

Labor Market Analysis: 0707.10/Computer Programming

Computer Science - Associate of Science (A.S.) degree

Los Angeles Center of Excellence, January 2024

Summary

Program Endorsement:	Endorsed: All Criteria Met <input checked="" type="checkbox"/>	Endorsed: Some Criteria Met <input 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 checked="" type="checkbox"/>	No <input type="checkbox"/>	
Emerging Occupation(s)			
Yes <input type="checkbox"/>		No <input checked="" type="checkbox"/>	

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

- **Computer Network Support Specialists (15-1231)** Analyze, test, troubleshoot, and evaluate existing network systems, such as local area networks (LAN), wide area networks (WAN), cloud networks, servers, and other data communications networks. Perform network maintenance to ensure networks operate correctly with minimal interruption;¹
- **Web Developers (15-1254)** Develop and implement websites, web applications, application databases, and interactive web interfaces. Evaluate code to ensure that it is properly structured, meets industry standards, and is compatible with browsers and devices. Optimize website performance, scalability, and server-side code and processes. May develop website infrastructure and integrate websites with other computer applications;²
- **Web and Digital Interface Designers (15-1255)** Design digital user interfaces or websites. Develop and test layouts, interfaces, functionality, and navigation menus to ensure compatibility and usability across browsers or devices. May use web framework applications as well as client-side code and processes. May evaluate web design following web and accessibility standards, and may analyze web use metrics and optimize websites for marketability and search engine ranking. May design and test interfaces that facilitate the human-computer interaction and maximize the usability of digital devices, websites, and software with a focus on aesthetics and design. May create graphics used in websites and manage website content and links;³

and three above middle-skill occupations:

¹ [Computer Support Specialists \(bls.gov\)](https://www.bls.gov/occupations/computer-support-specialists)

² [Web Developers and Digital Designers \(bls.gov\)](https://www.bls.gov/occupations/web-developers-and-digital-designers)

³ [Web Developers and Digital Designers : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics \(bls.gov\)](https://www.bls.gov/occupations/web-developers-and-digital-designers)

- **Computer Programmers (15-1251)** Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information;⁴
- **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;⁵
- **Software Quality Assurance Analysts and Testers (15-1253)** Develop and execute software tests to identify software problems and their causes. Test system modifications to prepare for implementation. Document software and application defects using a bug tracking system and report defects to software or web developers. Create and maintain databases of known defects. May participate in software design reviews to provide input on functional requirements, operational characteristics, product designs, and schedules.⁶

Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree. Although some of the occupations in this report typically require a bachelor's degree, they are considered middle-skill because approximately one-third of workers in the field have completed some college or an associate degree. Computer science occupations vary in terms of entry-level education. In order to illuminate which occupations are immediately accessible to community college graduates, the computer science occupations have been divided into middle-skill and above middle-skill occupations. This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations.

Based on the available data, there appears to be a supply gap for these computer programming occupations in the region. Furthermore, entry-level wages exceed the self-sufficiency standard wage in both Los Angeles and Orange counties, and between 25% and 40% of current workers in these middle-skill occupations have completed some college or an associate degree. **Therefore, due to all of the criteria being met, the LA COE endorses this proposed program.** Detailed reasons include:

Demand:

- **Supply Gap Criteria** – Over the next five years, **there is projected to be 1,440 middle-skill jobs and 5,339 above middle-skill jobs available annually** in the region due to new job growth and replacements, **which is more than the three-year average of 2,234 awards conferred** by educational institutions in the region.

