58.54. (Exhibit 3).

Four occupations have entry-level wages above the self-sufficiency standard wage:

- *Database architects*, \$58.54
- *Computer systems analysts*, \$44.50
- *Data scientists*, \$38.65
- *Database administrators*, \$37.60

Experienced workers can expect to earn wages between \$64.22 and \$89.88.

<sup>10</sup> Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

### Exhibit 3: Earnings for occupations in Los Angeles County

Occupation	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)	Median Annual Earnings*
Computer Systems Analysts	\$44.50	\$56.41	\$69.42	\$117,300
Database Administrators	\$37.60	\$50.73	\$64.22	\$105,500
Database Architects	\$58.54	\$74.38	\$89.88	\$154,700
Data Scientists	\$38.65	\$60.37	\$78.53	\$125,600

\*Rounded to the nearest \$100

### Orange County

All four occupations have entry-level wages above the self-sufficiency standard wage for one adult (\$27.13 in Orange County). Typical entry-level hourly wages are in a range between \$36.16 and \$56.65 (Exhibit 4).

Four occupations have entry-level wages above the self-sufficiency standard wage:

- *Database architects*, \$56.65
- *Computer systems analysts*, \$43.02
- *Data scientists*, \$37.10
- *Database administrators*, \$36.16

Experienced workers can expect to earn wages between \$61.78 and \$86.95.

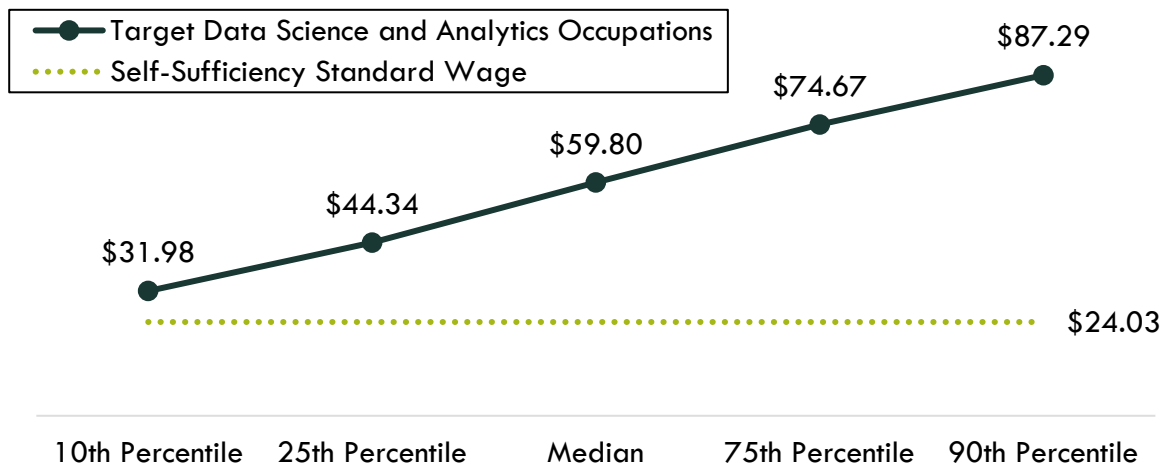
### Exhibit 4: Earnings for occupations in Orange County

Occupation	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)	Median Annual Earnings*
Computer Systems Analysts	\$43.02	\$54.49	\$67.03	\$113,300
Database Administrators	\$36.16	\$48.79	\$61.78	\$101,500
Database Architects	\$56.65	\$71.98	\$86.95	\$149,700
Data Scientists	\$37.10	\$57.90	\$75.28	\$120,400

\*Rounded to the nearest \$100

Across the greater Los Angeles and Orange County region, the average entry-level hourly earnings for the occupations in this report are \$44.34; this is above the living wage for one single adult in Los Angeles County (\$24.03). Exhibit 5 shows the average hourly wage for the occupations in this report, for entry-level to experienced workers.

