Labor Market Analysis for Program Recommendation: 0707.10/Computer Programming (*Programming Certificate*) (*Programming Skills Certificate*)

Orange County Center of Excellence, March 2023

Summary

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

Program LMI Endorsement Criteria		
	Yes ☑	No ☐
Supply Gap:	*Comments:* there is projected to be **2,117 middle-skill annual job openings** throughout Los Angeles and Orange counties for these middle-skill computer programming occupations, which **is more than the 1,092 awards conferred by educational institutions.**	
	Yes ☑	No ☐
Living Wage: (Entry-Level, 25th)	*Comments:* **all annual job openings** for these middle-skill computer programming occupations **have entry-level hourly wages above the OC living wage of $20.63.**	
	Yes ☑	No ☐
Education:	*Comments:* Though the majority (76%) of annual job openings for these middle-skill computer programming occupations typically require a high school diploma, **a significant percentage of workers in the field have completed some college or an associate degree as their highest level of education.**	

Emerging Occupation(s)	
Yes ☐	*No* ☑
Comments: N/A	

The Orange County Center of Excellence for Labor Market Research (OC COE) prepared this report to determine whether there is a supply gap in the Los Angeles/Orange County regional labor market related to five computer programming occupations:

- Middle-Skill
  - Computer Network Support Specialists (15-1231)
  - Web Developers (15-1254)
  - Web and Digital Interface Designers (15-1255)
- Above Middle-Skill – denoted with an asterisk (*) throughout this report.
  - Computer Programmers (15-1251)*
  - Software Developers (15-1252)*

Middle-skill occupations typically require a community college education while above middle-skill occupations typically require at least a bachelor's degree.

Based on the available data, there appears to be a supply gap for these middle-skill computer programming occupations in the region. Additionally, typical education requirements for these middle-skill computer programming occupations align with a community college education and all annual job openings have entry-level wages above the living wage. **Therefore, due to all of the regional labor market criteria being met, the COE endorses this proposed program.**

Exhibit 1 lists the occupational demand, supply, typical entry-level education, and educational attainment for the occupations included in this report.

Exhibit 1: Labor Market Endorsement Summary

Occupation (SOC)	Demand (Annual Openings)	Supply (CC and Non-CC)	Entry-Level Hourly Earnings (25th Percentile)	Typical Entry-Level Education	Community College Educational Attainment
Computer Network Support Specialists (15-1251)	512	958	OC: $25.48	Associate degree	40%
Web Developers (15-1254)	804	95	OC: $21.98	Bachelor's degree	25%
Web and Digital Interface Designers (15-1255)	801	39	PC: $22.33	Bachelor's degree	25%
Middle-Skill Total	**2,117**	**1,092**	**N/A**	**N/A**	**N/A**
Advertising and Promotions Managers (11-2011)*	563	560	OC: $30.92	Bachelor's degree	20%
Marketing Managers (11-2021)*	5,482	3,027	OC: $45.62	Bachelor's degree	12%
Above Middle-Skill Total	**6,045**	**3,587**	**N/A**	**N/A**	**N/A**
Total	**8,163**	**4,679**	**N/A**	**N/A**	**N/A**

Demand:

- The number of jobs related to these middle-skill computer programming occupations are projected to increase 15% through 2026; there is projected to be 2,117 annual job openings.
- Hourly entry-level wages for these middle-skill computer programming occupations range from $21.98 to $25.48 in Orange County; all annual job openings have entry-level wages above the living wage.
- There were 11,775 online job postings for these middle-skill computer programming occupations over the past 12 months. The highest number of postings were for front end developers, UI/UX designers, and front end engineers.
- The typical entry-level education for these middle-skill computer programming occupations ranges from an associate degree or equivalent to a bachelor's degree.
- Between 25% and 40% of workers in these middle-skill occupations have completed some college or an associate degree as their highest level of education.

Supply:

- There was an average of 1,029 awards conferred by 28 community colleges in Los Angeles and Orange Counties from 2018 to 2021.
- Non-community college institutions conferred an average of 63 awards from 2017 to 2020.
- Orange County community college students that exited computer programming programs in the 2019-20 academic year had a median annual wage of $35,034 after exiting the program and 39% attained the regional living wage.
- Throughout Orange County, 42% of computer programming students that exited their program in 2018-19 reported that they are working in a job closely related to their field of study.

Demand

Occupational Projections:

Exhibit 2 shows the annual percent change in jobs for all five of the computer programming occupations researched in this report from 2016 through 2026. Despite a 7% decline in employment across all occupations due to the COVID-19 pandemic, employment in this computer programming occupations increased 1% in Orange County from 2019 to 2020. Employment in these computer programming occupations is projected to increase at a higher rate when compared to all occupations through 2026.

Exhibit 2: Annual Percent Change in Jobs for Computer Programming Occupations, 2016-2026

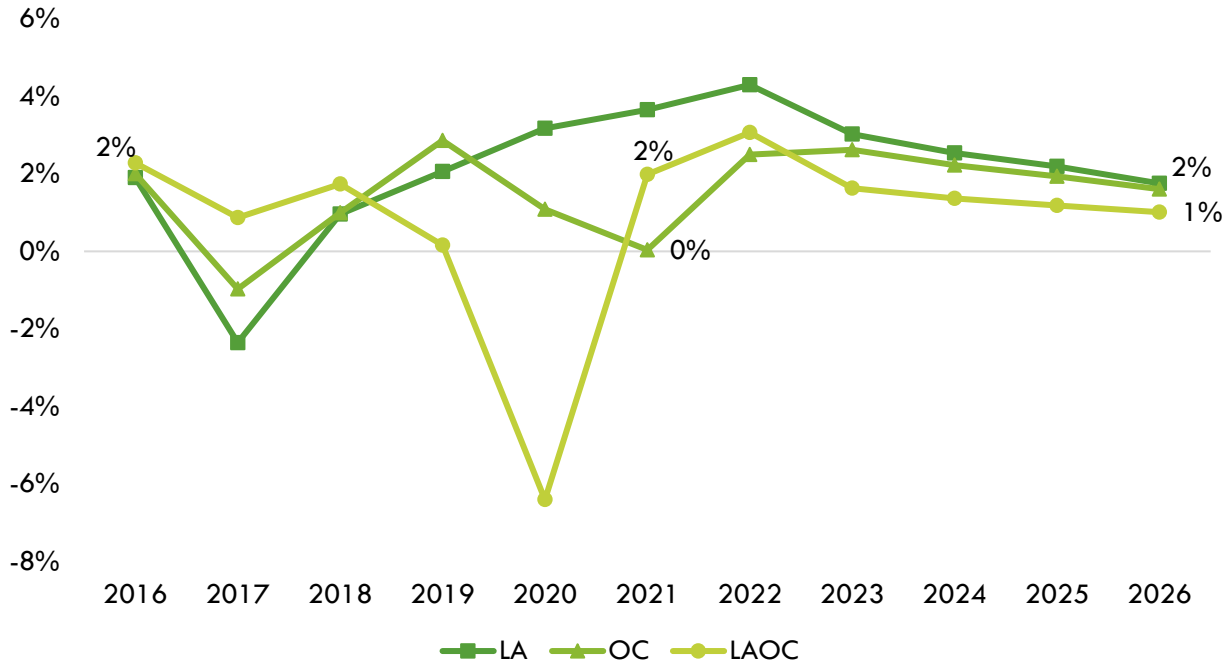


Exhibit 3 shows the five-year occupational demand projections for these middle-skill computer programming occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase 15% through 2026. There is projected to be 2,117 jobs available annually.

