![COE Centers of Excellence for Labor Market Research logo]

Program Endorsement Brief: 0707.10/Computer Programming
Certificate of Achievement in Programming
Los Angeles/Orange County Center of Excellence, April 2021

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 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 **7,659 jobs available annually** in the region due to new job growth and replacements, **which is more than the 2,111 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* – The Bureau of Labor Statistics (BLS) lists an associate degree as the typical entry-level education for *computer network support specialists* (15-1231) and *web developers and digital interface designers* (15-1257), and a bachelor 's degree for *computer programmers* (15-1251) and *software developers, software quality assurance analysts, and testers* (15-1256).
  - 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:
- There are **25 community colleges** in the LA/OC region that issue awards related to computer programming, conferring an average of **1,135 awards annually** between 2017 and 2020.
- Between 2014 and 2017, there was an average of **976 awards conferred annually** in related training programs by non-community college institutions throughout the region.

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[1] Living wage data was pulled from California Family Needs Calculator on 4/16/2021. For more information, visit the California Family Needs Calculator website: https://insightcced.org/2018-family-needs-calculator/.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for the four computer programming-related occupations of interest. 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**

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**

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[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.

Wages

The labor market endorsement in this report considers the entry-level hourly wages for the computer programming-related 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—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— 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.

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.

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 an associate degree as the typical entry-level education for *computer network support specialists* (15-1231) and *web developers and digital interface designers* (15-1257); and a bachelor's degree for *computer programmers* (15-1251) and *software developers and software quality assurance analysts and testers* (15-1256). In the LA/OC region, annual job openings for middle-skill computer programming occupations typically require an associate degree. Furthermore, the national-level educational attainment data indicates between 25% and 41% 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

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[3] Living wage data was pulled from California Family Needs Calculator on 4/16/2021. For more information, visit the California Family Needs Calculator website: https://insightcced.org/2018-family-needs-calculator/.

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 programs that have historically trained for the occupations of interest. The colleges with the most completions in the region are Mt. San Antonio and Long Beach. Over the past 12 months, there were 15 other related program recommendation requests from regional community colleges.

Exhibit 3: Regional community college awards (certificates and degrees), 2017-2020

TOP Code	Program	Colleges	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Average
0614.30	Website Design and Development	LA Pierce	-	3	2	2
		Mt San Antonio	9	9	7	8
		Pasadena	-	-	1	-
		Santa Monica	-	-	2	1
		LA Subtotal	**9**	**12**	**12**	**11**
		Coastline	-	1	1	1
		Fullerton	-	3	-	1
		Irvine Valley	2	3	-	2
		Orange Coast	-	-	9	3
		Saddleback	4	7	2	4
		Santa Ana	1	-	2	1
		Santiago Canyon	9	24	3	12
		OC Subtotal	**16**	**38**	**17**	**24**
		Supply Subtotal/Average	**25**	**50**	**29**	**35**
0701.00	Information Technology, General	East LA	15	23	10	16
		LA Harbor	6	-	-	2
		LA Mission	1	1	3	2
		Long Beach	25	34	64	41
		Mt San Antonio	79	74	90	81
		Santa Monica	-	39	-	13
		West LA	4	4	5	4
		LA Subtotal	**130**	**175**	**172**	**159**
		Supply Subtotal/Average	**130**	**175**	**172**	**159**
0702.10	Software Applications	Cerritos	3	9	6	6
		LA City	-	-	1	-
		LA Mission	7	2	-	3

