



Labor Market Analysis: 0799.00 – Other Information Technology Applied Artificial Intelligence

Certificate requiring 16 to fewer than 30 semester units

Los Angeles Center of Excellence, May 2025

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 checked="" type="checkbox"/>	No <input type="checkbox"/>	
Education:	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Emerging Occupation(s)			
	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 artificial intelligence-related occupations¹ 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. Since this field of technology is constantly evolving, the Standard Occupational Classification (SOC) system has yet to classify artificial intelligence occupations. Therefore, this report utilizes real-time job posting information from employer job advertisements to approximate demand for artificial intelligence-related jobs, as well as SOC codes that employ the skills necessary for artificial intelligence.

Based on the available data, there appears to be a supply gap for the three identified occupations in the region. While entry-level wages exceed the self-sufficiency standard wage in both Los Angeles and Orange counties, the Bureau of Labor Statistics (BLS) lists a bachelor’s degree as the typical entry-level education for the target occupations, which positions this proposed program ideally as an up-skilling or re-skilling certificate for students that have already obtained a bachelor’s degree, since this stand-alone certificate will likely not be sufficient on its own for employment.

¹ 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.

Recommendation: Due to two of three 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

- 6,319 annual job openings are projected in the region through 2028. This number is greater than the three-year average of 5,514 awards conferred by educational institutions in the region.
 - Over the past 12 months in the LA/OC region, there were 953 online job postings for the three occupations in this report that also listed “artificial intelligence” or “machine learning” as a specialized skill.

Living Wage

- All three occupations have entry-level wages **above** Los Angeles County’s self-sufficiency standard hourly wage (\$24.03/hour).²

Educational Attainment

- A bachelor’s degree is the typical entry-level education for these artificial intelligence-related occupations according to the Bureau of Labor Statistics (BLS).
- 13%-46% of workers in the field have completed an associate degree or less education, according to national educational attainment data.

Community college supply

- 28 community colleges issued awards related to information technology and/or artificial intelligence in the greater LA/OC region.
- 1,440 awards (degrees and certificates) were conferred on average each year between 2022 and 2024.

Other postsecondary supply

- 38 educational institutions in the LA/OC region have conferred awards in programs related to information technology and/or artificial intelligence over the past three years.
- 4,074 awards were conferred on average each year by other postsecondary institutions throughout the greater LA/OC region between 2021 and 2023.

TARGET OCCUPATIONS

The LA COE prepared this report to provide regional labor market and postsecondary supply data for three occupations related to artificial intelligence. Although the occupations in this report typically require a bachelor’s degree, these SOC codes employ the skills necessary for artificial intelligence. [For full occupation descriptions, please see Appendix.](#)

- **Software Developers (15-1252)**³

² Self-Sufficiency Standard wage data was pulled from The Self-Sufficiency Standard Tool for California. For more information, visit: <http://selfsufficiencystandard.org/california>.

³ [Software Developers, Quality Assurance Analysts, and Testers U.S. Bureau of Labor Statistics \(bls.gov\)](#)

- **Computer Occupations, All Other (15-1299)**⁴
- **Data Scientists (15-2051)**⁵

OCCUPATIONAL DEMAND

Exhibit 1 shows the five-year occupational demand projections for these occupations related to artificial intelligence. In the greater Los Angeles/Orange County region, the number of jobs related to these occupations is projected to increase by 5% through 2028. There will be more than 6,300 job openings per year through 2028 due to job growth and replacements. The majority of jobs in 2023 for these occupations (69%) were located in Los Angeles County.

