Labor Market Analysis for Program Modification: 0956.00/Manufacturing and Industrial Technology (CNC Operator Certificate) (Computer Numerical Control (CNC) Certificate) (Conversational Programming Certificate) (Swiss Lathe Certificate)

Orange County Center of Excellence, July 2024



Summary

Program LMI Endorsement	Endorsed: All LMI Criteria Met		Endorsed: Some LMI Criteria Met	X	Not LMI Endorsed	
	D 1441 E					
	Program LMI Er	idor	rsement Criteria			
	Yes ✓	<u> </u>		١	10 🗆	
Supply Gap:	Comments: There is proj Angeles and Orange co than the 415 awards co	ountie	s for these drafting occ	upatior	ns, which is mor	
	Yes □			١	10 ☑	
Living Wage: (Entry-Level, 25 th)	Comments: Nearly 94% have entry-level hourly				•	ns
	Yes ✓			١	10 П	
Comments: Though 94% of annual job openings for these CNC occupations require a high school diploma or equivalent, between 26% and 44% of workers in the field have completed some college or an associate degree their highest level of education.						
	Emerging	Occ	cupation(s)			
Ye	s 🗆	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 four middle-skill occupations:

- Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4034)
- Machinists (51-4041)
- Computer Numerically Controlled Tool Operators (51-9161)
- Computer Numerically Controlled Tool Programmers (51-9162)

Based on the available data there appears be a supply gap for these CNC occupations. In addition, though most (94%) annual job openings have entry-level wages below the living wage, typical education requirements for these occupations align with a community college education. **Therefore, due to some regional labor market criteria being met, the COE endorses this 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

Operators (51-9161)	Operators		equivalent	4470			
Computer Numerically Controlled Tool	LA: 394 OC: 211	LA: 5 OC: 2	High school OC: \$17.89 diploma or	44%			
	TTL: 1,275 TTL: 408						
Machinists (51-4041)	OC: 466	OC: 180	OC: \$18.70	High school diploma or equivalent	41%		
	LA: 809	LA: 228					
and Plastic (51-4034)	TTL: 1 <i>77</i>						
Setters, Operators, and Tender, Metal	OC: 66	Accounted for Below	OC: \$18.29	High school diploma or equivalent	26%		
Lathe and Turning Machine Tool	LA: 111						
Occupation (SOC)	Demand (Annual Openings)	Supply (CC and Non-CC)	Entry-Level Hourly Earnings (25th Percentile)	Typical Entry- Level Education	Community College Educational Attainment		

Demand:

- The number of jobs related to these CNC occupations is projected to remain relatively flat through 2027, equating to 2,180 annual job openings.
- Hourly entry-level wages for these CNC occupations in Orange County range from \$17.89 to
 \$28.38; approximately 94% of annual job openings for these occupations below the living wage.
- There were 4,127 online job postings for these CNC occupations over the past 12 months. The highest number of postings were for CNC machinists, CNC programmers, and CNC operators.
- The typical entry-level education for these CNC occupations range from a high school diploma or equivalent to a postsecondary nondegree award.
- Between 26% and 44% of workers in the field have completed some college or an associate degree as their highest level of educational attainment.

Supply:

- There was an average of 276 awards conferred by 15 community colleges in Los Angeles and Orange Counties from 2019 to 2022.
- Non-community college institutions conferred an average of 140 awards from 2019 to 2021.
- Orange County community college students that exited manufacturing and industrial technology programs in the 2020-21 academic year had a median annual wage of \$44,864 (\$21.57 per hour) after exiting the program and 52% attained the regional living wage.
- Throughout Orange County, 76% of drafting technology students that exited their program in 2019-20 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 these four CNC occupations from 2017 through 2027. Though there was an 11% decrease in employment for the occupations from 2019 to 2020 in Orange County, there was a 7% decline across all occupations during the same period in Los Angeles and Orange counties due to the COVID-19 pandemic. Employment for these four CNC occupations continued to decrease through 2022, though at varying degrees.

In the years preceding the pandemic, employment for these occupations fluctuated, with a decline in 2017, an increase in 2018, and a decrease in 2019. However, these occupations are now projected to remain flat, albeit below all occupations, through 2027 in Orange County.