TOP Code	Program	Colleges	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Average
		LA Southwest	2	1	-	1
		Long Beach	-	-	7	2
		Mt San Antonio	3	1	2	2
		Santa Monica	10	18	13	14
		LA Subtotal	**25**	**31**	**29**	**28**
		Coastline	4	9	8	7
		Irvine Valley	22	39	48	36
		Saddleback	3	2	7	4
		OC Subtotal	**29**	**50**	**63**	**47**
		Supply Subtotal/Average	**54**	**81**	**92**	**76**
0707.00	Computer Software Development	LA City	-	1	-	-
		LA Subtotal	**-**	**1**	**-**	**-**
		Cypress	1	1	1	1
		Golden West	3	4	2	3
		Orange Coast	7	7	2	5
		Saddleback	3	13	3	6
		OC Subtotal	**14**	**25**	**8**	**16**
		Supply Subtotal/Average	**14**	**26**	**8**	**16**
0707.10	Computer Programming	Cerritos	4	-	2	2
		Citrus	-	-	1	-
		East LA	6	8	4	6
		Glendale	2	2	3	2
		LA City	-	-	6	2
		LA Mission	5	6	4	5
		LA Pierce	9	18	4	10
		LA Southwest	1	-	1	1
		LA Valley	10	7	6	8
		Long Beach	2	4	5	4
		Mt San Antonio	62	119	114	98
		Pasadena	8	11	21	13
		Santa Monica	42	44	46	44
		West LA	-	1	-	-
		LA Subtotal	**151**	**220**	**217**	**196**
		Cypress	18	22	20	20
		Fullerton	-	16	28	15
		Irvine Valley	10	8	4	7

TOP Code	Program	Colleges	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Average
		Orange Coast	29	31	157	72
		Santa Ana	1	13	1	5
		Santiago Canyon	30	9	3	14
		OC Subtotal	**88**	**99**	**213**	**133**
		Supply Subtotal/Average	**239**	**319**	**430**	**329**
0707.30	Computer Systems Analysis	Cerritos	4	2	3	3
		East LA	-	-	1	-
		LA Mission	-	-	1	-
		LA Subtotal	**4**	**2**	**5**	**4**
		Cypress	5	2	-	2
		OC Subtotal	**5**	**2**	**-**	**2**
		Supply Subtotal/Average	**9**	**4**	**5**	**6**
0708.00	Computer Infrastructure and Support	Cerritos	-	-	4	1
		Glendale	-	-	3	1
		LA City	-	-	3	1
		LA Harbor	1	1	1	1
		LA Mission	-	2	12	5
		LA Valley	8	5	2	5
		Long Beach	1	3	8	4
		Mt San Antonio	20	24	24	23
		Pasadena	-	1	1	1
		Rio Hondo	-	-	9	3
		West LA	-	4	15	6
		LA Subtotal	**30**	**40**	**82**	**51**
		Coastline	65	49	46	53
		Cypress	1	2	3	2
		Orange Coast	-	-	7	2
		OC Subtotal	**66**	**51**	**56**	**58**
		Supply Subtotal/Average	**96**	**91**	**138**	**108**
0708.10	Computer Networking	Cerritos	8	11	9	9
		Glendale	6	3	3	4
		LA City	37	23	-	20
		LA Pierce	23	39	20	27
		Long Beach	27	55	47	43
		Mt San Antonio	2	8	11	7
		Rio Hondo	-	5	7	4

TOP Code	Program	Colleges	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Average
		West LA	43	77	48	56
		LA Subtotal	**146**	**221**	**145**	**171**
		Coastline	12	38	59	36
		Cypress	37	70	95	67
		Irvine Valley	12	11	21	15
		Saddleback	17	10	21	16
		Santa Ana	7	14	12	11
		OC Subtotal	**85**	**143**	**208**	**145**
		Supply Subtotal/Average	**231**	**364**	**353**	**316**
0708.20	Computer Support	Citrus	-	-	1	-
		Glendale	3	10	7	7
		LA Pierce	7	9	8	8
		Long Beach	1	8	14	8
		Pasadena	3	7	30	13
		LA Subtotal	**14**	**34**	**60**	**36**
		Cypress	1	3	5	3
		Santa Ana	10	9	-	6
		OC Subtotal	**11**	**12**	**5**	**9**
		Supply Subtotal/Average	**25**	**46**	**65**	**45**
0709.00	World Wide Web Administration	Glendale	9	6	7	7
		LA Pierce	5	9	-	5
		Long Beach	4	22	24	17
		West LA	24	13	9	15
		LA Subtotal	**42**	**50**	**40**	**44**
		Saddleback	-	-	2	1
		OC Subtotal	**-**	**-**	**2**	**1**
		Supply Subtotal/Average	**42**	**50**	**42**	**45**
		Supply Total/Average	**865**	**1,206**	**1,334**	**1,135**