Exhibit 1: Current employment and occupational demand, Los Angeles and Orange counties⁶

Geography	2023 Jobs	2028 Jobs	2023-2028 Change	2023-2028 % Change	Annual Openings
Los Angeles	64,806	68,009	3,203	5%	4,369
Orange	29,227	30,605	1,378	5%	1,951
Total	94,033	98,614	4,581	5%	6,319

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 resilience⁷ 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 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 County⁸

Occupation	2023 Jobs	2028 Jobs	5-Yr % Change	Annual Openings	Automation Resilience	% Aged 55 and older	% Full Time Workers
Software Developers	40,239	42,740	6%	2,677	19.8	14%	99%
Computer Occupations, All Other	18,154	18,186	0%	1,164	14.5	19%	90%
Data Scientists	6,412	7,083	10%	528	16.6	14%	Data unavail.
Total	64,806	68,009	5%	4,369	-	-	-

⁴ [Computer Occupations, All Other \(bls.gov\)](https://www.bls.gov)

⁵ [Data Scientists U.S. Bureau of Labor Statistics \(bls.gov\)](https://www.bls.gov)

⁶ Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

⁷ 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.

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.

WAGES

The labor market endorsement in this report considers the entry-level hourly wages for these occupations related to artificial intelligence 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 three 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 \$29.41 and \$58.96. (Exhibit 3).

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

- *Software developers, \$58.96*
- *Data scientists, \$38.65*
- *Computer occupations, all other, \$29.41*

Experienced workers can expect to earn wages between \$71.23 and \$84.43.

Exhibit 3: Earnings for occupations in Los Angeles County

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)	Median Annual Earnings*
Software Developers	\$58.96	\$74.18	\$84.43	\$154,300
Computer Occupations, All Other	\$29.41	\$48.07	\$71.23	\$100,000
Data Scientists	\$38.65	\$60.37	\$78.53	\$125,600

*Rounded to the nearest \$100

Orange County

All three 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 \$28.29 and \$57.39 (Exhibit 4).

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

- *Software developers, \$57.39*
- *Data scientists, \$37.10*
- *Computer occupations, all other, \$28.29*

Experienced workers can expect to earn wages between \$68.46 and \$82.11.

Exhibit 4: Earnings for occupations in Orange County

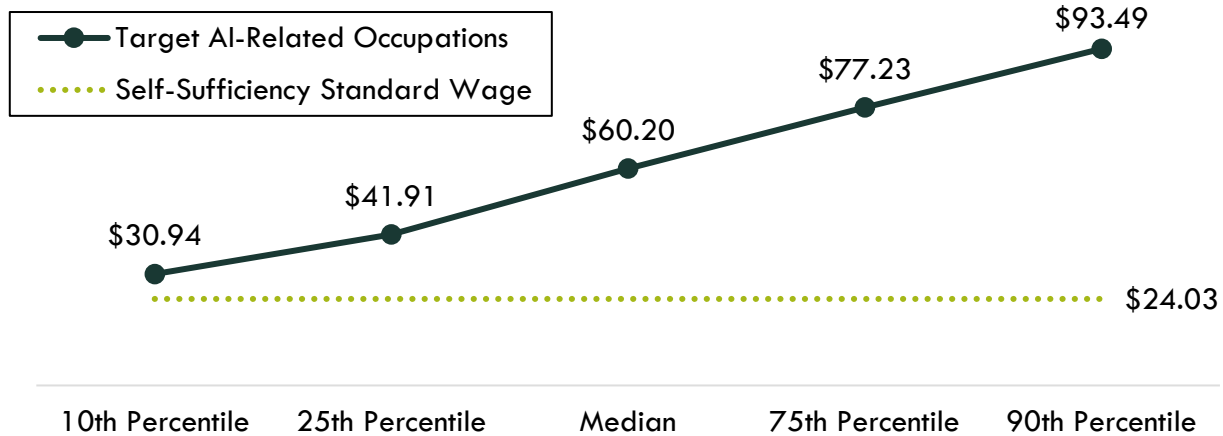
Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)	Median Annual Earnings*
Software Developers	\$57.39	\$72.17	\$82.11	\$150,100

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)	Median Annual Earnings*
Computer Occupations, All Other	\$28.29	\$46.23	\$68.46	\$96,200
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 \$41.91; 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 AI-related occupations, Los Angeles and Orange counties



JOB POSTINGS

Over the past 12 months in the region, there were 953 online job postings for the three occupations in this report that also listed “artificial intelligence” or “machine learning” as specialized skills. Exhibit 6 displays the number of job postings by occupation. The majority of job postings (52%) were for software developers, followed by data scientists (27%) and computer occupations, all other (20%).

