2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

EXECUTIVE SUMMARY

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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FOR LABOR MARKET RESEARCH

EXECUTIVE SUMMARY
Demand and Supply Analysis: Orange County

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INTRODUCTION

Orange County's nine community colleges and one noncredit school have a long history of serving the region by teaching students the skills and helping them earn the awards necessary to satisfy the region's industry demand for qualified workers in a wide-range of occupations. However, while there currently are a number of funding initiatives supporting career education, there is always a finite amount of resources – physical and human as well as financial. The Orange County region is committed to strategically using all of the resources at its disposal to address its current supply gap of 47,040 awards. Furthermore, Orange County wants to focus investments that will continue to see outcomes in the future. To this end, the Orange County Center of Excellence for Labor Market Research (COE) embarked on an almost year-long research project, the Orange County Sector Analysis Project, to combine quantitative labor market demand and supply data with qualitative insights from the region's community college experts – its faculty and administrators – in order to produce a series of briefs that identifies areas of opportunity for the region to positively impact its supply gap.

This executive summary is a product of the Orange County Sector Analysis Project. It provides labor market information about eight –six emerging and two priority– sectors. Orange County's six priority sectors include:

- Advanced Transportation and Logistics
- Business and Entrepreneurship
- Energy, Construction and Utilities
- Health
- ICT and Digital Media
- Retail, Hospitality and Tourism

The two emerging Orange County sectors are:

- Advanced Manufacturing
- Life Sciences and Biotechnology

In addition to this Executive Summary, a brief for each of the eight sectors was completed that compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in these reports for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. Four of the sectors: Business & Entrepreneurship, Energy, Construction & Utilities, ICT/Digital Media, and Retail, Hospitality & Tourism had two focus groups each in order to accommodate participants' scheduling needs. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

For the Orange County Sector Analysis Project, 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.

For the Orange County Sector Analysis Project, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of these reports, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the purpose of this report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A for each of the sector briefs.

FOCUS GROUP INSIGHTS

The sector focus groups included 65 unique participants representing the Orange County community college region. There was a total of 35 faculty – two counselors and 33 academic – and 20 administrators, from all 10 educational institutions – nine community colleges and one noncredit school – that offered career education programs in Orange County between 2015 and 2017. Additionally, there were 10 directors for employer engagement – all seven regional plus three statewide directors who also attended the focus groups. Some participants attended more than one focus group. Faculty were able to attend up to two focus groups and some administrators attended up to three sessions.

Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. These cross-sector, common themes are expanded on and explained in further detail in this standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to individual sectors. Sector-specific information is highlighted throughout each of the eight sector briefs. In both the Executive Summary as well as the individual sector briefs, the qualitative information is highlighted in the green Focus Group Insights and the Focus Group Insights – The Big Picture sections.

Reporting Limitations and Data Quality Issues

Focus group participants in all sectors agreed that supply data from traditional labor market information is limited; it does not capture awards from programs that do not report outcomes data to the California Community Colleges Chancellor's Office (CCCCO) or to the Integrated Postsecondary Education Data System (IPEDS), including, but not limited to:

- Locally-issued certificate programs,
- Fee-based (not-for-credit) programs,

[1] https://insightcced.org/2018-family-needs-calculator/

- Contracted education (or customized training) programs, and
- Nonprofit programs offered in the community outside of postsecondary education.

Focus group participants indicated that a supply-data-collection system does not currently exist for all these programs, and suggested that the supply numbers are underestimated across all sectors. Focus group participants in each of the sectors also said that their programs attract industry professionals who are interested in upskilling or learning new skills for their current jobs. However, the supply data does not capture students that take a small number of courses to gain additional skills if colleges do not report data for local low-unit certificate programs. This could result in an under-reporting of the supply number.

Additionally, there is a lag in reporting supply data to the CCCCO; therefore, recently created programs will not be represented in traditional labor market information either.

Low Completion Numbers

According to the demand and supply exhibits (Exhibits 1, 2, 3, and 4), the community colleges in Orange County are undersupplying for both types of jobs analyzed in this brief: 1) top middle-skill jobs and 2) jobs that have entry-level wages below the California Family Needs Calculator (CFNC), but have median wages above the CFNC. According to the CCCCO LaunchBoard[2], 127,556 (unduplicated) students took one or more CTE courses across all programs in Program Year 2016-17. However, in that same year, only 8,423 students earned a certificate or degree.