Exhibit 3: Middle-Skill Occupational Demand in Los Angeles and Orange Counties[1]

Geography	2021 Jobs	2026 Jobs	2021-2026 Change	2021-2026 % Change	Annual Openings
Los Angeles	14,034	16,258	2,225	16%	1,623
Orange	4,595	5,176	581	13%	494
Total	**18,628**	**21,434**	**2,805**	**15%**	**2,117**

Exhibit 4 shows the five-year occupational demand projections for these above middle-skill computer programming occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 13% through 2026. There is projected to be 6,045 jobs available annually.

Exhibit 4: Above Middle-Skill Occupational Demand in Los Angeles and Orange Counties

Geography	2021 Jobs	2026 Jobs	2021-2026 Change	2021-2026 % Change	Annual Openings
Los Angeles	42,812	48,867	6,056	14%	4,250
Orange	19,475	21,634	2,159	11%	1,795
Total	**62,287**	**70,501**	**8,214**	**13%**	**6,045**

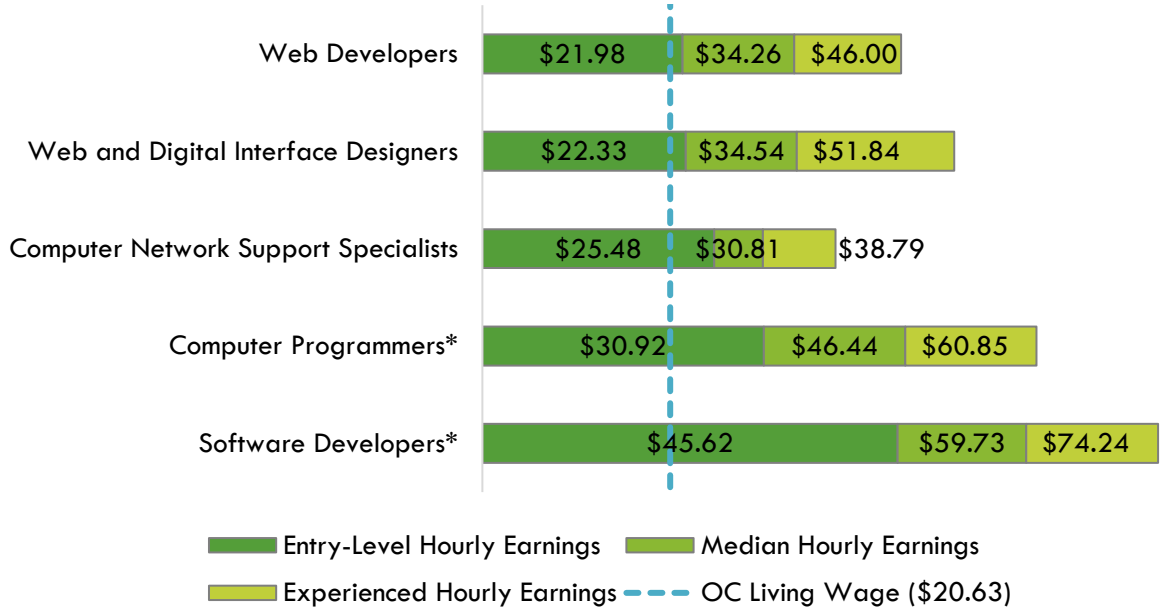
Wages:

The labor market endorsement in this report considers the entry-level hourly wages for these middle-skill computer programming occupations in Orange County as they relate to the county's living wage. Los Angeles County wages are included below in order to provide a complete analysis of the LA/OC region.

All annual openings for these middle-skill computer programming occupations have entry-level wages above the living wage for one adult ($20.63 in Orange County). Typical entry-level hourly wages range between $21.98 and $25.48. Orange County's average wages are below the average statewide wage of $42.19 for these occupations. Exhibit 5 shows the wage range for each of these computer programming occupations in Orange County and how they compare to the regional living wage, sorted from lowest to highest entry-level wage.

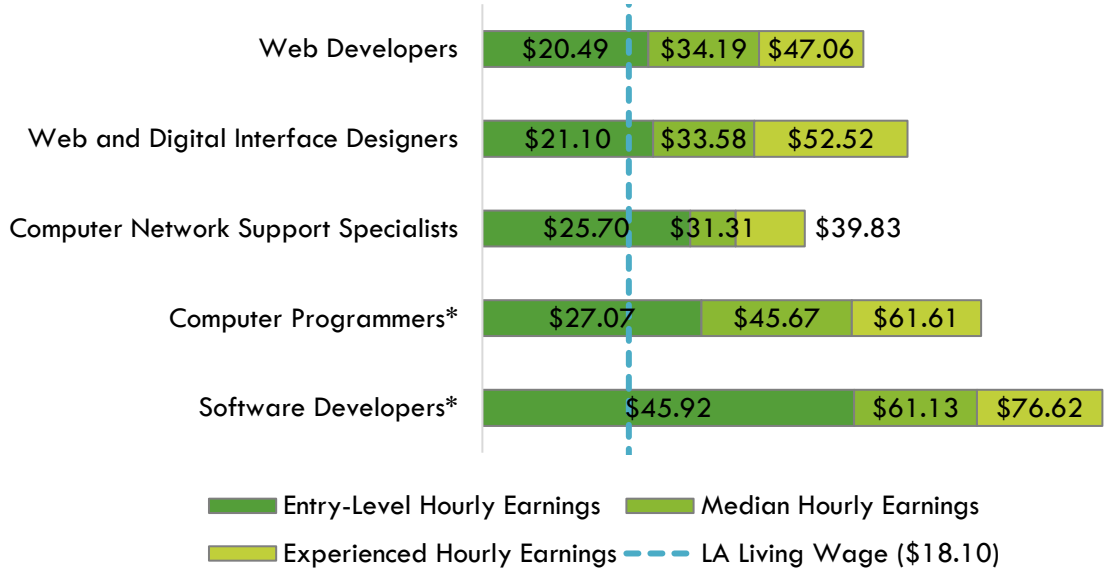
[1] Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Exhibit 5: Wages by Occupation in Orange County



All annual openings for these computer programming occupations have entry-level wages above the living wage for one adult ($18.10 in Los Angeles County). Typical entry-level hourly wages are in a range between $20.49 and $25.70. Los Angeles County's average wages are lower than the statewide wage of $42.19 for these occupations. Exhibit 6 shows the wage range for each of these computer programming occupations in Los Angeles County how they compare to the regional living wage, sorted from lowest to highest entry-level wage.

Exhibit 6: Wages by Occupation in Los Angeles County



Job Postings:

Important Online Job Postings Data Note: *Online job postings data is sourced from Lightcast, a labor market analytics firm that scrapes, collects, and organizes data from online job boards such as LinkedIn, Indeed, Glassdoor, Monster, GovernmentJobs.com, and thousands more. Lightcast uses natural language processing (NLP) to determine the related company, industry, occupation, and other information for each job posting. However, NLP has limitations that include understanding contextual words of phrases; determining differences in words that can be used as nouns, verbs, and/or adjectives; and misspellings or grammatical errors.*[2] *For these reasons, job postings could be assigned to the wrong employer, industry, or occupation within Lightcast's database.*

Additionally, there are several limitations when analyzing job postings. A single job posting may not represent a single job opening, as employers may be creating a pool of candidates for future openings or hiring for multiple positions with a single posting. Additionally, not all jobs are posted online, and jobs may be filled through other methods such as internal promotion, word-of-mouth advertising, physical job boards, or a variety of other channels.