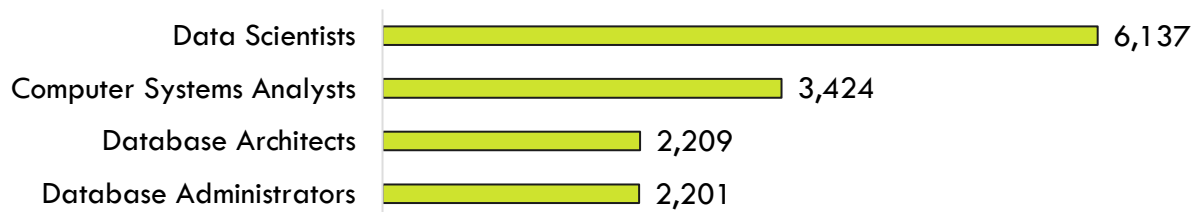
**Exhibit 5: Average hourly earnings for target data science and analytics occupations, Los Angeles and Orange counties**



**JOB POSTINGS**

There were 13,971 online job postings related to data science and analytics occupations listed in the past 12 months in Los Angeles and Orange counties. Exhibit 6 displays the number of job postings by occupation. The majority of job postings (44%) were for *data scientists*, followed by *computer systems analysts* (25%).

**Exhibit 6: Job postings by occupation (last 12 months), Los Angeles and Orange counties**



Job postings were analyzed for the most common job titles, skills, and employers associated with the target occupations in this report (Exhibit 7).

**Exhibit 7: Most commonly requested job titles, skills and employers in job postings, Los Angeles and Orange counties**

Top Job Titles	Top Skills	Top Employers
<ul style="list-style-type: none"> <li>Data analysts</li> <li>Data engineers</li> <li>Business systems analysts</li> <li>Data scientists</li> <li>Data architects</li> </ul>	<ul style="list-style-type: none"> <li>SQL (prog. language)</li> <li>Data analysis</li> <li>Computer science</li> <li>Python (prog. language)</li> <li>Project management</li> </ul>	<ul style="list-style-type: none"> <li>University of California</li> <li>Deloitte</li> <li>The Judge Group*</li> <li>Accenture</li> <li>Disney</li> </ul>

\*Staffing company

In the greater Los Angeles/Orange County region, 63% of the data science and analytics job postings listed a minimum educational requirement. Exhibit 8 details the number and percentage of job postings by educational level.

**Exhibit 8: Education levels requested in job postings for occupations related to data science and analytics, Los Angeles and Orange counties**

Education Level	Job Postings	% of Job Postings
Bachelor's degree	7,593	86%
Associate degree	444	5%
High school diploma or vocational training	819	9%

**EDUCATIONAL ATTAINMENT**

The Bureau of Labor Statistics (BLS) lists a bachelor’s degree as the typical entry-level education for the occupations in this report (Exhibit 9). The national-level educational attainment data indicates between 13% and 27% of workers in the field have completed an associate degree or less education, while between 73% and 87% hold a bachelor’s degree or more education. The Bureau of Labor Statistics (BLS) lists the following typical entry-level education levels for the occupations in this report:

**Exhibit 9: Entry-level education preferred by employers nationally, Bureau of Labor Statistics**

Occupation	Education Level
Computer Systems Analysts	Bachelor’s degree
Database Administrators	Bachelor’s degree
Database Architects	Bachelor’s degree
Data Scientists	Bachelor’s degree

**EDUCATIONAL SUPPLY**

**Community College Supply**

Exhibit 10 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 Orange Coast, Mt. San Antonio, and Santa Monica.