Focus group participants provided the following explanations as to some of the reasons why supply numbers are so low:

- Because programs in all sectors tend to attract industry professionals, students may drop out or withdraw from a program before completion because they learned what they needed to learn and returned to their jobs.
- In order to close so many supply gaps, companies may also hire students before they complete their programs as long as they have the foundational skills needed for the job. Once hired, companies could then provide training specific to their policies and procedures.
- Students may decide that instead of just obtaining an associate degree, they would rather transfer to a four-year institution because employers typically list "bachelor's degree" as the minimum educational requirement for many occupations. During this transition, if the student does not complete the necessary paperwork to be issued their associate degree, then even though they may have earned it, there is no official award to be counted.

Faculty and administrators shared that although completion numbers appeared low, they know that many non-completers have positive employment outcomes from the stories shared with them by their former students. Some faculty members said that they are developing internal tracking systems to identify non-completers in order to track student outcomes. However, the CTE Outcomes Survey (CTEOS) is already tracking this information and could help colleges better understand outcomes for students who leave a program before completing a degree or certificate.

[2] https://www.calpassplus.org/LaunchBoard/Home.aspx

ORANGE COUNTY'S TOP MIDDLE-SKILL JOBS

Comparing Orange County's labor market demand for the top middle-skill jobs, those with entry-level wages[3] higher than the $17.39 per hour living wage, in all sectors with program supply from the region's community colleges and non-community college providers (Exhibits 1 and 2) results in an overarching supply gap of 19,069. Business and Entrepreneurship has both the largest demand and supply of all eight sectors; however, it accounts for 48% (9,157) of the supply gap for top middle-skill jobs in Orange County. While Energy, Construction, and Utilities has the second largest demand, it has the fourth largest supply which equals a supply gap of 22% (4,204) of the top middle-skill jobs in Orange County.

Exhibit 1. All Sectors Top Middle-Skill Jobs in Orange County: Labor Market Demand