There were 64,619 online job postings related to these computer programming occupations listed in the past 12 months. Of those, 18% (11,755) were for middle-skill computer programming occupations. Exhibit 7 shows the number of job postings by occupation.

Exhibit 7: Number of Job Postings by Occupation (n=64,619)

Occupation	Job Postings	Percentage of Job Postings
Software Developers*	49,793	77%
Web Developers	9,146	14%
Computer Programmers*	3,071	5%
Web and Digital Interface Designers	1,647	3%
Computer Network Support Specialists	962	1%
Total Postings	**64,619**	**100%**

The top employers for the middle-skill human resource occupations in the region, by number of job postings, are shown in Exhibit 8.

Exhibit 8: Top Middle-Skill Employers by Number of Job Postings (n=11,755)

Employer	Job Postings	Percentage of Job Postings
CyberCoders	654	6%
Jobot	464	4%
Motion Recruitment	301	3%
Amazon	244	2%
Elevance Health	146	1%
Canteen Vending	128	1%
Robert Half	115	1%
Riot Games	100	1%
Randstad	98	1%
Disney	93	1%

[2] K. R. Chowdhary, Fundamentals of Artificial Intelligence (Basingstoke: Springer Nature, 2020), https://link.springer.com/book/10.1007/978-81-322-3972-7.

The top employers for the above middle-skill human resource occupations in the region, by number of job postings, are shown in Exhibit 9.

Exhibit 9: Top Above Middle-Skill Employers by Number of Job Postings (n=58,939)

Employer	Job Postings	Percentage of Job Postings
CyberCoders	2,179	4%
Motion Recruitment	1,852	4%
Jobot	1,684	3%
Boeing	1,624	3%
Northrop Grumman	1,083	2%
Amazon	999	2%
Disney	896	2%
Revature	710	1%
Tata Consultancy Services	527	1%
UnitedHealth Group	509	1%

The top specialized, soft, and computer skills listed by those most frequently mentioned in job postings (denoted in parentheses) are shown for these middle-skill occupations in Exhibit 10.

Exhibit 10: Top Skills for Middle-Skill Occupations by Number of Job Postings (n=11,755)

Top Specialized Skills	Top Soft Skills	Top Computer Skills
JavaScript (Programming Language) (3,774)	Communications (4,355)	JavaScript (Programming Language) (3,774)
User Experience (3,406)	Research (2,105)	Cascading Style Sheets (CSS) (3,269)
Cascading Style Sheets (CSS) (3,269)	Problem Solving (1,946)	HyperText Markup Language (HTML) (2,490)
Front End (Software Engineering) (2,709)	Management (1,662)	React.js (2,455)
User Interface (2,560)	Leadership (1,553)	Application Programming Interface (API) (1,857)
Computer Science (2,496)	Detail Oriented (1,376)	Amazon Web Services (1,561)
HyperText Markup Language (HTML) (2,490)	Customer Service (1,355)	Node.js (1,446)
React.js (2,455)	Innovation (1,348)	Angular (Web Framework) (1,359)
Agile Methodology (2,139)	Writing (1,345)	Figma (Design Software) (1,268)
Application Programming Interface (API) (1,857)	Troubleshooting (Problem Solving) (1,307)	Git (Version Control System) (1,204)

The top specialized, soft, and computer skills listed by those most frequently mentioned in job postings (denoted in parentheses) are shown for these middle-skill occupations in Exhibit 11.

Exhibit 11: Top Skills for Above Middle-Skill Occupations by Number of Job Postings (n=58,939)

Top Specialized Skills	Top Soft Skills	Top Software and Computer Skills
Computer Science (20,291)	Communications (17,555)	Java (Programming Language) (13,664)
Software Engineering (19,342)	Management (10,298)	Python (Programming Language) (12,919)
Software Development (15,571)	Problem Solving (8,820)	Amazon Web Services (12,374)
Java (Programming Language) (13,664)	Leadership (8,415)	SQL (Programming Language) (11,547)
Agile Methodology (13,340)	Troubleshooting (Problem Solving) (8,200)	JavaScript (Programming Language) (10,958)
Python (Programming Language) (12,919)	Operations (6,893)	Application Programming Interface (API) (10,639)
Amazon Web Services (12,374)	Writing (5,857)	C++ (Programming Language) (8,537)
SQL (Programming Language) (11,547)	Planning (5,574)	C# (Programming Language) (8,121)
JavaScript (Programming Language) (10,958)	Innovation (5,312)	React.js (7,086)
Application Programming Interface (API) (10,639)	Mathematics (4,989)	RESTful API (6,667)

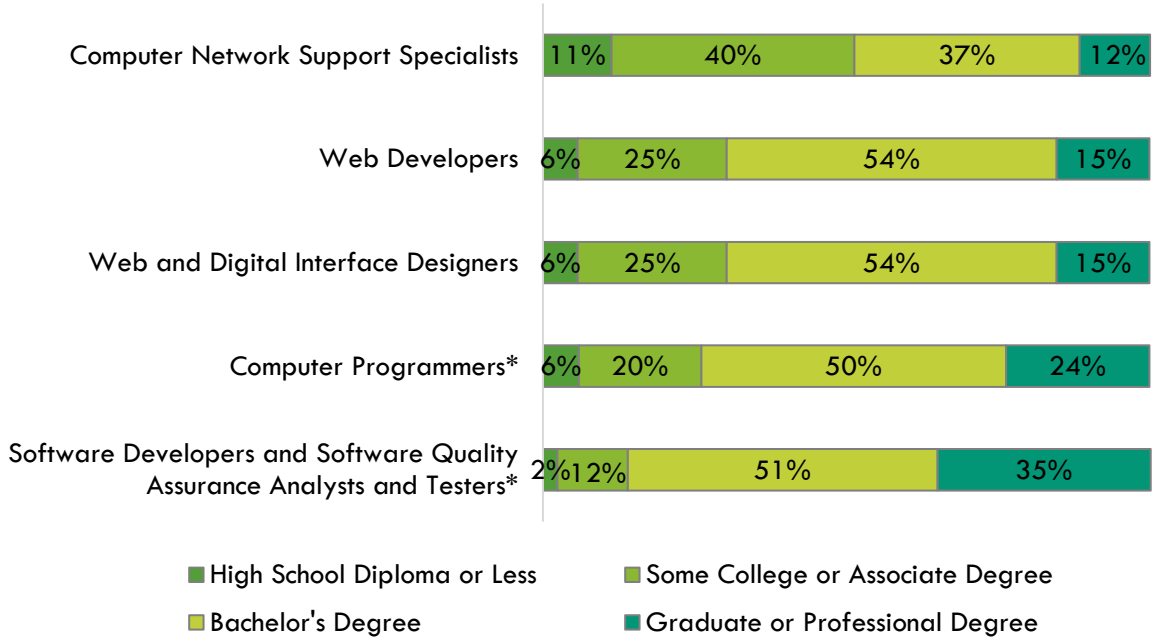
Educational Attainment:

The Bureau of Labor Statistics (BLS) lists an associate degree or equivalent as the typical entry-level education for *computer network support specialists*; and a bachelor's degree for the four other computer programming occupations in this report. The national-level educational attainment data indicates between 25% and 40% of workers in the middle-skill occupations have completed some college or an associate degree as their highest level of education. Between 12% and 20% of workers in the above middle-skill occupations have completed some college or an associate degree. Exhibit 12 shows the educational attainment for each occupation, sorted by highest community college educational attainment to lowest.