**Exhibit 10: Regional community college awards (certificates and degrees), 2022-2024**

TOP Code	Program	College	2021-22 Awards	2022-23 Awards	2023-24 Awards	3-Year Average		
0702.00	Computer Information Systems	Citrus	6	2	5	4		
		Compton	12	4	4	7		
		East LA	11	23	42	25		
		El Camino	28	19	27	25		
		Glendale	8	11	5	8		
		LA City	3	4	20	9		
		LA Harbor	1	2	3	2		
		LA Mission	1	-	-	0		
		LA Southwest	21	20	10	17		
		LA Trade-Tech	17	35	18	23		
		Long Beach	-	6	26	11		
		Mt San Antonio	68	41	41	50		
		Rio Hondo	15	14	14	14		
		Santa Monica	-	2	6	3		
		West LA	14	8	7	10		
		<b>LA Subtotal</b>	<b>205</b>	<b>191</b>	<b>228</b>	<b>208</b>		
		Coastline	2	7	11	7		
		Fullerton	49	48	51	49		
		Irvine	-	1	-	0		
		Orange Coast	1	-	-	0		
		Saddleback	-	1	1	1		
		Santa Ana	18	8	23	16		
		Santiago Canyon	1	5	2	3		
		<b>OC Subtotal</b>	<b>71</b>	<b>70</b>	<b>88</b>	<b>76</b>		
		<b>Supply Subtotal/Average</b>			<b>276</b>	<b>261</b>	<b>316</b>	<b>284</b>
		0706.00	Computer Science (transfer)	Cerritos	33	26	12	24
				Citrus	44	57	49	50
El Camino	32			21	31	28		
Glendale	16			14	25	18		
LA City	13			11	17	14		
LA Mission	3			3	2	3		
LA Southwest	-			-	1	0		
Long Beach	27			25	30	27		
Rio Hondo	2			9	10	7		

TOP Code	Program	College	2021-22 Awards	2022-23 Awards	2023-24 Awards	3-Year Average
		Santa Monica	86	64	85	78
		West LA	3	7	5	5
		<b>LA Subtotal</b>	<b>259</b>	<b>237</b>	<b>267</b>	<b>254</b>
		Cypress	7	16	35	19
		Fullerton	-	-	25	8
		Golden West	5	2	18	8
		Irvine	62	55	27	48
		Orange Coast	66	-	2	23
		Saddleback	33	38	27	33
		Santa Ana	28	28	41	32
		Santiago Canyon	8	19	28	18
		<b>OC Subtotal</b>	<b>209</b>	<b>158</b>	<b>203</b>	<b>190</b>
		<b>Supply Subtotal/Average</b>	<b>468</b>	<b>395</b>	<b>470</b>	<b>444</b>
0707.00	Computer Software Development	LA City	1	-	-	0
		LA Harbor	2	2	-	1
		LA Mission	2	-	-	1
		LA Pierce	7	7	9	8
		Santa Monica	1	2	-	1
		West LA	6	1	4	4
		<b>LA Subtotal</b>	<b>19</b>	<b>12</b>	<b>13</b>	<b>15</b>
		Golden West	4	1	1	2
		Saddleback	15	16	24	18
		<b>OC Subtotal</b>	<b>19</b>	<b>17</b>	<b>25</b>	<b>20</b>
		<b>Supply Subtotal/Average</b>	<b>38</b>	<b>29</b>	<b>38</b>	<b>35</b>
0707.10	Computer Programming	Cerritos	7	2	2	4
		Citrus	9	7	9	8
		East LA	-	1	2	1
		Glendale	-	-	1	0
		LA City	10	19	30	20
		LA Harbor	4	6	1	4
		LA Mission	7	6	15	9
		LA Pierce	5	7	7	6
		LA Southwest	2	3	3	3
		LA Valley	8	15	15	13
		Long Beach	7	4	4	5

TOP Code	Program	College	2021-22 Awards	2022-23 Awards	2023-24 Awards	3-Year Average
		Mt San Antonio	125	65	68	86
		Pasadena	23	37	46	35
		Santa Monica	71	55	77	68
		West LA	-	-	1	0
		<b>LA Subtotal</b>	<b>278</b>	<b>227</b>	<b>281</b>	<b>262</b>
		Coastline	1	2	-	1
		Cypress	5	5	6	5
		Fullerton	28	32	1	20
		Orange Coast	160	250	202	204
		Santa Ana	-	-	5	2
		Santiago Canyon	2	3	4	3
		<b>OC Subtotal</b>	<b>196</b>	<b>292</b>	<b>218</b>	<b>235</b>
		<b>Supply Subtotal/Average</b>			<b>474</b>	<b>519</b>
0707.20	Database Design and Administration	Citrus	1	-	1	1
		Long Beach	11	10	24	15
		Mt San Antonio	16	22	10	16
		Pasadena	14	10	12	12
		Santa Monica	4	5	10	6
		<b>LA Subtotal</b>	<b>46</b>	<b>47</b>	<b>57</b>	<b>50</b>
		Cypress	-	2	3	2
		Irvine	-	-	3	1
		Santa Ana	2	5	16	8
		<b>OC Subtotal</b>	<b>2</b>	<b>7</b>	<b>22</b>	<b>10</b>
		<b>Supply Subtotal/Average</b>			<b>48</b>	<b>54</b>
0709.00	World Wide Web Administration	Cerritos	3	3	7	4
		Glendale	7	2	6	5
		LA Pierce	-	2	1	1
		Long Beach	44	39	15	33
		Mt San Antonio	-	4	8	4
		Santa Monica	-	3	3	2
		West LA	7	8	5	7
		<b>LA Subtotal</b>	<b>61</b>	<b>61</b>	<b>45</b>	<b>56</b>
		Fullerton	-	-	1	0
		Saddleback	3	3	-	2
		<b>OC Subtotal</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>

