C·O·E CENTERS OF EXCELLENCE FOR LABOR MARKET RESEARCH

Program Endorsement Brief: 0707.10/Computer Programming
C++ Programming
JAVA Programming

Los Angeles/Orange County Center of Excellence, December 2020

Summary Analysis

Program Endorsement:	Endorsed: All Criteria Met ☒	Endorsed: Some Criteria Met ☐	Not Endorsed ☐

Program Endorsement Criteria		
Supply Gap:	Yes ☑	No ☐
Living Wage: (Entry-Level, 25th)	Yes ☑	No ☐
Education:	Yes ☑	No ☐
Emerging Occupation(s)		
	Yes ☐	*No* ☑

The Los Angeles/Orange County Center of Excellence for Labor Market Research (COE) prepared this report to provide Los Angeles/Orange County regional labor market supply and demand data for four occupations related to computer programming. Computer programming occupations vary in terms of entry-level education. In order to illuminate which occupations are immediately accessible to community college graduates, the computer programming occupations have been divided into middle-skill and above middle-skill occupations. Middle-skill occupations typically accommodate community college graduates, while above middle-skill occupations typically require a four-year degree.

The occupations included in the **middle-skill** computer programming occupational group are: *computer network support specialists* (15-1231) and *web developers and digital interface designers* (15-1257). The occupations in the **above middle-skill** computer programming group are: *computer programmers* (15-1251) and *software developers and software quality assurance analysts and testers* (15-1256).

Based on the available data, there appears to be a supply gap for middle-skill computer programming occupations in the region. Furthermore, all of the annual openings for the middle-skill occupations in this report typically require an associate degree and entry-level wages exceed the living wage in Los Angeles County. **Therefore, due to all of the criteria being met, the COE endorses this proposed program.** Detailed reasons include:

Demand:

- ***Supply Gap Criteria –*** Over the next five years, there is projected to be **1,521 middle-skill jobs available annually** in the region due to new job growth and replacements, **which is more than the 340 awards conferred annually** by educational institutions in the region.

- ***Living Wage Criteria –***Within Los Angeles County, all of the annual job openings for these four computer programming occupations have entry-level wages above the county's living wage ($15.04/hour).[1]
- ***Educational Criteria –***Within the LA/OC region, ***all of the annual job openings*** for middle-skill occupations related to computer programming ***typically require an associate degree.***
    - Furthermore, the national-level educational attainment data indicates **between 25.0% and 41.2% of workers in the field have completed some college or an associate degree.**

Supply:

- **Nineteen community colleges** in the LA/OC region issue awards related to computer programming, conferring an average of **270 awards annually** between 2016 and 2019.
- Between 2014 and 2017, there was an average of **70 awards conferred annually** in related training programs by non-community college institutions throughout the region.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for the middle-skill group of computer programming occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 7% through 2024. There will be more than 1,500 job openings per year through 2024 due to job growth and replacements.

This report includes employment projection data by Emsi which uses EDD information. Emsi's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy, during the projection period, will be at approximately full employment. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, it may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Therefore, the projections included in this report do not take the impacts of COVID-19 into account.

Exhibit 1: Middle-skill occupational demand in Los Angeles and Orange Counties[2]

Geography	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Los Angeles	11,675	12,484	809	7%	1,099
Orange	4,626	4,888	262	6%	422
Total	**16,301**	**17,372**	**1,071**	**7%**	**1,521**

[1] Living wage data was pulled from California Family Needs Calculator on 11/20/2020. For more information, visit the California Family Needs Calculator website: https://insightcced.org/2018-family-needs-calculator/.
[2] 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 2 shows the five-year occupational demand projections for the above middle-skill group of computer programming occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 8% through 2024. There will be more than 6,100 job openings per year through 2024 due to job growth and replacements field.

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

Geography	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Los Angeles	43,017	46,535	3,517	8%	4,118
Orange	21,601	23,147	1,546	7%	2,020
Total	**64,618**	**69,681**	**5,063**	**8%**	**6,138**

Wages

The labor market endorsement in this report considers the entry-level hourly wages for all of the computer programming occupations in this report (middle-skill and above middle-skill) in Los Angeles County as they relate to the county's living wage. Orange County wages are included below in order to provide a complete analysis of the LA/OC region. Detailed wage information, by county, is included in Appendix A.