⁴ [Computer Programmers \(bls.gov\)](https://www.bls.gov/occupations/15-1251)

⁵ [Software Developers, Quality Assurance Analysts, and Testers \(bls.gov\)](https://www.bls.gov/occupations/15-1252)

⁶ [Software Developers, Quality Assurance Analysts, and Testers \(bls.gov\)](https://www.bls.gov/occupations/15-1253)

- Over the past 12 months, there were **31,903 online job postings for these computer science-related occupations**. The highest number of job postings were for software engineers, embedded software engineers, principal software engineers, DevOps engineers, and software developers.
- **Living Wage Criteria** – Within Los Angeles County, all the occupations in this report have entry-level wages **above** the self-sufficiency standard hourly wage (\$18.10/hour).⁷
- **Educational Criteria** – Within the greater LA/OC region, **94% of the annual job openings** for occupations related to computer science **typically require a bachelor’s degree**.
 - While the national-level educational attainment data indicates between 12% and 40% of workers in the field have completed some college or an associate degree, the three **middle-skill occupations have between 25% and 40% of workers in the field who have completed some college or an associate degree**.

Supply:

- There are **26 community colleges** in the greater LA/OC region that issue awards related to computer science, conferring an average of **1,505 awards annually** between 2019 and 2022.
- Between 2019 and 2021, there was an average of **729 awards conferred annually** in related training programs by non-community college institutions throughout the greater LA/OC region.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for the three middle-skill computer science-related programs of interest. In the greater Los Angeles/Orange County region, the number of jobs related to these occupations is projected to increase by 9% through 2027. There will be more than 1,400 job openings per year through 2027 due to job growth and replacements. The majority of jobs in 2022 for these middle-skill computer science-related occupations (72%) were located in Los Angeles County.

Exhibit 1: Middle-skill occupational demand in Los Angeles and Orange Counties⁸

Geography	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	Annual Openings
Los Angeles	11,864	12,984	1,120	9%	1,049
Orange	4,534	4,927	393	9%	392
Total	16,399	17,911	1,513	9%	1,440

Exhibit 2 shows the five-year occupational demand projections for the above middle-skill group of computer science occupations. In Los Angeles/Orange County, the number of jobs related to

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

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.

these occupations is projected to increase by 11% through 2027. There will be more than 5,300 job openings per year through 2027 due to job growth and replacements in the field. The majority of jobs in 2022 for these middle-skill computer science-related occupations (67%) were located in Los Angeles County.

Exhibit 2: Above middle-skill occupational demand in Los Angeles and Orange Counties⁹

Geography	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	Annual Openings
Los Angeles	45,229	50,271	5,042	11%	3,607
Orange	22,025	24,366	2,340	11%	1,731
Total	67,255	74,637	7,382	11%	5,339

Wages

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

Los Angeles County

All of the occupations in this report have entry-level wages above the self-sufficiency standard wage for one adult (\$18.10 in Los Angeles County). Typical entry-level hourly wages are in a range between \$24.99 and \$51.33. Experienced workers can expect to earn wages between \$45.55 and \$82.41.

Exhibit 2: Earnings for Occupations in LA County

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)	Median Annual Earnings*
Computer Network Support Specialists (15-1231)	\$27.09	\$35.66	\$45.55	\$74,200
Computer Programmers (15-1251)	\$33.71	\$47.77	\$62.45	\$99,400
Software Developers (15-1252)	\$51.33	\$65.39	\$82.41	\$136,000
Software Quality Assurance Analysts and Testers (15-1253)	\$38.71	\$51.46	\$63.79	\$107,000
Web Developers (15-1254)	\$24.99	\$40.22	\$56.55	\$83,700
Web and Digital Interface Designers (15-1255)	\$26.50	\$35.66	\$57.84	\$74,200

*Rounded to the nearest \$100

⁹ Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Orange County

All of the occupations in this report have entry-level wages above the self-sufficiency standard wage for one adult (\$20.63 in Orange County). Typical entry-level hourly wages are in a range between \$23.39 and \$50.38. Experienced workers can expect to earn wages between \$44.99 and \$80.78.