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"> • Data scientists • Software engineers • Solutions architects • Software developers • DevOps engineers • Data science interns 	<ul style="list-style-type: none"> • Machine learning • Artificial intelligence • Computer science • Python (programming language) • Amazon Web Services 	<ul style="list-style-type: none"> • Amazon • Anduril Industries • First American Financial • Pacific Life • Deloitte • StubHub

In the greater Los Angeles/Orange County region, 66% of the target 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 artificial intelligence, Los Angeles and Orange counties

Education Level	Job Postings	% of Job Postings
Bachelor's degree	601	95%
Associate degree	6	1%
High school diploma or vocational training	23	4%

EDUCATIONAL ATTAINMENT

The Bureau of Labor Statistics (BLS) lists a bachelor’s degree as the typical entry-level education for each of the occupations in this report (Exhibit 9). The national-level data indicates 13% of *software developers* and *data scientists* in the field have completed an associate degree or less education as their highest level of educational attainment. However, 46% of *computer occupations, all other* have completed an associate degree or less education as their highest level of educational attainment. 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
Software Developers	Bachelor’s degree
Computer Occupations, All Other	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
0701.00	Information Technology, General	Citrus	-	-	1	0
		East LA	30	18	25	24
		Glendale	17	16	17	17
		LA Harbor	2	-	-	1
		LA Mission	4	3	2	3
		LA Southwest	12	1	7	7
		Long Beach	88	73	63	75
		Mt San Antonio	23	12	22	19
		West LA	6	4	3	4
		LA Subtotal	182	127	140	150
		Santa Ana	9	25	-	11
		OC Subtotal	3	9	25	12
Supply Subtotal/Average			191	152	140	161
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
		LA Subtotal	205	191	228	208
		Coastline	2	7	11	7

TOP Code	Program	College	2021-22 Awards	2022-23 Awards	2023-24 Awards	3-Year Average
		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
		OC Subtotal	71	70	88	76
		Supply Subtotal/Average	276	261	316	284
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
		Santa Monica	86	64	85	78
		West LA	3	7	5	5
		LA Subtotal	259	237	267	254
		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
		OC Subtotal	209	158	203	190
		Supply Subtotal/Average	468	395	470	444
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
		LA Subtotal	19	12	13	15

TOP Code	Program	College	2021-22 Awards	2022-23 Awards	2023-24 Awards	3-Year Average
		Golden West	4	1	1	2
		Saddleback	15	16	24	18
		OC Subtotal	19	17	25	20
	Supply	Subtotal/Average	38	29	38	35
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
		Mt San Antonio	125	65	68	86
		Pasadena	23	37	46	35
		Santa Monica	71	55	77	68
		West LA	-	-	1	0
		LA Subtotal	278	227	281	262
		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
		OC Subtotal	196	292	218	235
Supply	Subtotal/Average	474	519	499	497	
0799.00	Other Information Technology	Glendale	-	-	2	1
		LA Harbor	1	-	-	0
		Mt San Antonio	12	1	24	12
		LA Subtotal	13	1	26	13
		Santa Ana	-	5	10	5
OC Subtotal	-	5	10	5		
Supply	Subtotal/Average	13	6	36	18	
Supply Total/Average			1,460	1,362	1,499	1,440

Exhibit 11 displays the community college awards issued broken down by award type. In this case, the majority of awards issued are associate degrees (53%), follow by certificates of achievement (45%).

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

Award Type	# of Awards	% of Awards
A.A./A.S. degrees	761	53%
Certificates	642	45%
Noncredit awards	37	3%
Total	1,440	100%

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 occupations related to artificial intelligence. 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 4,074 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 degrees (3,759 awards), followed by sub-baccalaureate awards (316 awards).