Los Angeles County—All of the annual openings for these computer programming occupations have entry-level wages above the California Family Needs Calculator hourly wage (living wage) for one adult ($15.04 in Los Angeles County)[3]. For the middle-skill occupations, typical entry-level hourly wages are in a range between $21.50 and $25.22. For the above middle-skill occupations, typical entry-level hourly wages are in a range between $34.40 and $44.48. Experienced workers in all four occupations can expect to earn wages between $40.74 and $72.56, which are higher than the living wage estimate.

Orange County— All of the annual openings for the middle-skill computer programming occupation group have typical entry-level wages above the living wage for one adult ($17.36 in Orange County). For the middle-skill occupations, typical entry-level hourly wages are in a range between $20.32 and $25.29. For the above middle-skill occupations, typical entry-level hourly wages are in a range between $33.86 and $43.48. Experienced workers in all four occupations can expect to earn wages between $40.85 and $70.77, which are higher than the living wage estimate.

[3] Living wage data was pulled from California Family Needs Calculator on 11/20/2020. For more information, visit the California Family Needs Calculator website: https://insightcced.org/2018-family-needs-calculator/.

Job Postings
There were 6,074 online job postings related to middle-skill computer programming occupations listed in the past 12 months. The highest number of job postings were for UX designers, front-end developers, web developers, web designers, and customer experience specialists. The top skills were: JavaScript, web development, Adobe Photoshop, HTML5, and website design. The top employers, by the number of job postings, in the region were: Anthem Blue Cross, Amazon, and IBM.

> **Job Postings with C++:** There were 158 online job postings related to middle-skill computer programming occupations with C++ skills listed in the past 12 months. The highest number of job postings were for UI/UX director, web developer IV, senior UI engineer, UI engineer, and backend developer. The top skills other than C++ were: JavaScript, Python, Java, web development, and software engineering. The top employers, by the number of job postings, in the region were: Activision, JP Morgan Chase, and InterBase Corporation.
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> **Job Postings with Java Skills:** There were 735 online job postings related to middle-skill computer programming occupations with Java skills listed in the past 12 months. The highest number of job postings were for front end developer, backend engineer, web developer, UI developer, and Hybris e-commerce developer. The top skills other than Java were: JavaScript, web development, SQL, HTML5, and AngularJS. The top employers, by the number of job postings, in the region were: Pacific Life, Safran, and Clean Energy USA.

It is important to note that the job postings data included in this section reflects online job postings listed in the past 12 months and does not yet demonstrate the impact of COVID-19. While employers have generally posted fewer online job postings since the beginning of the pandemic, the long-term effects are currently unknown.

Educational Attainment
The Bureau of Labor Statistics (BLS) lists the following typical entry-level education requirements for the computer programming occupations studied in this report:

- **Bachelor's degree:** *computer programmers* (15-1251), *software developers and software quality assurance analysts and testers* (15-1256)
- **Associate degree:** *computer network support specialists* (15-1231), *web developers and digital interface designers* (15-1257)

In the LA/OC region, all of the annual job openings for middle-skill computer programming occupations typically require an associate degree. Furthermore, the national-level educational attainment data indicates between 25.0% and 41.2% of workers in the field have completed some college or an associate degree. Of the 52% of middle-skill computer programming job postings listing a minimum education requirement in Los Angeles/Orange County, 7% (231) requested a high school diploma, 2% (67) requested an associate degree, and 91% (2,878) requested a bachelor's degree.

Educational Supply

Community College Supply— Exhibit 3 shows the annual and three-year average number of awards conferred by community colleges in the related TOP code: Computer Programming (0707.10). The colleges with the most completions in the region are: Mt. San Antonio, Santa Monica, and Orange Coast. Over the past 12 months, there were three other related program recommendation requests from regional community colleges.

