Program Endorsement Brief: 0707.10/Computer Programming
CIS Professional in Python Programming
Los Angeles/Orange County Center of Excellence, August 2020

Summary Analysis

Program Endorsement:	Endorsed: All Criteria Met	☐	Endorsed: Some Criteria Met	☒	Not Endorsed	☐
Program Endorsement Criteria						
Supply Gap:	Yes	☑	No	☐		
Meets Living Wage: (Entry-Level, 25th)	Yes	☑	No	☑		
Typical Entry-Level Education:	HS Diploma or Less ☐	Some College/ Cert./AA ☐	Bachelor's Degree ☑	Graduate Degree ☐		
Emerging Occupation(s)						
Yes ☐			No ☑			

Based on the available data, there appears to be a supply gap for middle-skill computer programming occupations in the region. **Therefore, the COE endorses this proposed program.** Detailed reasons include:

Demand:
- Over the next five years, there are projected to be **922 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.
- The national-level educational attainment data indicates **between 12.4% and 25.0% of workers in the field have completed some college or an associate degree.**
- **Typical regional entry-level hourly wages** for computer programming occupations in Los Angeles County are between **$21.50 and $44.48, which are higher than the California Family Needs Calculator** hourly wage (living wage) for one adult in Los Angeles County ($15.04).[1]

Supply:
- There are **19 community colleges** in the region that issue awards related to computer programming. Between 2016 and 2019, an average of **270 awards were conferred annually.**
- Between 2014 and 2017, there was an average of **70 awards conferred annually** in related training programs by non-community college institutions, all of which were generated by **two institutions throughout** the region.

Introduction

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 related to one middle-skill occupation, *web developers and digital interface designers* (15-1257) and two above middle-skill occupations, *computer programmers* (15-1251) and *software developers and software quality assurance analysts* (15-1256). Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree. [2] Occupational definitions are displayed below:

Web Developers and Digital Interface Designers (15-1257)*:

Web Developers (15-1134): Design, create, and modify Web sites. Analyze user needs to implement Web site content, graphics, performance, and capacity. May integrate Web sites with other computer applications. May convert written, graphic, audio, and video components to compatible Web formats by using software designed to facilitate the creation of Web and multimedia content.

Computer Programmers (15-1251): Create, modify, and test the code, forms, and script that allow computer applications to run. Work from specifications drawn up by software developers or other individuals. May assist software developers by analyzing user needs and designing software solutions. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.

Software Developers and Software Quality Assurance Analysts and Testers (15-1256)*:

Software Developers, Applications (15-1132): Develop, create, and modify general computer applications software or specialized utility programs. Analyze user needs and develop software solutions. Design software or customize software for client use with the aim of optimizing operational efficiency. May analyze and design databases within an application area, working individually or coordinating database development as part of a team. May supervise computer programmers.

Software Developers, Systems Software (15-1133): Research, design, develop, and test operating systems-level software, compilers, and network distribution software for medical, industrial, military, communications, aerospace, business, scientific, and general computing applications. Set operational specifications and formulate and analyze software requirements. May design embedded systems software. Apply principles and techniques of computer science, engineering, and mathematical analysis.

*On March 31, 2020, the Occupational Employment Statistics (OES) program within the Bureau of Labor Statistics (BLS) released their May 2019 data set, which included updates to the

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[2] 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.

occupational structure.[3] Occupational updates included title changes, SOC code changes, and new occupational codes that are a combination of old occupational codes. The SOC code for *computer programmers* changed from (15-1131) to (15-1251), while the occupation, *web developers* (15-1134) is now referred to *web developers and digital interface designers* (15-1257). The occupations, *software developers, applications* (15-1132) and *software developers, systems software* (15-1133), have been combined to create the new occupation, *software developers, and software quality assurance analysts and testers* (15-1256). Occupational projections and wage data utilize the new occupational codes.

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.

Occupational Demand

Exhibit 1 shows the five-year occupational demand projections for computer programming occupations. In Los Angeles/Orange County, the number of jobs related to this occupational group is projected to increase by 8% through 2024. There will be 7,161 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: Occupational demand in Los Angeles and Orange Counties[4]

Geography	2019 Jobs	2024 Jobs	2019-2024 Change	2019-2024 % Change	Annual Openings
Los Angeles	49,916	53,987	4,071	8%	4,820
Orange	24,314	26,253	1,939	8%	2,340
Total	**74,230**	**80,240**	**6,010**	**8%**	**7,161**

Wages—Typical entry-level hourly wages for computer programming occupations in Los Angeles County are between $21.50 and $44.48. These wages are higher than the living wage for one adult in Los Angeles County. Exhibit 2 displays hourly wage information for computer programming occupations in Los Angeles County. Wage information, by county, is included in Appendix A.