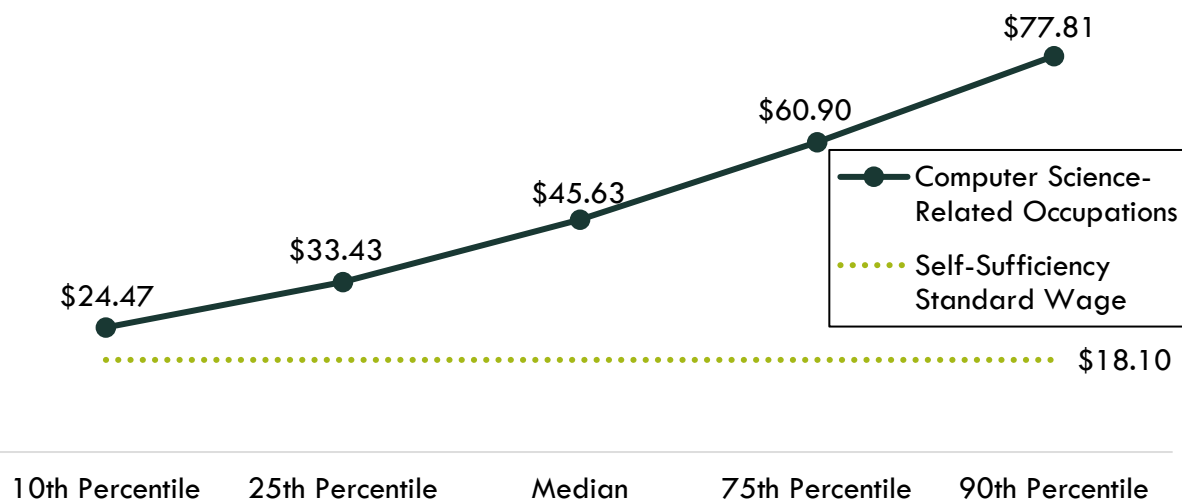
Exhibit 3: Earnings for Occupations in Orange County

Occupation	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)	Median Annual Earnings*
Computer Network Support Specialists (15-1231)	\$26.71	\$35.19	\$44.99	\$73,200
Computer Programmers (15-1251)	\$33.37	\$47.18	\$61.60	\$98,100
Software Developers (15-1252)	\$50.38	\$64.12	\$80.78	\$133,400
Software Quality Assurance Analysts and Testers (15-1253)	\$37.57	\$49.94	\$61.90	\$103,900
Web Developers (15-1254)	\$23.39	\$38.09	\$54.13	\$79,200
Web and Digital Interface Designers (15-1255)	\$24.87	\$33.84	\$54.80	\$70,400

*Rounded to the nearest \$100

On average, the entry-level earnings for the occupations in this report are \$33.43; this is above the living wage for one single adult in Los Angeles County (\$18.10). Exhibit 4 shows the average wage for the occupations in this report, from entry-level to experienced workers.

Exhibit 4: Average Hourly Earnings for Computer Science-Related Occupations in LA/OC