Exhibit 3: Regional community college awards (certificates and degrees), 2016-2019

TOP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
0707.10	Computer Programming	Cerritos	1	4	-	2
		East LA	5	6	8	6
		Glendale	1	2	2	2
		LA City	43	-	-	14
		LA Mission	2	5	6	4
		LA Pierce	6	9	18	11
		LA Southwest	2	1	-	1
		LA Valley	26	10	7	14
		Long Beach	-	2	4	2
		Mt. San Antonio	68	62	119	83
		Pasadena	1	8	11	7
		Santa Monica	25	42	44	37
		West LA	-	-	1	0
		LA Subtotal	**180**	**151**	**220**	**184**
		Cypress	27	18	22	22
		Fullerton	-	-	16	5
		Irvine	16	10	8	11
		Orange Coast	29	29	31	30
		Santa Ana	-	1	13	5
		Santiago Canyon	-	30	9	13
		OC Subtotal	**72**	**88**	**99**	**86**
		Supply Total/Average	**252**	**239**	**319**	**270**

Non-Community College Supply—For a comprehensive supply analysis, it is important to consider the supply from non-community college institutions in the region that provide training programs for computer programming occupations. Exhibit 4 shows the annual and three-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes: Computer Programming/Programmer, General (11.0201).

Due to different data collection periods, the most recent three-year period of available data is from 2014 to 2017. Between 2014 and 2017, non-community college institutions in the region conferred an average of 70 awards annually in related training programs.

Exhibit 4: Regional non-community college awards, 2014-2017

CIP Code	Program	College	2014-2015 Awards	2015-2016 Awards	2016-2017 Awards	3-Year Award Average
11.0201	Computer Programming/ Programmer, General	ABCO Technology	6	12	18	12
		University of Phoenix-California	68	62	43	58
		Supply Total/Average	**74**	**74**	**61**	**70**

Appendix A: Occupational demand and wage data by county

Exhibit 5. Los Angeles County

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Web Developers and Digital Interface Designers (15-1257)	6,916	7,488	572	8%	655	$21.50	$33.13	$46.71
Computer Network Support Specialists (15-1231)	4,759	4,996	237	5%	444	$25.22	$32.08	$40.74
Middle-Skill Subtotal	**11,675**	**12,484**	**809**	**7%**	**1,099**	**-**	**-**	**-**
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	37,605	41,228	3,624	10%	3,738	$44.48	$58.13	$72.56
Computer Programmers (15-1251)	5,413	5,306	(107)	(2%)	380	$34.40	$44.61	$56.18
Above Middle-Skill Subtotal	**43,017**	**46,535**	**3,517**	**8%**	**4,118**	**-**	**-**	**-**
Total	**54,693**	**59,019**	**4,326**	**8%**	**5,217**			

Exhibit 6. Orange County

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Web Developers and Digital Interface Designers (15-1257)	2,710	2,897	187	7%	248	$20.32	$31.41	$44.33
Computer Network Support Specialists (15-1231)	1,916	1,991	75	4%	174	$25.29	$32.13	$40.85
Middle-Skill Subtotal	**4,626**	**4,888**	**262**	**6%**	**422**	**-**	**-**	**-**
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	19,046	20,658	1,612	8%	1,842	$43.48	$56.74	$70.77
Computer Programmers (15-1251)	2,554	2,489	(66)	(3%)	178	$33.86	$43.77	$55.06
Above Middle-Skill Subtotal	**21,601**	**23,147**	**1,546**	**7%**	**2,020**	**-**	**-**	**-**
Total	**26,227**	**28,035**	**1,808**	**7%**	**2,442**			

Exhibit 7. Los Angeles and Orange Counties

Occupation (SOC)	2019 Jobs	2024 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Typical Entry-Level Education	On-The-Job Training & Work Experience
Web Developers and Digital Interface Designers (15-1257)	9,626	10,385	759	8%	903	Associate degree	None & None
Computer Network Support Specialists (15-1231)	6,675	6,987	312	5%	618	Associate degree	None & None
Middle-Skill Subtotal	**16,301**	**17,372**	**1,071**	**7%**	**1,521**	**-**	**-**
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	56,651	61,886	5,235	9%	5,580	Bachelor's degree	None & None
Computer Programmers (15-1251)	7,967	7,795	(172)	(2%)	558	Bachelor's degree	None & None
Above Middle-Skill Subtotal	**64,618**	**69,681**	**5,063**	**8%**	**6,138**	**-**	**-**
Total	**80,920**	**87,054**	**6,134**	**8%**	**7,659**		

Appendix B: Sources

- O*NET Online
- Labor Insight/Jobs (Burning Glass)
- Economic Modeling Specialists, International (Emsi)
- Bureau of Labor Statistics (BLS)
- Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- California Family Needs Calculator, Insight Center for Community Economic Development
- Chancellor's Office Curriculum Inventory (COCI 2.0)

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