Non-Community College Supply—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 relevant programs. 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 976 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 Average
11.0101	Computer and Information Sciences, General	ABCO Technology	15	-	-	5
		Azusa Pacific University	10	20	19	16
		Brand College	1	2	-	1
		Brandman University	19	14	26	20
		California Institute of Technology	48	56	-	35
		Chapman University	6	7	5	6
		Loyola Marymount University	15	16	19	17
		Pacific States University	-	2	1	1
		University of California-Irvine	31	3	1	12
		University of La Verne	14	21	19	18
		University of the People	-	36	57	31
11.0201	Computer Programming/ Programmer, General	ABCO Technology	6	12	18	12
		ITT Technical Institute-San Dimas	5	-	-	2
		University of Phoenix-California	68	62	43	58
11.0501	Computer Systems Analysis/Analyst	Brand College	1	2	4	2
		DeVry University-California	110	103	94	102
		University of Phoenix-California	9	8	4	7
11.0801	Web Page, Digital/ Multimedia and Information Resources Design	Advanced Computing Institute	73	46	57	59
		Argosy University-The Art Institute of California-Hollywood	22	20	24	22
		Argosy University-The Art Institute of	15	23	24	21

CIP Code	Program	College	2014-2015 Awards	2015-2016 Awards	2016-2017 Awards	3-Year Average
		California-Los Angeles				
		Argosy University-The Art Institute of California-Orange County	19	15	33	22
		DeVry University-California	91	69	36	65
		Fremont College	8	1	-	3
		University of Phoenix-California	5	6	1	4
11.0901	Computer Systems Networking and Telecommunications	Advanced Computing Institute	6	5	98	36
		Brand College	-	1	2	1
		DeVry University-California	166	154	135	152
		ITT Technical Institute-Sylmar	1	-	-	-
		Mt Sierra College	8	6	5	6
		PCI College	1	-	-	-
		University of Phoenix-California	51	55	27	44
11.1003	Computer and Information Systems Security/ Information Assurance	Azusa Pacific University	8	4	3	5
		ITT Technical Institute-Orange	37	-	-	12
		ITT Technical Institute-San Dimas	23	-	-	8
		ITT Technical Institute-Sylmar	19	-	-	6
		ITT Technical Institute-Torrance	6	-	-	2
		Learnet Academy Inc	-	39	48	29
		Mt Sierra College	14	9	8	10
		University of Phoenix-California	111	74	71	85
11.1004		ABCO Technology	7	9	12	9

CIP Code	Program	College	2014-2015 Awards	2015-2016 Awards	2016-2017 Awards	3-Year Average
	Web/Multimedia Management and Webmaster	Pepperdine University	-	1	-	-
		University of Phoenix-California	7	5	4	5
11.1006	Computer Support Specialist	Palladium Technical Academy	6	-	-	2
		Southern California Institute of Technology	13	32	16	20
		University of Phoenix-California	-	-	1	-
Supply Total/Average			**1,075**	**938**	**915**	**976**

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
Web Developers and Digital Interface Designers (15-1257)	9,626	10,385	759	8%	903	Associate degree
Computer Network Support Specialists (15-1231)	6,675	6,987	312	5%	618	Associate degree
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
Computer Programmers (15-1251)	7,967	7,795	(172)	(2%)	558	Bachelor's degree
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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