TOP Code	Program	College	2021-22 Awards	2022-23 Awards	2023-24 Awards	3-Year Average
<b>Supply Subtotal/Average</b>			<b>64</b>	<b>64</b>	<b>46</b>	<b>58</b>
0799.00	Other Information Technology	Glendale	-	-	2	1
		LA Harbor	1	-	-	0
		Mt San Antonio	12	1	24	12
		<b>LA Subtotal</b>	<b>13</b>	<b>1</b>	<b>26</b>	<b>13</b>
		Santa Ana	-	5	10	5
		<b>OC Subtotal</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>
<b>Supply Subtotal/Average</b>			<b>13</b>	<b>6</b>	<b>36</b>	<b>18</b>
<b>Supply Total/Average</b>			<b>1,381</b>	<b>1,328</b>	<b>1,484</b>	<b>1,398</b>

**Exhibit 11: Regional community college awards (certificates and degrees), 2022-2024**

Award Type	# of Awards	% of Awards
A.A./A.S. degrees	746	53%
Certificates	628	45%
Noncredit awards	24	2%
	<b>1,398</b>	<b>100%</b>

### Other Postsecondary 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 data science and analytics occupations. Exhibit 12 shows the number of awards conferred by these institutions in relevant programs. Due to different data collection periods, the most recent data is from 2021 to 2023. Between 2021 and 2023, other postsecondary college institutions in the region conferred an average of 3,804 bachelor's and sub-baccalaureate awards. Sub-baccalaureate awards include associate degrees, postsecondary awards, and other academic awards that typically take fewer than four years to complete. The majority of awards (92%) in Exhibit 12 are bachelor's awards (3,496 awards), followed by sub-baccalaureate awards (308 awards).

There are three CIP codes that are relevant to data science and analytics occupations, but have no bachelor's or sub-baccalaureate award completions in the last three years:

- Data Modeling/Warehousing and Database Administration (11.0802)
- Data Science, General (30.7001)
- Data Analytics, General (30.7101)

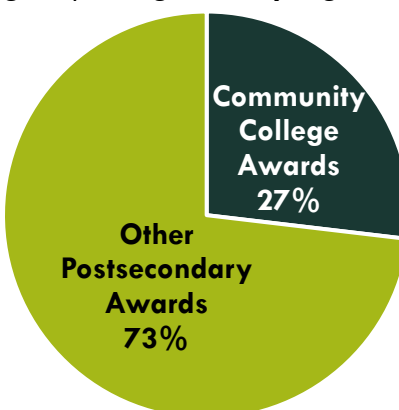
**Exhibit 12: Other regional postsecondary awards, 2021-2023**