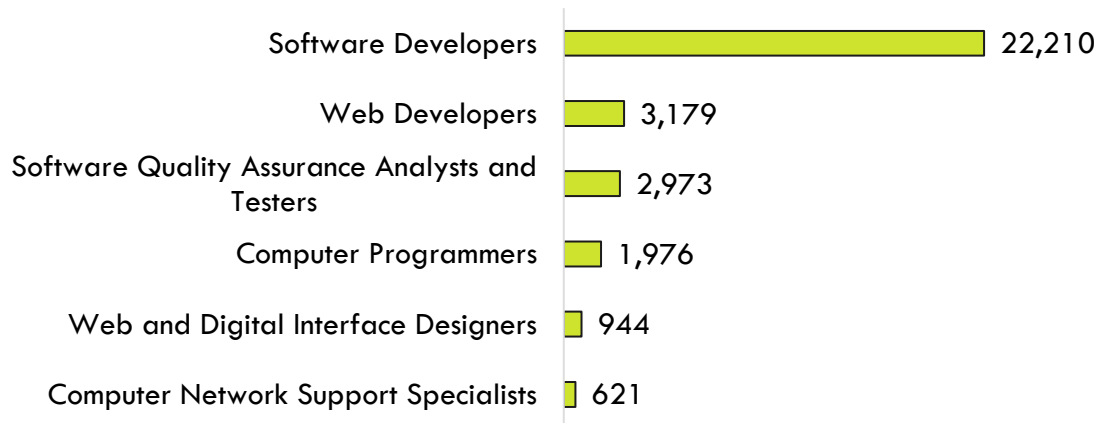


Job Postings

There were 31,903 online job postings related to these computer science occupations listed in the past 12 months. Exhibit 5 displays the number of job postings by occupation. The majority of job

postings (70%) were for *software developers*, followed by *web developers* (10%) and *software quality assurance analysts and testers* (9%). The highest number of job postings were for software engineers, embedded software engineers, principal software engineers, DevOps engineers, and software developers. The top skills were computer science, software engineering, software development, agile methodology, and Python (programming language). The top three employers, by number of job postings, in the region were Boeing, Motion Recruitment (staffing company), and Northrop Grumman.

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



Programming Languages

Of the 31,903 online job postings related to computer science, the following programming languages were requested or required competencies in job advertisements:

- **Python:** 5,878 job postings (18%)
- **SQL:** 5,290 job postings (17%)
- **JavaScript:** 5,230 job postings (16%)
- **Java:** 4,608 job postings (14%)
- **Application Programming Interface (API):** 4,364 job postings (14%)
- **Amazon Web Services:** 4,354 job postings (14%)
- **C++:** 4,081 job postings (13%)
- **C#:** 3,460 job postings (11%)

Educational Attainment

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

- **Bachelor's degree:** *Computer programmers; Software developers; Software quality assurance analysts and testers; Web developers; Web and digital interface designers*
- **Associate degree:** *Computer network support specialists*

In the greater LA/OC region, the majority of annual job openings (94%) typically require a bachelor's degree. While the national-level educational attainment data indicates between 12% and 40% of workers in the field have completed some college or an associate degree, the three

middle-skill occupations count between 25% and 40% of workers in the field who have completed some college or an associate degree. Of the 61% of computer science-related job postings listing a minimum education requirement in the greater Los Angeles/Orange County region, 6% (1,270) requested high school or vocational training, 3% (665) requested an associate degree, and 90% (17,648) requested a bachelor's degree.

Educational Supply

Community College Supply

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

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

TOP	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
0614.30	Website Design and Development	Citrus	-	-	1	0
		LA Pierce	2	4	5	4
		Mt San Antonio	7	6	1	5
		Pasadena	1	1	7	3
		Santa Monica	2	3	2	2
		West LA	-	-	3	1
		LA Subtotal	12	14	19	15
		Coastline	1	1	-	1
		Fullerton	-	1	2	1
		Irvine	-	5	4	3
		Orange Coast	9	7	13	10
		Saddleback	2	7	4	4
		Santa Ana	2	1	-	1
		Santiago Canyon	3	6	5	5
OC Subtotal	17	28	28	24		
Supply Subtotal/Average			29	42	47	39
0701.00	Information Technology, General	East LA	10	4	30	15
		Glendale	-	3	17	7
		LA Harbor	-	1	2	1
		LA Mission	3	1	4	3
		LA Southwest	-	2	12	5
		Long Beach	64	106	88	86
		Mt San Antonio	90	49	23	54
		Santa Monica	-	1	-	0