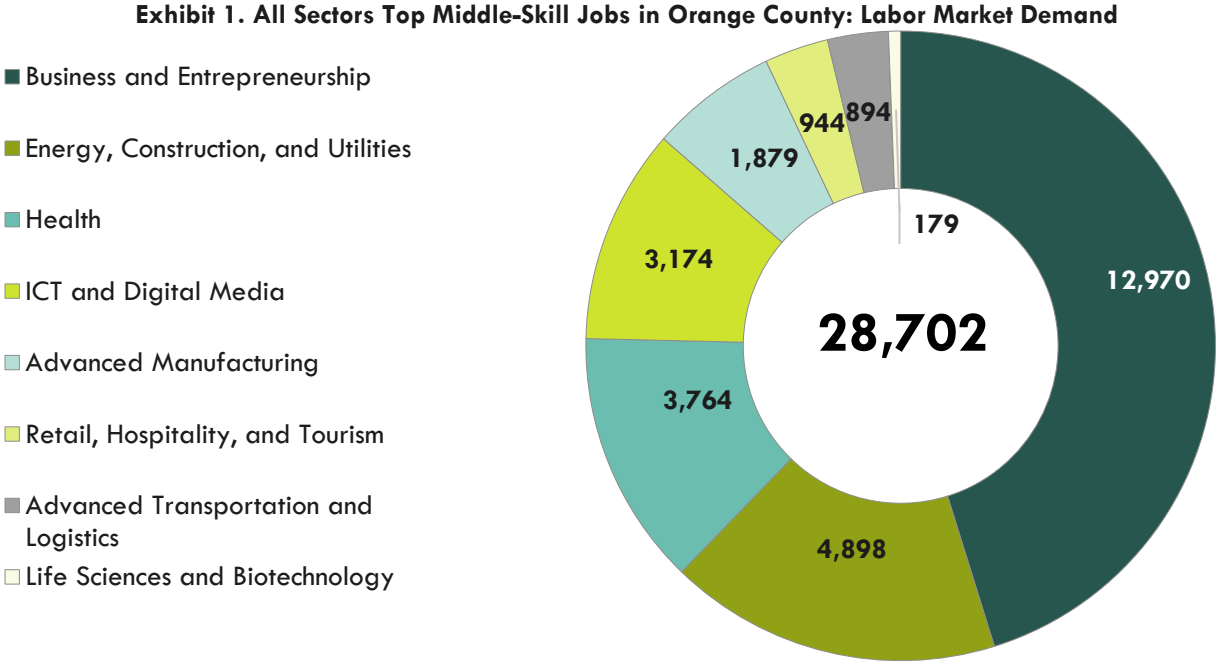
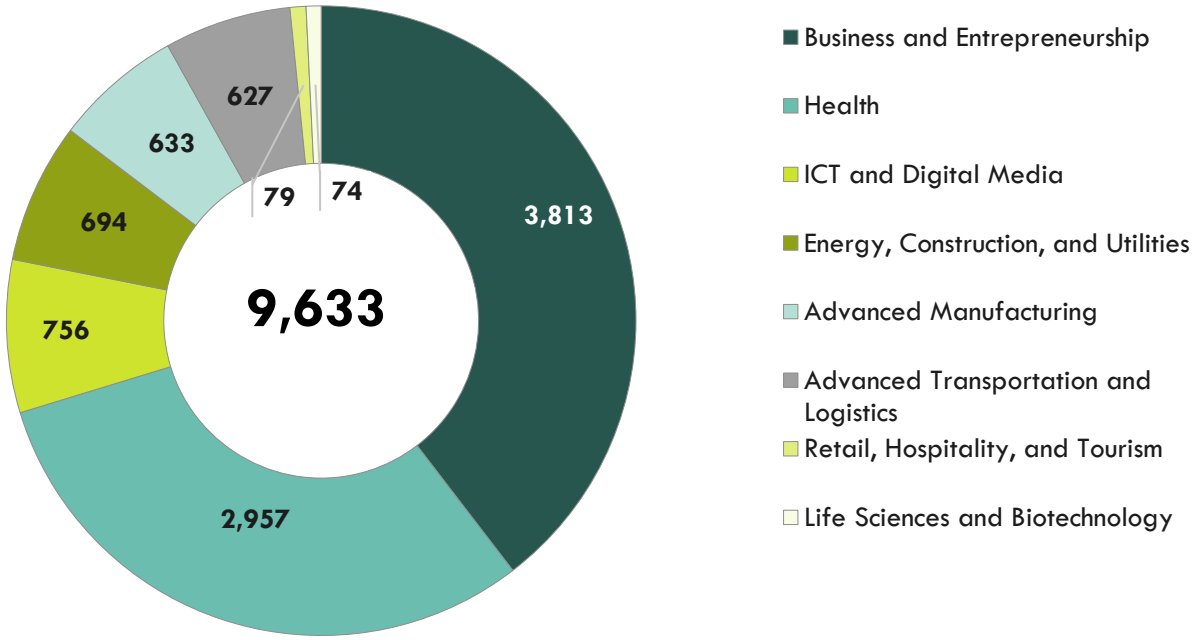


Exhibit 2. All Sectors Top Middle-Skill Jobs in Orange County: Labor Market Supply



[3] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

Exhibit 3 shows entry-level and median wages for the top 20 middle-skill jobs by number of annual openings across all sectors. The entry-level wages for these top middle-skill jobs are higher than the $17.39 per hour living wage. Of these occupations, nine are in the Business and Entrepreneurship sector, five are in the Energy, Construction, and Utilities sector, and two each are in the ICT and Digital Media as well as the Health sectors, and one each are in the Advanced Manufacturing as well as the Retail, Hospitality, and Tourism sectors. There are only two sectors – Advanced Transportation and Logistics as well as Life Sciences and Biotechnology – that are not represented in the top 20 occupations.