Of the 46% of the cumulative job postings for these middle-skill computer programming occupations that listed a minimum education requirement in Los Angeles/Orange County, 89% (4,818) requested a bachelor's degree and 11% (616) requested a high school diploma or an associate degree.

Of the 60% of the postings for these above middle-skill computer programming occupations that listed a minimum education requirement, 91% (28,997) requested a bachelor's degree and 9% (2,855) requested a high school diploma or an associate degree.

Exhibit 12: National-level Educational Attainment for Occupations



Educational Supply

Community College Supply:

Exhibit 13 shows the three-year average number of awards conferred by community colleges in the related TOP codes: Digital Media (0614.00), Website Design and Development (0614.30), Computer Graphics and Digital Imagery (0614.60), Information Technology, General (0701.00), Computer Information Systems (0702.00), Software Applications (0702.10), Computer Software Development (0707.00), Computer Programming (0707.10), Database Design and Administration (0707.20), Computer Systems Analysis (0707.30), Computer Infrastructure and Support (0708.00), Computer Networking (0708.10), Computer Support (0708.20), and World Wide Web Administration (0709.00).

The colleges with the most completions in the region are: Mt. San Antonino, Long Beach, and Orange Coast. Canyon. Over the past 12 months, there were two other related program recommendation requests from regional community colleges.

Exhibit 13: Regional Community College Awards (Certificates and Degrees), 2018-2021

TOP Code	Program	College	2018-2019 Awards	2019-2020 Awards	2020-2021 Awards	3-Year Award Average
0614.00	Digital Media	Glendale	0	1	0	0
		LA Mission	1	4	5	3
		LA Trade	19	11	18	16
		Pasadena	0	0	3	1
		Rio Hondo	0	2	1	1
		Glendale	0	1	0	0
		LA Subtotal	**20**	**18**	**27**	**21**
		Coastline	3	0	3	2
		Cypress	0	0	2	1
		Golden West	10	10	7	8
		Irvine	9	1	6	5
		Saddleback	0	0	1	0
		Santa Ana	0	1	6	2
		OC Subtotal	**22**	**12**	**25**	**18**
Supply Subtotal/Average			**42**	**30**	**52**	**39**
0614.30	Website Design and Development	LA Pierce	3	2	4	3
		Mt San Antonio	9	7	6	7
		Pasadena	0	1	1	1
		Santa Monica	0	2	3	2
		LA Subtotal	**12**	**12**	**14**	**13**
		Coastline	1	1	1	1
		Fullerton	3	0	1	2
		Irvine	3	0	5	2

TOP Code	Program	College	2018-2019 Awards	2019-2020 Awards	2020-2021 Awards	3-Year Award Average
		Orange Coast	0	9	7	5
		Saddleback	7	2	7	5
		Santa Ana	0	2	1	1
		Santiago Canyon	24	3	6	11
		OC Subtotal	**38**	**17**	**28**	**27**
		Supply Subtotal/Average	**50**	**29**	**42**	**40**
0614.60	Computer Graphics and Digital Imagery	Citrus	13	12	26	17
		East LA	16	1	2	6
		Mt San Antonio	0	0	1	0
		LA Subtotal	**29**	**13**	**29**	**23**
		Coastline	5	1	0	2
		Cypress	7	5	0	4
		Fullerton	2	1	3	2
		North Orange Adult	9	3	0	4
		Orange Coast	38	21	31	30
		Saddleback	4	4	2	4
		Santa Ana	0	11	3	4
		OC Subtotal	**65**	**46**	**39**	**50**
		Supply Subtotal/Average	**94**	**59**	**68**	**73**
0701.00	Information Technology, General	East LA	23	10	4	13
		Glendale	0	0	3	1
		LA Harbor	0	0	1	0
		LA Mission	1	3	1	2
		LA Swest	0	0	2	0
		Long Beach	34	64	106	68
		Mt San Antonio	74	90	49	71
		Santa Monica	39	0	1	13
		West LA	4	5	0	3
		LA Subtotal	**175**	**172**	**167**	**171**
		Santa Ana	0	0	3	1
		OC Subtotal	**0**	**0**	**3**	**1**
		Supply Subtotal/Average	**175**	**172**	**170**	**172**
0702.00	Computer Information Systems	Citrus	5	8	4	6
		Compton	1	0	0	0
		East LA	19	15	23	20
		El Camino	14	21	11	16

TOP Code	Program	College	2018-2019 Awards	2019-2020 Awards	2020-2021 Awards	3-Year Award Average
		Glendale	0	5	6	4
		LA City	1	1	4	2
		LA Mission	5	1	1	2
		LA Trade	8	20	15	15
		Long Beach	0	0	3	1
		Mt San Antonio	0	79	6	28
		Rio Hondo	21	10	6	12
		West LA	8	10	9	9
		LA Subtotal	**82**	**170**	**88**	**115**
		Cypress	5	4	0	2
		Fullerton	15	11	31	19
		Irvine	0	2	0	1
		Orange Coast	4	2	0	2
		Saddleback	0	0	1	0
		Santa Ana	4	2	16	7
		Santiago Canyon	3	4	1	3
		OC Subtotal	**31**	**25**	**49**	**34**
Supply Subtotal/Average			**113**	**195**	**137**	**149**
0702.10	Software Applications	Cerritos	9	6	2	6
		LA City	0	1	1	1
		LA Mission	2	0	3	2
		LA Swest	1	0	0	0
		Long Beach	0	7	0	2
		Mt San Antonio	1	2	0	1
		Santa Monica	18	13	6	13
		LA Subtotal	**31**	**29**	**12**	**25**
		Coastline	9	8	8	9
		Irvine	39	48	50	46
		Saddleback	2	7	11	6
		OC Subtotal	**50**	**63**	**69**	**61**
Supply Subtotal/Average			**81**	**92**	**81**	**86**
0707.00	Computer Software Development	LA City	1	0	0	0
		LA Pierce	0	0	4	1
		Santa Monica	0	0	1	0
		LA Subtotal	**1**	**0**	**5**	**1**
		Cypress	1	1	0	1
		Golden West	4	2	6	4