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[3] Bureau of Labor Statistics (BLS). March 31, 2020. *Occupational Employment Statistics (OES)*. Retrieved from https://www.bls.gov/oes/home.htm
[4] 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: Hourly wages for computer programming occupations in Los Angeles County

Bar chart showing hourly wages. Living wage line at $15.04.

- Web Developers and Digital Interface Designers: $21.50, $33.13, $46.72
- Computer Programmers: $34.41, $44.62, $56.19
- Software Developers and Software Quality Assurance Analysts and Testers: $44.48, $58.13, $72.56

Legend:
- Entry-Level (25th percentile)
- Median-Level (50th percentile)
- Experienced-Level (75th percentile)
- Los Angeles County Living Wage ($15.04)
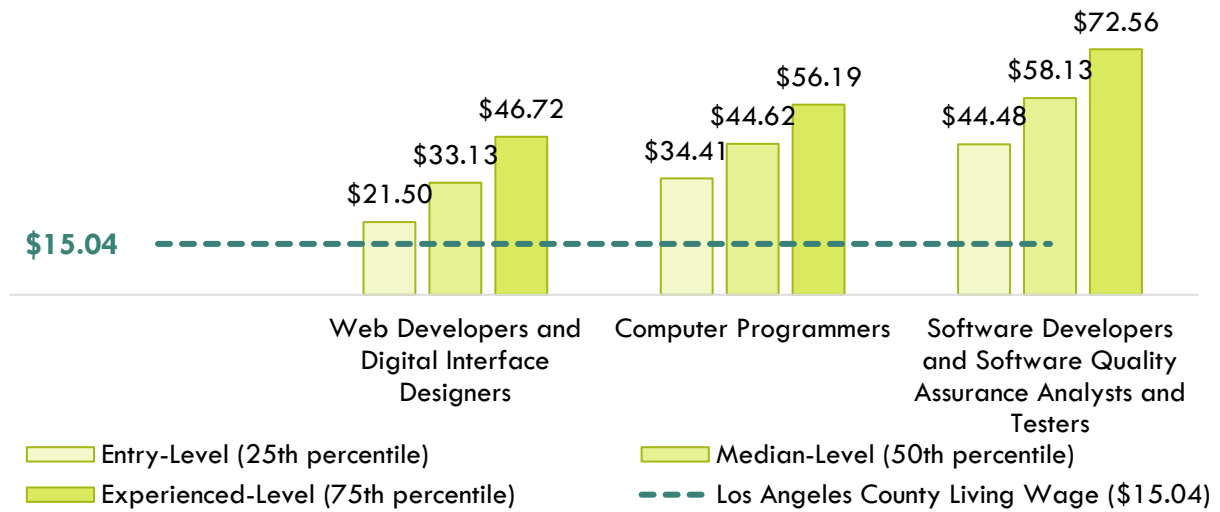
Job Postings— The computer programming job postings included in this report have been limited to advertisements that include the skill python programming. Over the last 12 months, there were 12,571 computer programming job advertisements seeking individuals with python programming skills, comprising approximately 18% of the total 69,315 computer programming job postings.

Exhibit 3: Most frequently used job titles for python programming positions

Job Titles	Job Ads
Software Development Engineer	3,488
DevOps Engineer	1,211
Software Developer	570
Python Developer	517
Principal Software Engineer	340

Exhibit 4: In-demand skills from job postings for python programming positions

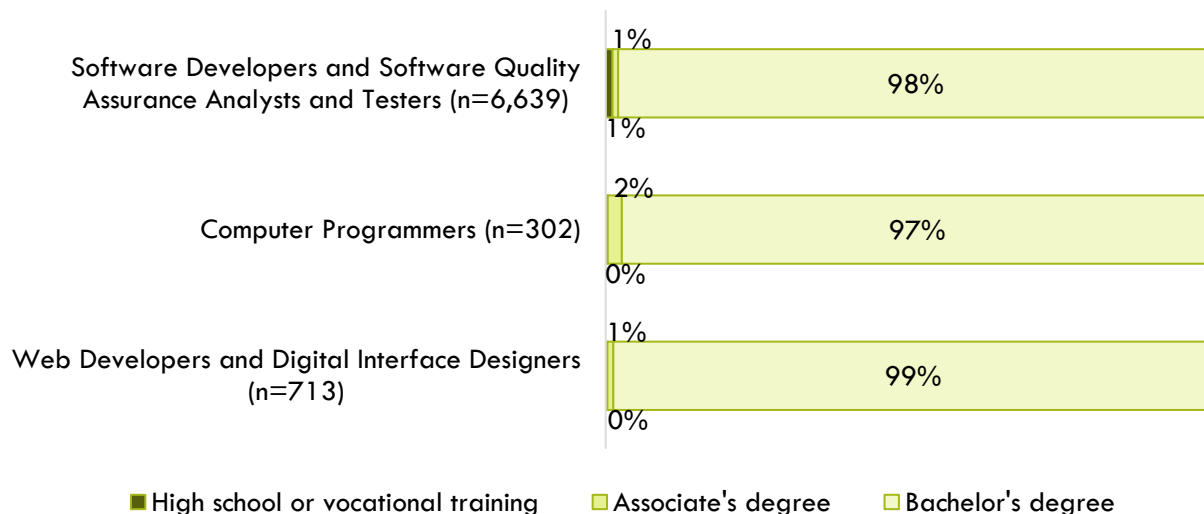| Skills	Job Ads
Python	12,571
Java	5,821
Software Engineering	5,785
Software Development	4,679
Linux	4,231