Exhibit 3. Top 20 Middle-Skill Jobs in Orange County Across All Sectors: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Sector	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
43-3031	Bookkeeping, Accounting, and Auditing Clerks	Business and Entrepreneurship	2,383	$17.61	$22.05
41-3099	Sales Representatives, Services, All Other	Business and Entrepreneurship	2,009	$18.32	$26.33
43-1011	First-Line Supervisors of Office and Administrative Support Workers	Business and Entrepreneurship	1,986	$18.32	$26.33
29-1141	Registered Nurses	Health	1,783	$32.88	$42.47
41-3021	Insurance Sales Agents	Business and Entrepreneurship	1,216	$17.50	$23.63
47-2111	Electricians	Energy, Construction, and Utilities	1,178	$17.93	$26.22
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	Energy, Construction, and Utilities	1,044	$26.88	$36.62
47-2152	Plumbers, Pipefitters, and Steamfitters	Energy, Construction, and Utilities	955	$17.52	$24.89
13-2072	Loan Officers	Business and Entrepreneurship	844	$18.53	$30.89
43-6011	Executive Secretaries and Executive Administrative Assistants	Business and Entrepreneurship	779	$25.93	$31.80
15-1151	Computer User Support Specialists	ICT and Digital Media	765	$21.70	$26.86
39-9031	Fitness Trainers and Aerobics Instructors	Retail, Hospitality, and Tourism	739	$17.45	$20.97
29-2061	Licensed Practical and Licensed Vocational Nurses	Health	652	$20.63	$25.57
41-9022	Real Estate Sales Agents	Business and Entrepreneurship	648	$19.12	$20.16
49-9071	First-Line Supervisors of Production and Operating Workers	Advanced Manufacturing	620	$19.57	$26.77
11-9021	Construction Managers	Energy, Construction, and Utilities	543	$20.89	$41.93
11-3011	Administrative Services Managers	Business and Entrepreneurship	471	$41.40	$55.21
11-9141	Property, Real Estate, and Community Association Managers	Business and Entrepreneurship	455	$20.64	$26.36
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Energy, Construction, and Utilities	418	$17.57	$23.85
15-1199	Computer Occupations, All Other	ICT and Digital Media	408	$27.90	$40.40

ORANGE COUNTY'S MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs across the sectors have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the regional living wage, but median wages near or above it. Since wages generally increase from entry-level to median earnings with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibits 4 and 5, middle-skill jobs with entry-level wages below the regional living wage have more annual job openings (labor market demand) than the top-middle skill jobs, but program supply from Orange County educational institutions is lower. Program supply for these occupations is particularly low for the Energy, Construction, and Utilities (eight awards) and Retail, Hospitality, and Tourism (25 awards) sectors.