TOP	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
		West LA	5	-	6	4
		LA Subtotal	172	167	182	174
		Santa Ana	-	3	9	4
		OC Subtotal	-	3	9	4
		Supply Subtotal/Average	172	170	191	178
0702.10	Software Applications	Cerritos	6	2	8	5
		LA City	1	1	-	1
		LA Mission	-	3	-	1
		LA Southwest	-	-	3	1
		Long Beach	7	-	-	2
		Mt San Antonio	2	-	1	1
		Santa Monica	13	6	12	10
		LA Subtotal	29	12	24	22
		Coastline	8	8	14	10
		Cypress	-	-	2	1
		Irvine	48	50	89	62
		Saddleback	7	11	10	9
		OC Subtotal	63	69	115	82
		Supply Subtotal/Average	X	X	X	X
0707.00	Computer Software Development	LA City	-	-	1	0
		LA Harbor	-	-	2	1
		LA Mission	-	-	2	1
		LA Pierce	-	4	7	4
		Santa Monica	-	1	1	1
		West LA	-	-	6	2
		LA Subtotal	-	5	19	8
		Cypress	1	-	-	0
		Golden West	2	6	4	4
		Orange Coast	2	2	-	1
		Saddleback	3	10	15	9
OC Subtotal	8	18	19	15		
		Supply Subtotal/Average	8	23	38	23
0707.10	Computer Programming	Cerritos	2	3	7	4
		Citrus	1	3	9	4
		East LA	4	1	-	2

TOP	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
		Glendale	3	-	-	1
		LA City	6	8	10	8
		LA Harbor	-	2	4	2
		LA Mission	4	7	7	6
		LA Pierce	4	5	5	5
		LA Southwest	1	2	2	2
		LA Valley	6	13	8	9
		Long Beach	5	3	7	5
		Mt San Antonio	114	83	125	107
		Pasadena	21	23	23	22
		Santa Monica	46	65	71	61
		LA Subtotal	217	218	278	238
		Coastline	-	-	1	0
		Cypress	20	6	5	10
		Fullerton	28	24	28	27
		Irvine	4	-	-	1
		Orange Coast	157	206	160	174
		Santa Ana	1	-	-	0
		Santiago Canyon	3	2	2	2
		OC Subtotal	213	238	196	216
		Supply Subtotal/Average	430	456	474	453
0707.30	Computer Systems Analysis	Cerritos	3	-	5	3
		East LA	1	-	-	0
		LA City	-	1	6	2
		LA Harbor	-	1	1	1
		LA Mission	1	1	1	1
		LA Pierce	-	6	5	4
		Mt San Antonio	-	-	9	3
		Rio Hondo	-	-	3	1
		LA Subtotal	5	9	30	15
		Supply Subtotal/Average	5	9	30	15
0708.00	Computer Infrastructure and Support	Cerritos	4	4	9	6
		East LA	-	-	3	1
		El Camino	-	-	5	2
		Glendale	3	4	11	6

TOP	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
		LA City	3	5	12	7
		LA Harbor	1	1	2	1
		LA Mission	12	17	32	20
		LA Valley	2	4	3	3
		Long Beach	8	8	2	6
		Mt San Antonio	24	24	36	28
		Pasadena	1	24	8	11
		Rio Hondo	10	11	19	13
		West LA	15	16	7	13
		LA Subtotal	83	118	149	117
		Coastline	46	73	91	70
		Cypress	3	1	1	2
		Orange Coast	7	5	7	6
		Saddleback	-	3	13	5
		Santa Ana	-	27	14	14
		OC Subtotal	56	109	126	97
		Supply Subtotal/Average	139	227	275	214
0708.10	Computer Networking	Cerritos	9	8	6	8
		Glendale	3	-	2	2
		LA City	-	4	8	4
		LA Pierce	20	12	19	17
		Long Beach	47	48	52	49
		Mt San Antonio	11	4	25	13
		Rio Hondo	7	2	5	5
		West LA	48	58	24	43
		LA Subtotal	145	136	141	141
		Coastline	59	92	49	67
		Cypress	95	61	71	76
		Fullerton	-	1	-	0
		Irvine	21	10	18	16
		Saddleback	21	19	15	18
		Santa Ana	12	23	45	27
		OC Subtotal	208	206	198	204
		Supply Subtotal/Average	353	342	339	345