CIP Code	Program	Postsecondary Institution	2020-21 Awards	2021-22 Awards	2022-23 Awards	3-Year Average
11.0101	Computer and Information Sciences, General	Azusa Pacific University	25	5	7	12
		Chapman University	20	25	20	22
		LA Pacific College	2	2	2	2
		Loyola Marymount Univ.	44	51	35	43
		Pitzer College	1	-	-	0
		UC-Irvine	1	-	-	0
		University of La Verne	36	20	22	26
		Univ. of Mass. Global	36	37	39	37
		University of the People	292	478	783	518
11.0103	Information Technology	Bethesda University	-	-	1	0
		Brand College	17	18	23	19
		CSU-Dominguez Hills	10	17	19	15
		CSU-Los Angeles	111	90	86	96
		CSU-Northridge	51	45	43	46
		Platt College-Anaheim	17	12	16	15
		Platt College-LA	6	3	6	5
		University of La Verne	3	15	7	8
		Univ. of Massachusetts Global	-	1	1	1
		Westcliff University	-	1	2	1
11.0701	Computer Science	Azusa Pacific University	-	9	8	6
		Biola University	18	15	13	15
		Cal Tech	83	77	67	76
		CSPU-Pomona	270	202	264	245
		CSU-Dominguez Hills	66	82	83	77
		CSU-Fullerton	307	325	369	334
		CSU-Long Beach	221	254	306	260
		CSU-Los Angeles	152	148	170	157
		CSU-Northridge	214	251	256	240
		Chapman University	45	50	56	50
		Claremont McKenna College	17	13	5	12
		Concordia Univ.-Irvine	-	3	9	4
		Harvey Mudd College	48	48	53	50
		Occidental College	14	31	30	25
		Pitzer College	5	10	2	6
		Pomona College	33	49	49	44
Scripps College	4	6	1	4		

CIP Code	Program	Postsecondary Institution	2020-21 Awards	2021-22 Awards	2022-23 Awards	3-Year Average
		Southern California Institute of Technology	7	5	-	4
		UC-Irvine	805	729	454	663
		UC-Los Angeles	345	349	340	345
		USC	293	287	305	295
30.3001	Computational Science	Chapman University	-	1	11	4
<b>Supply Total/Average</b>			<b>3,653</b>	<b>3,778</b>	<b>3,980</b>	<b>3,804</b>

Exhibit 13 shows the proportion of community college awards conferred in the greater Los Angeles/Orange County region compared to the number of other postsecondary awards for the programs in this report. The majority of awards conferred in these programs are awarded by other postsecondary institutions in the greater Los Angeles/Orange County region.

**Exhibit 13: Percentage of community college awards compared to other postsecondary institution awards in the Los Angeles/Orange County region**



## APPENDIX: OCCUPATION DESCRIPTIONS

LA COE prepared this report to provide regional labor market supply and demand data related to these target occupations:

- Computer Systems Analysts (15-1211)** Analyze science, engineering, business, and other data processing problems to develop and implement solutions to complex applications problems, system administration issues, or network concerns. Perform systems management and integration functions, improve existing computer systems, and review computer system capabilities, workflow, and schedule limitations. May analyze or recommend commercially available software.<sup>11</sup>

<sup>11</sup> [Computer Systems Analysts \(bls.gov\)](https://www.bls.gov)

- **Database Administrators (15-1242)** Administer, test, and implement computer databases, applying knowledge of database management systems. Coordinate changes to computer databases. Identify, investigate, and resolve database performance issues, database capacity, and database scalability. May plan, coordinate, and implement security measures to safeguard computer databases.<sup>12</sup>
- **Database Architects (15-1243)** Design strategies for enterprise databases, data warehouse systems, and multidimensional networks. Set standards for database operations, programming, query processes, and security. Model, design, and construct large relational databases or data warehouses. Create and optimize data models for warehouse infrastructure and workflow. Integrate new systems with existing warehouse structure and refine system performance and functionality.<sup>13</sup>
- **Data Scientists (15-2051)** Develop and implement a set of techniques or analytics applications to transform raw data into meaningful information using data-oriented programming languages and visualization software. Apply data mining, data modeling, natural language processing, and machine learning to extract and analyze information from large structured and unstructured datasets. Visualize, interpret, and report data findings. May create dynamic data reports.<sup>14</sup>
  - **Business Intelligence Analysts (15-2051.01)** Produce financial and market intelligence by querying data repositories and generating periodic reports. Devise methods for identifying data patterns and trends in available information sources.<sup>15</sup>

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<sup>12</sup> [Database Administrators and Architects \(bls.gov\)](https://www.bls.gov)

<sup>13</sup> [Database Administrators and Architects \(bls.gov\)](https://www.bls.gov)

<sup>14</sup> [Data Scientists \(bls.gov\)](https://www.bls.gov)

<sup>15</sup> [Business Intelligence Analysts \(onetonline.org\)](https://www.onetonline.org)

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**DATA 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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