TOP Code	Program	College	2018-2019 Awards	2019-2020 Awards	2020-2021 Awards	3-Year Award Average
		Orange Coast	7	2	2	4
		Saddleback	13	3	10	8
		OC Subtotal	**25**	**8**	**18**	**17**
		Supply Subtotal/Average	**26**	**8**	**23**	**18**
0707.10	Computer Programming	Cerritos	0	2	3	1
		Citrus	0	1	3	1
		East LA	8	4	1	4
		Glendale	2	3	0	2
		LA City	0	6	8	5
		LA Harbor	0	0	2	0
		LA Mission	6	4	7	6
		LA Pierce	18	4	5	9
		LA Swest	0	1	2	1
		LA Valley	7	6	13	9
		Long Beach	4	5	3	4
		Mt San Antonio	119	114	83	105
		Pasadena	11	21	23	19
		Santa Monica	44	46	65	52
		West LA	1	0	0	0
		LA Subtotal	**220**	**217**	**218**	**218**
		Cypress	22	20	6	16
		Fullerton	16	28	24	23
		Irvine	8	4	0	4
		Orange Coast	31	157	206	131
		Santa Ana	13	1	0	5
		Santiago Canyon	9	3	2	5
		OC Subtotal	**99**	**213**	**238**	**184**
		Supply Subtotal/Average	**319**	**430**	**456**	**402**
0707.20	Database Design and Administration	Citrus	1	1	0	1
		Long Beach	3	1	13	6
		Mt San Antonio	11	12	8	10
		Pasadena	0	4	24	9
		Santa Monica	1	5	2	3
		LA Subtotal	**16**	**23**	**47**	**29**
		Santa Ana	1	8	2	4
		OC Subtotal	**1**	**8**	**2**	**4**
		Supply Subtotal/Average	**17**	**31**	**49**	**33**

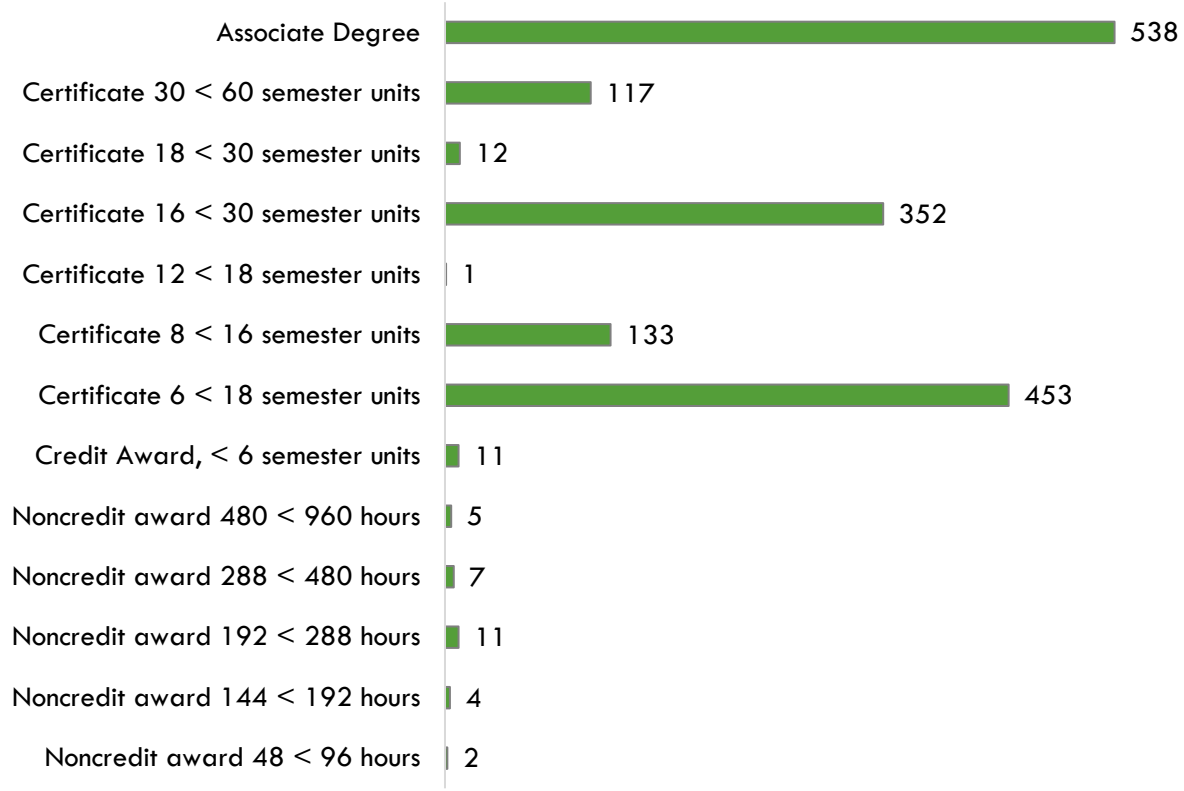
TOP Code	Program	College	2018-2019 Awards	2019-2020 Awards	2020-2021 Awards	3-Year Award Average
0707.30	Computer Systems Analysis	Cerritos	2	3	0	1
		East LA	0	1	0	0
		LA City	0	0	1	0
		LA Harbor	0	0	1	0
		LA Mission	0	1	1	1
		LA Pierce	0	0	6	2
		LA Subtotal	**2**	**5**	**9**	**4**
		Cypress	2	0	0	1
		OC Subtotal	**2**	**0**	**0**	**1**
		Supply Subtotal/Average	**113**	**195**	**137**	**149**
0708.00	Computer Infrastructure and Support	Cerritos	0	4	4	3
		Glendale	0	3	4	2
		LA City	0	3	5	3
		LA Harbor	1	1	1	1
		LA Mission	2	12	17	11
		LA Valley	5	2	4	4
		Long Beach	3	8	8	6
		Mt San Antonio	24	24	24	24
		Pasadena	1	1	24	9
		Rio Hondo	0	10	11	7
		West LA	4	15	16	12
		LA Subtotal	**40**	**83**	**118**	**82**
		Coastline	49	46	73	56
		Cypress	2	3	1	2
		Orange Coast	0	7	5	4
		Saddleback	0	0	3	1
		Santa Ana	0	0	27	9
		OC Subtotal	**51**	**56**	**109**	**72**
		Supply Subtotal/Average	**91**	**139**	**227**	**154**
0708.10	Computer Networking	Cerritos	11	9	8	9
		Glendale	3	3	0	2
		LA City	23	0	4	9
		LA Pierce	39	20	12	23
		Long Beach	55	47	48	51
		Mt San Antonio	8	11	4	7
		Rio Hondo	5	7	2	5
		West LA	77	48	58	61

TOP Code	Program	College	2018-2019 Awards	2019-2020 Awards	2020-2021 Awards	3-Year Award Average
		LA Subtotal	**221**	**145**	**136**	**167**
		Coastline	38	59	92	64
		Cypress	70	95	61	76
		Fullerton	0	0	1	0
		Irvine	11	21	10	14
		Saddleback	10	21	19	17
		Santa Ana	14	12	23	16
		OC Subtotal	**143**	**208**	**206**	**187**
Supply Subtotal/Average			**364**	**353**	**342**	**354**
0708.10	Computer Networking	Cerritos	11	9	8	9
		Glendale	3	3	0	2
		LA City	23	0	4	9
		LA Pierce	39	20	12	23
		Long Beach	55	47	48	51
		Mt San Antonio	8	11	4	7
		Rio Hondo	5	7	2	5
		West LA	77	48	58	61
		LA Subtotal	**221**	**145**	**136**	**167**
		Coastline	38	59	92	64
		Cypress	70	95	61	76
		Fullerton	0	0	1	0
		Irvine	11	21	10	14
		Saddleback	10	21	19	17
		Santa Ana	14	12	23	16
		OC Subtotal	**143**	**208**	**206**	**187**
Supply Subtotal/Average			**364**	**353**	**342**	**354**
0708.20	Computer Support	Citrus	0	1	1	1
		Glendale	10	7	2	6
		LA Pierce	9	8	6	8
		LA Valley	0	0	1	0
		Long Beach	8	14	40	21
		Pasadena	7	30	34	23
		LA Subtotal	**34**	**60**	**84**	**59**
		Cypress	3	5	3	4
		Santa Ana	9	0	0	3
		OC Subtotal	**12**	**5**	**3**	**7**
Supply Subtotal/Average			**46**	**65**	**87**	**66**