Exhibit 12: Other regional postsecondary awards, 2021-2023

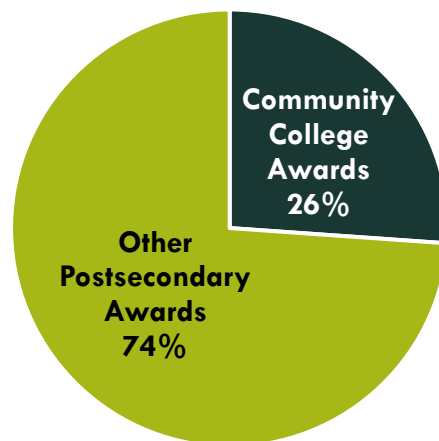
CIP Code	Program	Postsecondary Institution	2020-21 Awards	2021-22 Awards	2022-23 Awards	3-Year Average
11.0101	Computer and Information Sciences, General	Azusa Pacific University	25	5	7	12
		Chapman University	20	25	20	22
		LA Pacific College	2	2	2	2
		Loyola Marymount Univ.	44	51	35	43
		Pitzer College	1	-	-	0
		UC-Irvine	1	-	-	0
		University of La Verne	36	20	22	26
		Univ. of Massachusetts 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

CIP Code	Program	Postsecondary Institution	2020-21 Awards	2021-22 Awards	2022-23 Awards	3-Year Average
		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
11.0199	Computer and Information Sciences, Other	CSU-Dominguez Hills	55	54	58	56
		CSU-Northridge	99	78	68	82
11.0201	Computer Programming/ Programmer, General	ABCO Technology	34	14	17	22
11.0701	Computer Science	Azusa Pacific University	-	9	8	6
		Biola University	18	15	13	15
		CA Institute of 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
		Southern CA Institute of Technology	7	5	-	4
		UC-Irvine	805	729	454	663
UC-Los Angeles	345	349	340	345		
USC	293	287	305	295		
11.0804	Modeling, Virtual Environments and Simulation	ABC Adult School	-	1	-	0
		UC-Irvine	70	62	55	62
		USC	45	32	36	38

CIP Code	Program	Postsecondary Institution	2020-21 Awards	2021-22 Awards	2022-23 Awards	3-Year Average
11.0899	Computer Software and Media Applications, Other	Art Center College of Design	14	21	20	18
		CA Institute of the Arts	1	6	7	5
		Learnet Academy	9	2	5	5
11.9999	Computer and Information Sciences and Support Services, Other	Woodbury University	1	-	-	0
15.1202	Computer/Computer Systems Technology/Technician	Learnet Academy	2	2	3	2
30.3001	Computational Science	Chapman University	-	1	11	4
30.3101	Human Computer Interaction	Woodbury University	2	2	2	2
Supply Total/Average			3,951	4,038	4,234	4,074

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 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:

- **Software Developers (15-1252)** Research, design, and develop computer and network software or specialized utility programs. Analyze user needs and develop software solutions, applying principles and techniques of computer science, engineering, and mathematical analysis. Update software or enhance existing software capabilities. May work with computer hardware engineers to integrate hardware and software systems, and develop specifications and performance requirements. May maintain databases within an application area, working individually or coordinating database development as part of a team.⁹
- **Computer Occupations, All Other (15-1299)** All computer occupations not listed separately.¹⁰
- **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.¹¹

Contact information:

Luke Meyer, Director

Los Angeles Center of Excellence

Lmeyer7@mtsac.edu

If for any reason this document is not accessible or if you have specific needs for readability, please contact us and we will do our utmost to accommodate you with a modified version.

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)



POWERED BY



⁹ [Software Developers, Quality Assurance Analysts, and Testers \(bls.gov\)](#)

¹⁰ [Computer Occupations, All Other \(bls.gov\)](#)

¹¹ [Data Scientists \(bls.gov\)](#)

Important Disclaimer: 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. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

**© 2024 California Community Colleges Chancellor's Office,
Centers of Excellence for Labor Market Research, Economic and Workforce Development Program**