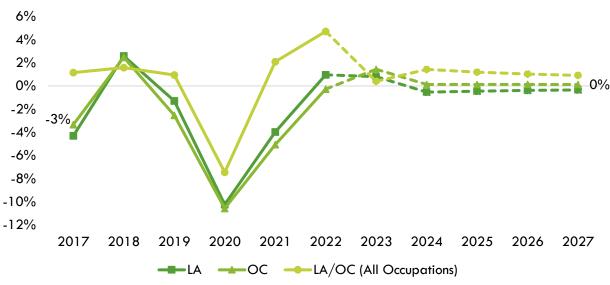


Exhibit 2: Annual Percent Change in Jobs for CNC Occupations, 2017-2027

Exhibit 3 shows the five-year occupational demand projections for these CNC occupations. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to remain relatively flat through 2027. There are projected to be 2,180 jobs available annually.

Exhibit 3: Occupational Demand in Los Angeles and Orange Counties¹

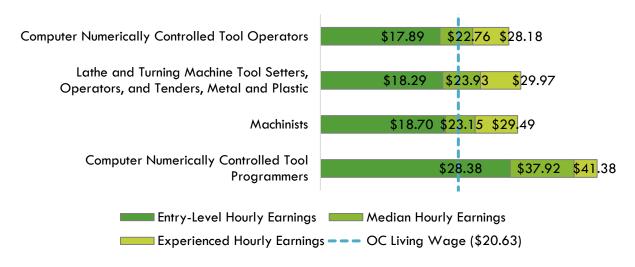
Geography	2022 Jobs	2027 Jobs	2022-2027 Change	2022- 2027 % Change	Annual Openings
Los Angeles	14,150	14,020	(131)	(0.9%)	1,392
Orange	7,597	7,745	148	2.0%	788
Total	21,747	21,765	18	0.1%	2,180

Wages:

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

Nearly 94% of annual openings for these CNC occupations have entry-level wages below the living wage for one adult (\$20.63 in Orange County). Typical entry-level hourly wages range between \$17.89 and \$28.38. Orange County's average wages are \$25.43, which is below the average statewide wage of \$26.34 for these occupations. Exhibit 4 shows the wage range for each of these CNC occupations in Orange County and how they compare to the regional living wage, sorted from lowest to highest entry-level wage.

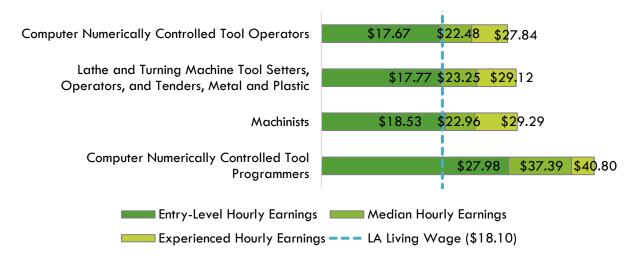
Exhibit 4: Wages by Occupation in Orange County



Nearly 64% annual openings for these CNC 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 \$17.67 and \$27.98. Los Angeles County's average wages of \$25.16 are below the average statewide wage of \$26.34 for these occupations. Exhibit 5 shows the wage range for each of these CNC occupations in Los Angeles 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 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 4,127 online job postings related to these CNC occupations listed in the past 12 months. Exhibit 6 shows the number of job postings by occupation. Almost half (49%) of all job postings were for machinists, followed by computer numerically controlled tool operators (34%).

Exhibit 6: Number of Job Postings by Occupation (n=4,127)

Occupation	Job Postings	Percentage of Job Postings
Machinists	2,039	49.4%
Computer Numerically Controlled Tool Operators	1,404	34.0%
Computer Numerically Controlled Tool Programmers	675	16.4%
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	9	0.2%
Total Postings	4,127	100.0%

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 in the region, by number of job postings, are shown in Exhibit 7.

Exhibit 7: Top Employers by Number of Job Postings (n=4,127)

Employer	Job Postings	Percentage of Job Postings
Aerotek	483	12%
Volt	118	3%
Flowserve	85	2%
Applied Medical Resources Corporation	77	2%
Flag Solutions	72	2%
Precision Castparts	72	2%
Express Employment Professionals	59	1%
Howmet Aerospace	51	1%
Kimco Staffing Services	50	1%
Stanley Black & Decker	41	1%

The top specialized, soft, and computer skills listed by those most frequently mentioned in job postings (denoted in parentheses) are shown in Exhibit 8.