TOP Code	Program	College	2018-2019 Awards	2019-2020 Awards	2020-2021 Awards	3-Year Award Average
0709.00	World Wide Web Administration	Glendale	6	7	10	7
		LA Pierce	9	0	2	4
		Long Beach	22	24	34	27
		Santa Monica	0	0	16	5
		West LA	13	9	6	10
		LA Subtotal	**50**	**40**	**68**	**53**
		Fullerton	0	0	1	0
		Saddleback	0	2	2	2
		OC Subtotal	**0**	**2**	**3**	**2**
		Supply Subtotal/Average	**50**	**42**	**71**	**55**
		Supply Total/Average	**1,472**	**1,650**	**1,814**	**1,646**

Exhibit 14 shows the annual average community college awards by type from 2018-19 through 2020-21. The plurality of the awards are for associate degrees, followed by certificates between 6 and less than 18 semester units and certificates between 16 and less than 30 semester units.

Exhibit 14: Annual Average Community College Awards by Type, 2018-2021



Community College Student Outcomes:

Exhibit 15 shows the Strong Workforce Program (SWP) metrics for computer programming programs in North Orange County Community College District (NOCCCD), the Orange County Region, and California. Of the 2,905 computer programming students in Orange County, 22% (637) attended a Coast CCD college.

Additionally, NOCCCD students that exited computer programming programs in the 2018-19 academic year had a 7% median change in earnings, which is lower than the Orange County Region (22%) and statewide (22%).

Exhibit 15: Computer Programming (0707.10) Strong Workforce Program Metrics, 2020-2021[3]

SWP Metric	NOCCCD	OC Region	California
SWP Students	637	2,905	39,212
SWP Students Who Earned 9 or More Career Education Units in the District in a Single Year	26%	19%	24%
SWP Students Who Completed a Noncredit CTE or Workforce Preparation Course	Insufficient Data	94%	76%
SWP Students Who Earned a Degree or Certificate or Attained Apprenticeship Journey Status	28	128	745
SWP Students Who Transferred to a Four-Year Postsecondary Institution (2019-20)	59	306	4,166
SWP Students with a Job Closely Related to Their Field of Study (2018-19)	52%	42%	67%
Median Annual Earnings for SWP Exiting Students (2019-20)	$34,522 ($16.60)	$35,034 ($16.84)	$41,032 ($19.73)
Median Change in Earnings for SWP Exiting Students (2019-20)	7%	22%	22%
SWP Exiting Students Who Attained the Living Wage (2019-20)	38%	39%	53%

Non-Community College Supply:

For a comprehensive regional supply analysis, it is also important to consider the supply from other institutions in the region that provide training programs for these computer programming occupations. Exhibit 16 shows the annual and three-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes: Computer and Information Sciences, General (11.0101), Information Technology (11.0103), Computer Programming/Programmer, General (11.0201), Computer Systems Analysis/Analyst (11.0501), Computer Science (11.0701), Computer Graphics (11.0803), Computer Systems Networking and Telecommunications (11.0901), Network and System Administration/Administrator (11.1001), Computer and Information Systems Security/Auditing/Information Assurance (11.1003), Computer Support Specialist (11.1006), Computer Engineering Technology/Technician (15.1201), and Computer/Computer Systems Technology/Technician (15.1202).

Due to different data collection periods, the most recent three-year period of available data is from 2017 to 2020. Between 2017 and 2020, non-community colleges in the region conferred an average of 3,033 awards annually in related training programs.

[3] All SWP metrics are for 2020-21 unless otherwise noted.

Exhibit 16: Regional Non-Community College Awards, 2017-2020

CIP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
11.0101	Computer and Information Sciences, General	Azusa Pacific University	26	30	21	26
		Brand College	2	0	0	1
		Brandman University	20	20	30	23
		Chapman University	12	13	18	14
		Los Angeles Pacific College	0	0	6	2
		Loyola Marymount University	42	32	27	34
		Mount Saint Mary's University	0	0	0	0
		Pacific States University	0	2	0	1
		The Master's University and Seminary	6	7	11	8
		University of California-Irvine	0	1	0	0
		University of La Verne	18	39	23	27
		University of the People	100	80	203	128
		Vanguard University of Southern California	1	0	0	0
		Supply Subtotal/Average	**227**	**224**	**339**	**264**
11.0103	Information Technology	Abraham Lincoln University	1	1	0	1
		Bethesda University	0	0	0	0
		Brand College	37	50	13	33
		California Intercontinental University	0	0	2	1
		California State University-Dominguez Hills	1	5	4	3
		California State University-Los Angeles	127	122	166	138
		California State University-Northridge	54	54	29	46
		Platt College-Anaheim	1	11	15	9
		Platt College-Los Angeles	0	6	12	6
		Trident University International	87	71	0	53
		University of La Verne	0	3	2	2
		Supply Subtotal/Average	**308**	**323**	**243**	**292**
11.0201	Computer Programming/	ABCO Technology	23	29	46	33
		Platt College-Anaheim	4	4	4	4

CIP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
	Programmer, General	Platt College-Los Angeles	0	0	0	0
		Supply Subtotal/Average	**27**	**33**	**50**	**37**
11.0202	Computer Systems Analysis/ Analyst	Brand College	2	0	0	1
		Supply Subtotal/Average	**2**	**0**	**0**	**1**
11.0701	Computer Science	Biola University	21	20	18	20
		California Institute of Technology	57	64	72	64
		California State Polytechnic University-Pomona	207	186	238	210
		California State University-Dominguez Hills	33	38	57	43
		California State University-Fullerton	193	246	264	234
		California State University-Long Beach	179	201	220	200
		California State University-Los Angeles	101	122	119	114
		California State University-Northridge	141	120	160	140
		Chapman University	32	31	30	31
		Claremont McKenna College	12	15	35	21
		East San Gabriel Valley Regional Occupational Program	16	12	0	9
		Harvey Mudd College	45	42	47	45
		Occidental College	3	20	18	14
		Pitzer College	3	5	10	6
		Pomona College	50	36	34	40
		Scripps College	2	12	11	8
		Southern California Institute of Technology	4	2	10	5
		The Master's University and Seminary	0	0	0	0
		Trident University International	62	76	0	46
		University of California-Irvine	521	558	805	628
		University of California-Los Angeles	213	242	283	246

CIP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
		University of Southern California	202	228	247	226
		Supply Subtotal/Average	**2,097**	**2,276**	**2,678**	**2,350**
11.0803	Computer Graphics	ABC Adult School	5	4	4	4
		Los Angeles Pacific College	0	33	0	11
		Supply Subtotal/Average	**5**	**37**	**4**	**15**
11.0901	Computer Systems Networking and Telecommunications	Brand College	0	2	2	1
		PCI College	0	0	0	0
		Supply Subtotal/Average	**0**	**2**	**2**	**1**
11.1001	Network and System Administrator/ Administration	ABCO Technology	13	5	25	14
		Brand College	6	23	9	13
		California Intercontinental University	1	3	1	2
		Supply Subtotal/Average	**20**	**31**	**35**	**29**
11.1003	Computer and Information Systems Security/ Auditing/ Information Assurance	Learnet Academy Inc	17	0	5	7
		Supply Subtotal/Average	**17**	**0**	**5**	**7**
11.1006	Computer Support Specialist	Southern California Institute of Technology	26	25	26	26
		Supply Subtotal/Average	**26**	**25**	**26**	**26**
15.1201	Computer Engineering Technology/ Technician	California State University-Long Beach	11	11	4	9
		Supply Subtotal/Average	**11**	**11**	**4**	**9**
15.1202	Computer/ Computer Systems Technology/ Technician	Learnet Academy Inc	1	0	4	2
		Supply Subtotal/Average	**1**	**0**	**4**	**2**
		Supply Total/Average	**2,741**	**2,962**	**3,390**	**3,033**