TOP	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
0708.20	Computer Support	Citrus	1	1	4	2
		Glendale	7	2	7	5
		LA Pierce	8	6	6	7
		LA Valley	-	1	-	0
		Long Beach	14	40	33	29
		Pasadena	30	34	12	25
		LA Subtotal	60	84	62	69
		Cypress	5	3	13	7
		OC Subtotal	5	3	13	7
Supply Subtotal/Average			65	87	75	76
0709.00	World Wide Web Administration	Cerritos	-	-	3	1
		Glendale	7	10	7	8
		LA Pierce	-	2	-	1
		Long Beach	24	34	44	34
		Santa Monica	-	16	-	5
		West LA	9	6	7	7
		LA Subtotal	40	68	61	56
		Fullerton	-	1	-	0
		Saddleback	2	2	3	2
OC Subtotal	2	3	3	3		
Supply Subtotal/Average			42	71	64	59
Supply Total/Average			1,335	1,508	1,672	1,505

Non-Community College Supply

For a comprehensive regional supply analysis, it is important to consider the supply from other institutions in the region that provide training programs for computer science occupations. Exhibit 7 shows the annual and three-year average number of awards conferred by these institutions in relevant programs. Due to different data collection periods, the most recent three-year period of available data is from 2019 to 2021. Between 2019 and 2021, non-community college institutions in the region conferred an average of 729 bachelor's and sub-baccalaureate awards. Bachelor's awards are included, since some of the occupations in this report typically require a bachelor's degree. Sub-baccalaureate awards include associate degrees, postsecondary awards, and other academic awards. The majority of awards (62%) in Exhibit 7 are bachelor's degrees.

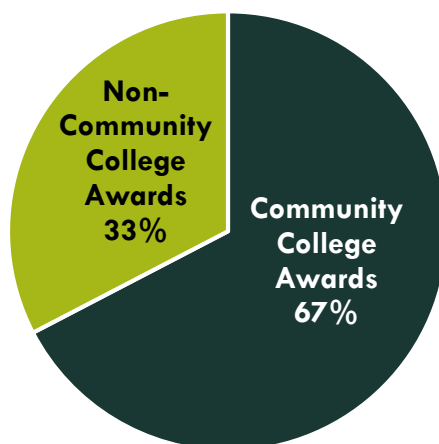
Exhibit 7: Regional non-community college awards, 2019-2021

CIP	Program	Institution	2019-20 Awards	2020-21 Awards	2-Year Average
11.0101	Computer and Information Sciences, General	Azusa Pacific University	21	25	23
		Chapman University	18	23	21
		LA Pacific College	6	2	4
		Loyola Marymount Univ.	27	45	36
		Pitzer College	-	1	1
		UC-Irvine	-	1	1
		University of La Verne	23	36	30
		University of Massachusetts Global	30	36	33
		University of the People	203	292	248
11.0199	Computer and Information Sciences, Other	CSU-Dominguez Hills	65	55	60
		CSU-Northridge	73	99	86
11.0201	Computer Programming/ Programmer, General	ABCO Technology	46	34	40
		Platt College-Anaheim	4	-	2
11.0801	Web Page, Digital/Multimedia and Information Resources Design	LA Pacific College	-	4	2
11.0899	Computer Software and Media Applications, Other	Art Center College of Design	20	14	17
		CA Institute of the Arts	8	1	5
		Learnet Academy	10	9	10
11.0901	Computer Systems Networking and Telecommunications	Brand College	2	-	1
11.1001	Network and System Administration/ Administrator	ABCO Technology	25	40	33
		Brand College	9	16	13
		CA Intercontinental Univ.	1	1	1
11.1003	Computer and Information Systems Security/ Auditing/Information Assurance	Learnet Academy	5	4	5
11.1004	Web/Multimedia Management and Webmaster	ABCO Technology	37	35	36
		LA Pacific College	1	1	1
11.1006	Computer Support Specialist	Southern California Institute of Technology	26	17	22