Exhibit 5: Employers posting the most job advertisements for python programming positions

Employers	Job Ads
Northrop Grumman	511
Raytheon	159
Blizzard Entertainment	122
The Boeing Company	118
Amazon	82

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 *web developers and digital interface designers*; and a bachelor's degree as the typical entry-level education for *computer programmers* and *software developers and software quality assurance analysts and testers*. The national-level educational attainment data indicates that between 12.4% and 25.0% of workers in the field have completed some college or an associate degree. The table below displays the 61% of python programming job postings listing a minimum education requirement in Los Angeles/Orange County. Nearly all employers are seeking candidates with a bachelor's degree.

Exhibit 6: Advertised education requirements for python programming positions

Software Developers and Software Quality Assurance Analysts and Testers (n=6,639): 1%, 98%, 1%

Computer Programmers (n=302): 2%, 97%, 0%

Web Developers and Digital Interface Designers (n=713): 1%, 99%, 0%

■ High school or vocational training   □ Associate's degree   □ Bachelor's degree

Educational Supply

Community College Supply—Exhibit 7 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 two other related program recommendation requests from regional community colleges.

Exhibit 7: 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**

Exhibit 8 displays strong workforce program outcome metrics for the computer programming programs in the region and California for comparison.

Exhibit 8: Strong workforce program metrics for regional computer programming programs

Strong Workforce Program Metrics (2017-18, unless noted otherwise)	Los Angeles/ Orange County	California
Unduplicated count of enrolled students (2018-19)	9,965	36,958
Job closely related to field of study (2016-17)	59%	65%
Median annual earnings	$33,780	$38,156
Median change in earnings	26%	29%
Students who attained the living wage	50%	55%

Non-Community College Supply—It is important to consider the supply from non-community college institutions in the region that provide training programs for programming occupations. Exhibit 9 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 9: 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 10. 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)
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	37,591	41,162	3,571	9%	3,772	$44.48	$58.13	$72.56
Computer Programmers (15-1251)	5,410	5,333	(77)	(1%)	386	$34.41	$44.62	$56.19
Above Middle-Skill Total	**43,001**	**46,496**	**3,494**	**8%**	**4,158**			
Web Developers and Digital Interface Designers (15-1257)	6,915	7,491	576	8%	662	$21.50	$33.13	$46.72
Middle-Skill Total	**6,915**	**7,491**	**576**	**8%**	**662**			
Total	**49,916**	**53,987**	**4,071**	**8%**	**4,820**			

Exhibit 11. 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)
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	19,049	20,805	1,756	9%	1,899	$43.48	$56.74	$70.77
Computer Programmers (15-1251)	2,555	2,512	(43)	(2%)	181	$33.84	$43.75	$55.03
Above Middle-Skill Total	**21,604**	**23,317**	**1,713**	**8%**	**2,081**			

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	2,936	226	8%	260	$20.32	$31.41	$44.31
Middle-Skill Total	**2,710**	**2,936**	**226**	**8%**	**260**			
Total	**24,314**	**26,253**	**1,939**	**8%**	**2,340**			

Exhibit 12. Los Angeles and Orange Counties

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)
Software Developers and Software Quality Assurance Analysts and Testers (15-1256)	56,640	61,968	5,328	9%	5,671	$44.13	$57.66	$71.96
Computer Programmers (15-1251)	7,965	7,845	(120)	(2%)	567	$34.22	$44.34	$55.82
Above Middle-Skill Total	**64,065**	**69,813**	**5,208**	**8%**	**6,239**			
Web Developers and Digital Interface Designers (15-1257)	9,625	10,428	803	8%	922	$21.17	$32.65	$46.08
Middle-Skill Total	**9,625**	**10,428**	**803**	**8%**	**922**			
Total	**74,230**	**80,240**	**6,010**	**8%**	**7,161**			

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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