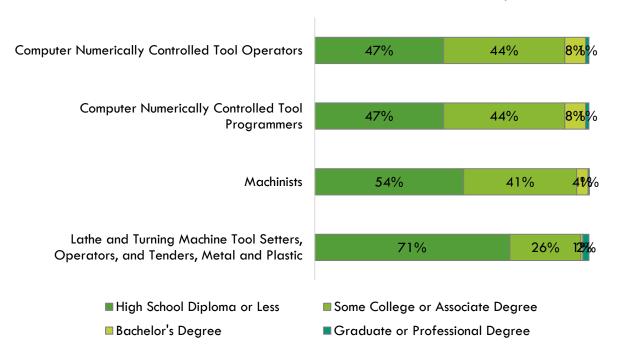
Exhibit 8: Top Skills by Number of Job Postings (n=4,127)

Top Specialized Skills	Top Soft Skills	Top Computer Skills
Machining (2,549)	Operations (1,522)	Mastercam (CAD/CAM Software) (443)
Lathes (1,840)	Mathematics (1,010)	G-Codes (263)
Computer Numerical Control (CNC) (1,699)	Communication (748)	SolidWorks (CAD) (226)
Tooling (1,498)	Troubleshooting (Problem Solving) (721)	Microsoft Office (135)
Mills (1,372)	Detail Oriented (697)	Vericut (113)
Blueprinting (1,200)	Problem Solving (532)	Computer Aided Three- Dimensional Interactive Application (CATIA) (92)
Micrometer (1,141)	Lifting Ability (504)	Microsoft Excel (81)
CNC Machining (1,025)	English Language (488)	Angular (Web Framework) (63)
Calipers (1,020)	Management (316)	Fusion 360 (CAD Software) (54)
Cutting Tool (Machining) (783)	Planning (289)	Microsoft Word (47)

Educational Attainment:

The Bureau of Labor Statistics (BLS) lists a high school diploma or equivalent as the typical entry-level education for computer numerically controlled tool operators, machinists, and lathe and turning machine tool setters, operators, and tenders, metal and plastic, and a postsecondary nondegree award for computer numerically controlled tool programmers. However, the national-level educational attainment data indicates between 26% and 44% of workers in the field have completed some college or an associate degree as their highest level of education. Exhibit 9 shows the educational attainment for each occupation, sorted by highest community college educational attainment to lowest.

Exhibit 9: National-level Educational Attainment for Occupations



Of the 41% of the cumulative job postings for these CNC occupations that listed a minimum education requirement in Los Angeles/Orange County, 97% (1,662) requested a high school diploma or an associate degree and 3% (48) requested a bachelor's degree.

Educational Supply

Community College Supply:

Exhibit 10 shows the three-year average number of awards conferred by community colleges in the related TOP codes: Manufacturing and Industrial Technology (0956.00) and Machining and Machine Tools (0956.30). The colleges with the most completions in the region are Santa Ana, Orange Coast, and Fullerton. Over the past 12 months, there were no related program recommendation requests from regional community colleges.

Exhibit 10: Regional Community College Awards (Certificates and Degrees), 2019-2022

TOP Code	Program	College	2019- 2020 Awards	2020- 2021 Awards	2021- 2022 Awards	3-Year Award Average
		Cerritos	0	1	1	1
Manufacturing 0956.00 and Industrial Technology	El Camino	0	0	4	1	
	Glendale	2	0	1	1	
	LA Trade	9	9	15	11	
	LA Valley	9	7	0	5	
	Mt San Antonio	14	4	13	10	
	LA Subtotal	34	21	34	30	
	Fullerton	38	20	18	25	

TOP Code	Program	College	2019- 2020 Awards	2020- 2021 Awards	2021- 2022 Awards	3-Year Award Average
		Irvine	0	4	2	2
		Saddleback	7	4	8	6
		Santa Ana	3	2	4	3
		Santiago Canyon	10	12	7	10
		OC Subtotal	58	42	39	46
	Supply	Subtotal/Average	92	63	73	76
		Cerritos	37	14	16	22
		Compton	12	0	16	9
		El Camino	22	4	26	1 <i>7</i>
		Glendale	7	1	1	3
		LA Pierce	8	2	2	4
207/20	Machining and	LA Trade	4	2	7	4
0956.30	Machine Tools	LA Valley	3	3	6	4
		Pasadena	0	2	3	2
		LA Subtotal	93	28	77	66
		Orange Coast	74	41	27	47
		Santa Ana	102	76	81	86
		OC Subtotal	176	117	108	134
	Supply	Subtotal/Average	269	145	185	200
	Supply Total/Average		361	208	258	276

Exhibit 11 shows the annual average community college awards by type from 2019-20 to 2021-22. The plurality of the awards are for certificates between 30 and less than 60 semester units, followed by associate degrees and certificates between 16 and less than 30 semester units.