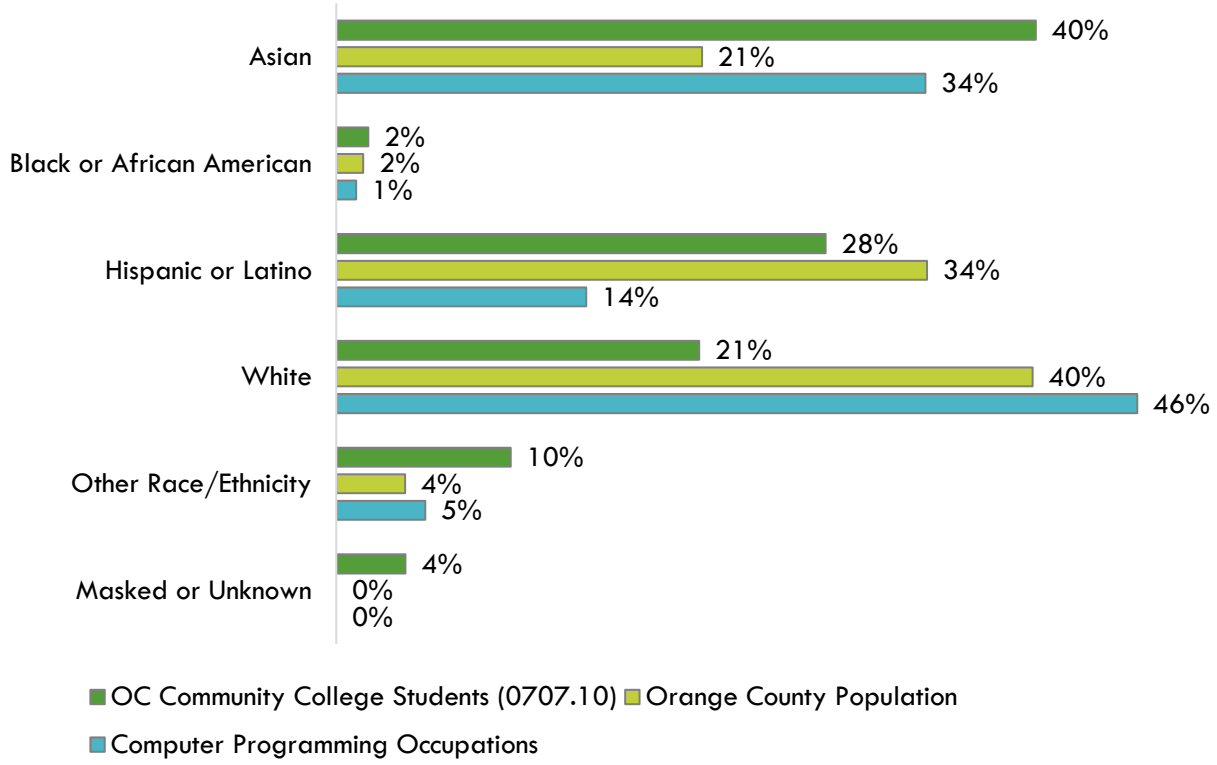
Regional Demographics

This section analyzes demographic data for Orange County community college students enrolled in computer programming programs compared to the OC population, as well occupational data, for the purpose of identifying potential diversity and equity issues that can be addressed by community college programs.

Ethnicity:

Exhibit 17 shows the ethnicity of Orange County community college students enrolled in computer programming programs compared to the overall Orange County population, as well as the five computer programming occupations included in this report. Notably, 46% of workers employed in these computer programming occupations are white, which is slightly higher than the population (40%) and significantly higher than community college computer programming students (21%). Conversely, 28% of community college computer programming students are Hispanic or Latino, which is slightly higher than the Orange County population (34%) and significantly higher than workers in these computer programming occupations (14%). Additionally, there is a significantly higher percentage of Asian computer programming students (40%) and workers (34%) when compared to the population (41%).

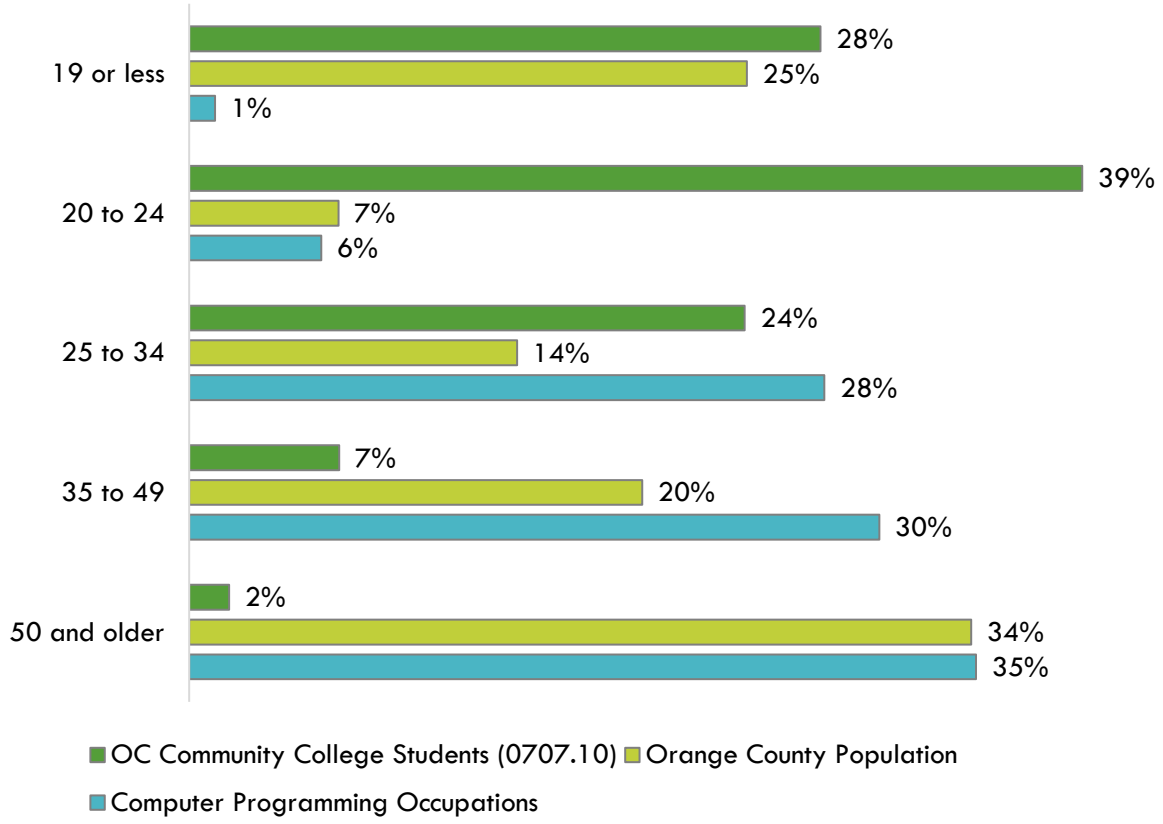
Exhibit 17: Program and County Demographics by Ethnicity



Age:

Exhibit 18 shows the age of Orange County community college students enrolled in computer programming programs compared to the overall Orange County population, as well as the five computer programming occupations included in this report. The plurality of workers in these computer programming occupations are age 50 and older (34%), which is nearly equivalent to the population (34%), but significantly higher than community college computer programming students (2%). Conversely, 67% of community college computer programming students are 24 or less, which is significantly higher than both the population (32%) and these computer programming occupations (7%).