CIP	Program	Institution	2019-20 Awards	2020-21 Awards	2-Year Average
15.1202	Computer/Computer Systems Technology/Technician	Learnet Academy	4	2	3
Supply Total/Average			664	793	729

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

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



Appendix A: Occupational demand and wage data by county

Exhibit 9. Los Angeles County

Occupation (SOC)	2022 Jobs	2027 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Computer Network Support Specialists (15-1231)	3,373	3,551	178	5%	264	\$27.09	\$35.66	\$45.55
Web Developers (15-1254)	2,984	3,339	355	12%	263	\$24.99	\$40.22	\$56.55
Web and Digital Interface Designers (15-1255)	5,507	6,094	587	11%	522	\$26.50	\$35.66	\$57.84
Middle-Skill Subtotal	11,864	12,984	1,120	9%	1,049	-	-	-

Occupation (SOC)	2022 Jobs	2027 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Computer Programmers (15-1251)	3,580	3,518	(62)	(2%)	219	\$25.43	\$33.71	\$47.77
Software Developers (15-1252)	37,274	41,936	4,662	13%	3,020	\$38.78	\$51.33	\$65.39
Software Quality Assurance Analysts and Testers (15-1253)	4,376	4,818	442	10%	368	\$28.98	\$38.71	\$51.46
Above Middle-Skill Subtotal	45,229	50,271	5,042	11%	3,607	-	-	-
Total	57,094	63,256	6,162	11%	4,656	-	-	-

Exhibit 10. Orange County

Occupation (SOC)	2022 Jobs	2027 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Computer Network Support Specialists (15-1231)	1,417	1,507	90	6%	114	\$26.71	\$35.19	\$44.99
Web Developers (15-1254)	1,164	1,291	127	11%	100	\$23.39	\$38.09	\$54.13
Web and Digital Interface Designers (15-1255)	1,953	2,129	176	9%	178	\$24.87	\$33.84	\$54.80
Middle-Skill Subtotal	4,534	4,927	393	9%	392	-	-	-
Computer Programmers (15-1251)	1,654	1,620	(35)	(2%)	102	\$33.37	\$47.18	\$61.60
Software Developers (15-1252)	18,179	20,345	2,166	12%	1,448	\$50.38	\$64.12	\$80.78
Software Quality Assurance Analysts and Testers (15-1253)	2,192	2,401	209	10%	181	\$37.57	\$49.94	\$61.90
Above Middle-Skill Subtotal	22,025	24,366	2,340	11%	1,731	-	-	-
Total	26,560	29,293	2,733	10%	2,123	-	-	-

Exhibit 11. Los Angeles and Orange Counties

Occupation (SOC)	2022 Jobs	2027 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	% Age 55 and older*	Typical Entry-Level Education
Computer Network Support Specialists (15-1231)	4,790	5,058	268	6%	378	17%	Associate degree
Web Developers (15-1254)	4,148	4,630	482	12%	363	11%	Bachelor's degree
Web and Digital Interface Designers (15-1255)	7,460	8,223	763	10%	699	9%	Bachelor's degree
Middle-Skill Subtotal	16,399	17,911	1,513	9%	1,440	-	
Computer Programmers (15-1251)	5,234	5,137	(97)	(2%)	321	23%	Bachelor's degree
Software Developers (15-1252)	55,453	62,281	6,828	12%	4,468	14%	Bachelor's degree
Software Quality Assurance Analysts and Testers (15-1253)	6,567	7,219	652	10%	549	15%	Bachelor's degree
Above Middle-Skill Subtotal	67,255	74,637	7,382	11%	5,339	-	-
Total	83,653	92,548	8,895	11%	6,779	-	-

*The average percentage of workers age 55 and older across all occupations in the greater LA/OC region is 27%. These occupations have a smaller share of older workers, which typically indicates fewer replacements needs to offset the amount of impending retirements.

Appendix B: Sources

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

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