Certificate 60+ semester units

Certificate 30 < 60 semester units

Certificate 16 < 30 semester units

Certificate 8 < 16 semester units

3

Certificate 6 < 18 semester units

10

Noncredit award 144 < 192 hours

Exhibit 11: Annual Average Community College Awards by Type, 2019-2022

Community College Student Outcomes:

Exhibit 12 shows the Strong Workforce Program (SWP) metrics for manufacturing and industrial technology programs in North Orange Community College District (NOCCD), the Orange County Region, and California. Of the 548 Orange County manufacturing and industrial technology students in the 2020-21 academic year, 52% (286) attended an NOCCD college.

NOCCD students that exited manufacturing and industrial technology programs in the 2020-21 academic year had slightly lower median annual earnings (\$44,768 or \$21.52 per hour) compared to all manufacturing and industrial technology students in Orange County (\$44,864 or \$21.57 per hour). In addition, identical percentages (52%) of NOCCD and Orange County manufacturing and industrial technology students attained the living wage.

Exhibit 12: Manufacturing and Industrial Technology (0956.00) Strong Workforce Program Metrics, 2020-21³

SWP Metric	NOCCD	OC Region	California
SWP Students	286	548	3,716
SWP Students Who Earned 9 or More Career Education Units in the District in a Single Year	48%	42%	35%
SWP Students Who Completed a Noncredit CTE or Workforce Preparation Course	Insufficient Data	65%	21%
SWP Students Who Earned a Degree or Certificate or Attained Apprenticeship Journey Status	1 <i>7</i>	34	327

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

SWP Metric	NOCCD	OC Region	California
SWP Students Who Transferred to a Four-Year	Insufficient	24	87
Postsecondary Institution (2019-20)	Data	24	07
SWP Students with a Job Closely Related to Their Field of Study (2019-20)	86%	76%	79%
Median Annual Earnings for SWP Exiting Students	\$44,768 (\$21.52)	\$44,864 (\$21.57)	\$47,028 (\$22.61)
Median Change in Earnings for SWP Exiting Students	10%	4%	31%
SWP Exiting Students Who Attained the Living Wage	52%	52%	67%

Non-Community College Supply:

To comprehensively analyze the regional supply, it is crucial to include data from other institutions offering CNC training programs. Exhibit 13 displays the annual and two-year average awards granted by these institutions under the related Classification of Instructional Programs (CIP) codes:

- Machine Tool Technology/Machinist (48.0501)
- Machine Shop Technology/Assistant (48.0503)
- Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist (48.0510)

The available data covers 2019 to 2021. During this period, non-community college institutions in the region conferred an average of 140 awards annually in related programs.

Exhibit 13: Regional Non-Community College Awards, 2019-2021

CIP Code	Program	College	2019- 2020 Awards	2020- 2021 Awards	2-Year Award Average
	Machine Tool	NTMA Training Centers of Southern California	139	124	132
48.0501	Technology / Machinist	Pomona Unified School District Adult and Career Education	2	0	1
	9	Supply Subtotal/Average	141	124	133
48.0503	Machine Shop Technology / Assistant	Pomona Unified School District Adult and Career Education	8	2	5
	9	Supply Subtotal/Average	8	2	5
	Computer Numerically	California Career School	4	0	2
48.0510	Controlled (CNC) Machinist Technology / CNC Machinist	NTMA Training Centers of Southern California	0	0	0
	Supply Subtotal/Average			0	2
		Supply Total/Average	153	126	140

Regional Demographics

This section examines demographic data for Orange County community college students in manufacturing and industrial technology programs compared to the OC population, along with occupational data, to identify potential diversity and equity issues addressable by community college programs.

Note, demographic data are identical across two occupations: computer numerically controlled tool operators and computer numerically controlled tool programmers.

Ethnicity:

Exhibit 14 compares the ethnicity of Orange County community college students enrolled in manufacturing and industrial technology programs, the overall Orange County population, and occupation-specific data for the four CNC occupations included in this report.

Though the plurality of workers in the field (34%) are Asian, Asian individuals account for only 21% of community college manufacturing and industrial technology students, a percentage identical to the share of Asian persons in the county population. Conversely, while Hispanic or Latino individuals account for the plurality of community college manufacturing and industrial technology students (42%), they comprise 35% of workers in the field while aligns with their share of the population (35%). Furthermore, though 40% of the population is white, only 30% of workers in the field and 26% of community college manufacturing and industrial technology students identify as white.