Exhibit 18: Program and County Demographics by Age

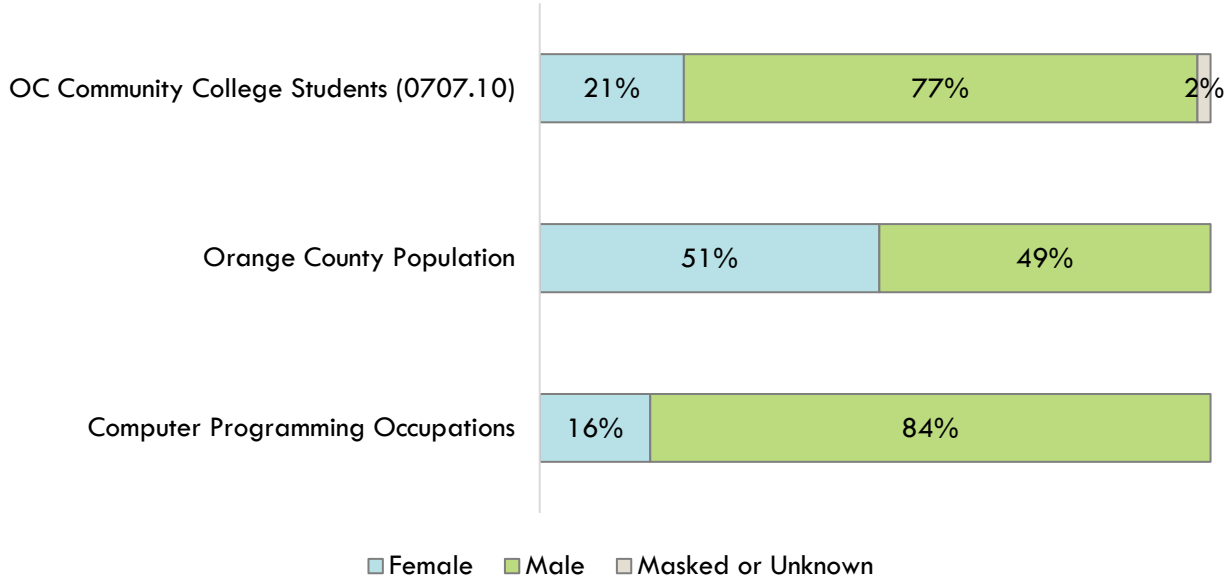


Sex:

Exhibit 19 shows the sex of Orange County community college students enrolled in computer programming programs compared to the overall Orange County population as well as these computer programming occupations.

Though the Orange County population is split nearly evenly between men and women, 77% of computer programming students and 84% of workers in these computer programming occupations are men.

Exhibit 19: Program and County Demographics by Sex



Appendix A: Methodology

The OC COE prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Lightcast, a labor market analytics firm that consolidates data from the California Employment Development Department (EDD), U.S. Bureau of Labor Statistics (BLS) and other government agencies. Program supply data is drawn from two systems: Taxonomy of Programs (TOP) and Classification of Instructional Programs (CIP).

Using a TOP-SOC crosswalk, the OC COE identified middle-skill jobs for which programs within these TOP codes train. Middle-skill jobs include:

- 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.

The OC COE determined labor market supply for an occupation or SOC code by analyzing the number of program completers or awards in a related TOP or CIP code. The COE developed a "supply table" with this information, which is the source of the program supply data for this report. TOP code data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP code data comes from the Integrated Postsecondary Education Data System (nces.ed.gov/ipeds/use-the-data), also known as IPEDS. TOP is a system of numerical codes used at the state level to collect and report information on California community college programs and courses throughout the state that have similar outcomes. CIP codes are a taxonomy of academic disciplines at institutions of higher education in the United States and Canada. Institutions outside of the California Community College system do not use TOP codes in their reporting systems.

Data included in this analysis represent the labor market demand for relevant positions most closely related to the proposed program as expressed by the requesting college in consultation with the OC COE. Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study which can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.

All representations have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. The most recent data available at the time of the analysis was examined; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.

Appendix B: Data Sources

Data Type	Source
Occupational Projections, Wages, and Job Postings	Traditional labor market information data is sourced from Lightcast, a labor market analytics firm. Lightcast occupational employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Wage estimates are based on Occupational Employment Statistics and the American Community Survey. For more information, see https://lightcast.io/
Living Wage	The living wage is derived from the Insight Center's California Family Needs Calculator, which measures the income necessary for an individual of family to afford basic expenses. The data assesses the cost of housing, food, child care, health care, transportation, and taxes. For more information, see: https://insightcced.org/family-needs-calculator/ The living wage for one adult in Orange County is $20.63 per hour ($42,910.40 annually). This figure is used by the CCCCO to calculate the percentage of students that attained the regional living wage.
Typical Education and Training Requirements, and Educational Attainment	The Bureau of Labor Statistics (BLS) provides information about education and training requirements for hundreds of occupations. BLS uses a system to assign categories for entry-level education, work experience in a related occupation, and typical on-the-job training to each occupation for which BLS publishes projections data. For more information, see https://www.bls.gov/emp/documentation/education/tech.htm
Emerging Occupation Descriptions, Additional Education Requirements, and Employer Preferences	The O*NET database includes information on skills, abilities, knowledges, work activities, and interests associated with occupations. For more information, see https://www.onetonline.org/help/online/
Educational Supply	The CCCCO Data Mart provides information about students, courses, student services, outcomes and faculty and staff. For more information, see: https://datamart.cccco.edu The National Center for Education Statistics (NCES) Integrated Postsecondary Integrated Data System (IPEDS) collects data on the number of postsecondary awards earned (completions). For more information, see https://nces.ed.gov/ipeds/use-the-data/survey-components/7/completions
Student Metrics and Demographics	LaunchBoard, a statewide data system supported by the California Community Colleges Chancellor's Office and hosted by Cal-PASS Plus, provides data on progress, success, employment, and earnings outcomes for California community college students. For more information, see: https://www.calpassplus.org/LaunchBoard/Home.aspx

Data Type	Source
Population and Occupation Demographics	The Census Bureau's American Community Survey (ACS) is the premier source for detailed population and housing information. For more information, see: https://www.census.gov/programs-surveys/acs Data is sourced from IPUMS USA, a database providing access to ACS and other Census Bureau data products. For more information, see: https://usa.ipums.org/usa/about.shtml

For more information, please contact the Orange County Center of Excellence:

Jesse Crete, Ed. D., Director
crete_jesse@rsccd.edu

Jacob Poore, Assistant Director
poore_jacob@rsccd.edu

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