Examining disaggregated data for each occupation (not shown), the occupation with the highest percentages of white (51%) and Asian (49%) workers is lathe and turning machine tool setters, operators, and tenders, metal and plastic. This occupation has the second lowest entry-level wages of the four CNC occupations. Demographically, machinists is split relatively evenly between Asian (34%), Hispanic or Latino (32%), and white (33%) workers. The occupations with the highest percentages of Hispanic or Latino workers are computer numerically controlled tool operators and computer numerically controlled tool programmers. These occupations offer the lowest (\$17.89) and highest (\$28.38) entry-level wages, respectively, of the four CNC occupations.

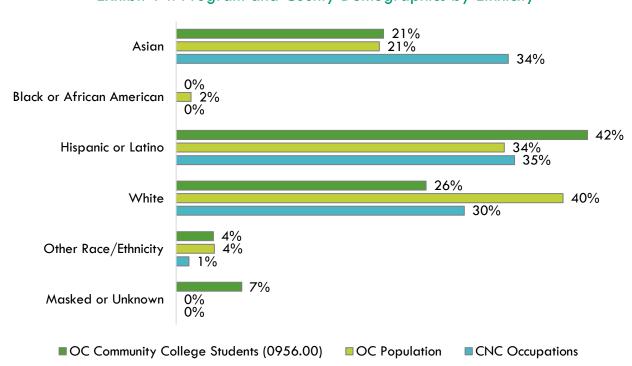


Exhibit 14: Program and County Demographics by Ethnicity

Age:

Exhibit 15 compares the age of Orange County community college students enrolled in manufacturing and industrial technology programs, the overall Orange County population, and occupation-specific data for the four CNC occupations included in this report.

Though the majority (86%) of workers in the field and individuals in the population (54%) are 35 and older, this age group accounts for only 35% of community college manufacturing and industrial technology students. Conversely, despite accounting for a majority (64%) of community college manufacturing and industrial technology students and 46% of the population, individuals 34 and younger account for only 15% of workers in the field.

Examining disaggregated data for each occupation (not shown), individuals 50 and older account for at least half of, if not all, workers across all four occupations: lathe and turning machine tool setters, operators, and tenders, metal and plastic (100%), machinists (57%), computer numerically controlled tool operators (50%), and computer numerically controlled tool programmers (50%).

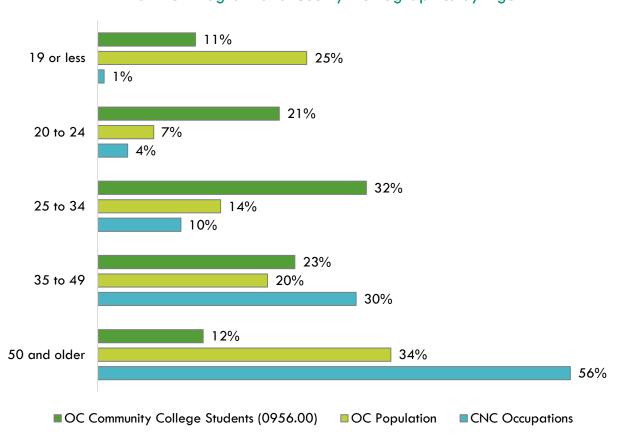


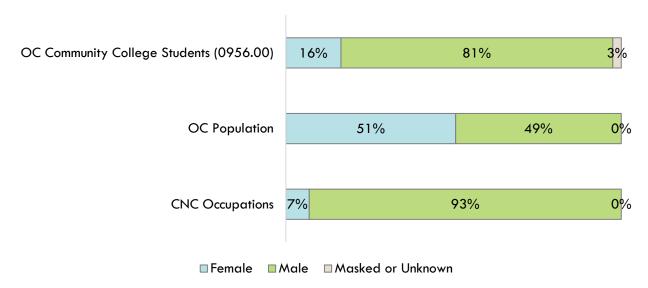
Exhibit 15: Program and County Demographics by Age

Sex:

Exhibit 16 compares the sex of Orange County community college students enrolled in manufacturing and industrial technology programs, the overall Orange County population, and occupation-specific data for these CNC occupations.

Though the population is largely split evenly between men and women, only 16% of community college manufacturing and industrial technology students and 7% workers in the field are women. When examining disaggregated data for each occupation (not shown), men represent 91% to 100% of workers across the four occupations.

Exhibit 16: 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/
	The CCCCO Data Mart provides information about students, courses, student services, outcomes and faculty and staff. For more information, see: https://datamart.cccco.edu
Educational Supply	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

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