Exhibit 4. All Sectors Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand

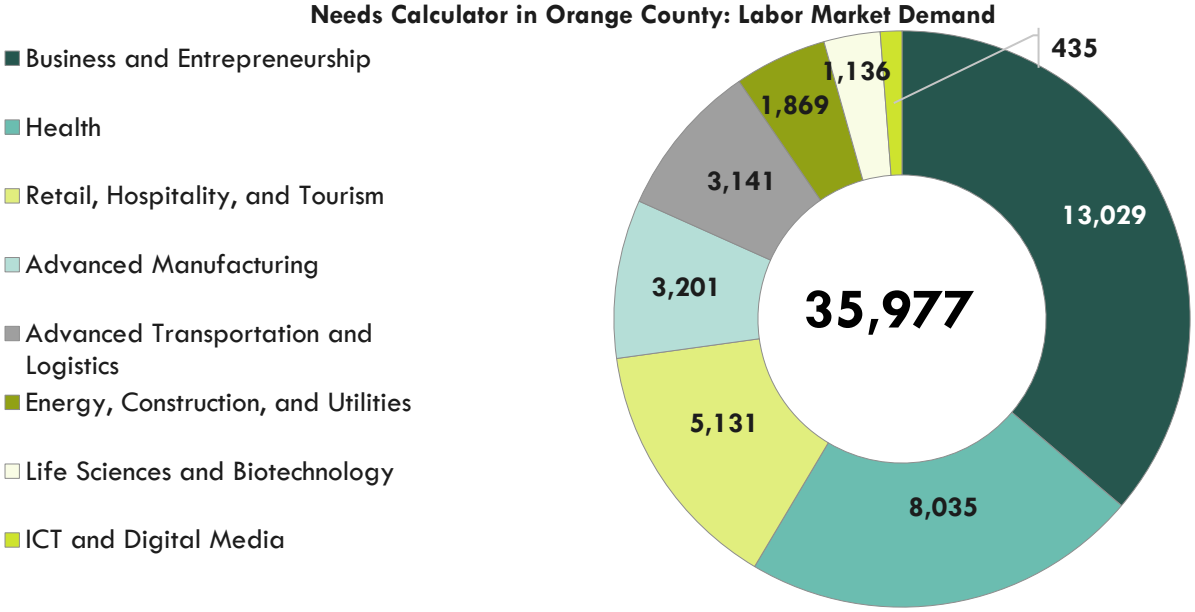


Exhibit 5. All Sectors Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Supply

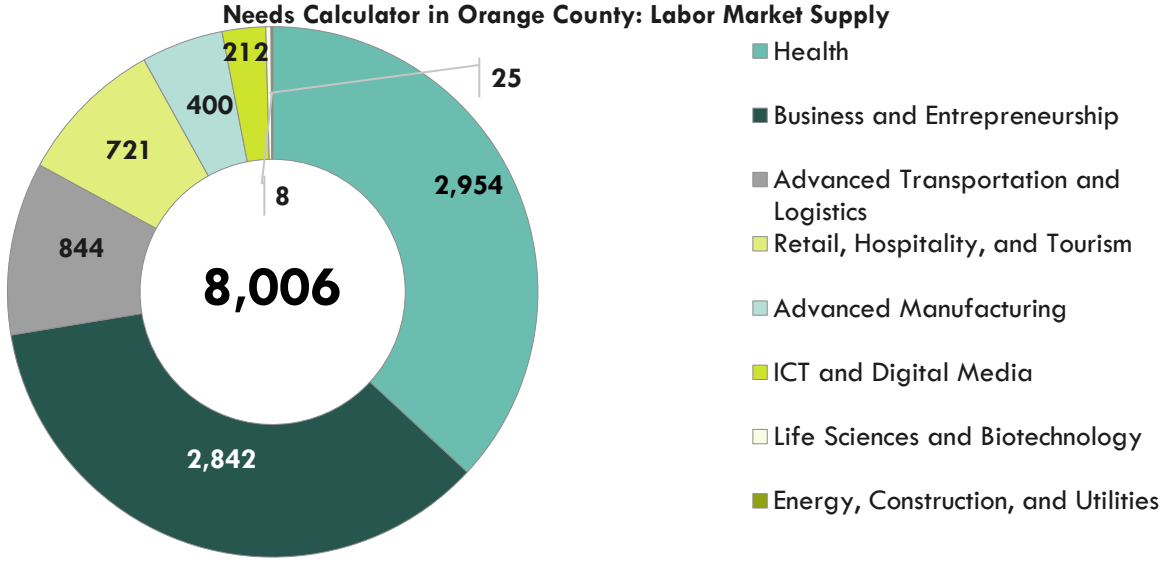


Exhibit 6 shows entry-level and median wages for the top 20 jobs with entry-level wages below the regional living wage by number of annual openings across all sectors. While these occupations have entry-level wages below the $17.39 per hour California Family Needs Calculator, occupations such as Customer Service Representatives, Carpenters, Nursing Assistants, and Dental Assistants have median wages higher than the regional living wage, as denoted by the gray shading in Exhibit 4. Of these occupations, six each are in the Business and Entrepreneurship and Health sectors, three are in the Retail, Hospitality, and Tourism sector, one each in the Advanced Manufacturing, Advanced Transportation and Logistics, Energy, Construction, and Utilities, and Life Sciences and Biotechnology sectors.

Exhibit 6. 20 All-Sectors Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Sector	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
43-4051	Customer Service Representatives	Business and Entrepreneurship	3,453	$14.58	$17.83
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Business and Entrepreneurship	2,835	$15.69	$19.66
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	Business and Entrepreneurship	1,770	$17.38	$25.34
41-1011	First-Line Supervisors of Retail Sales Workers	Retail, Hospitality, and Tourism	1,488	$13.15	$16.63
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	Retail, Hospitality, and Tourism	1,486	$12.60	$15.01
49-9071	Maintenance and Repair Workers, General	Advanced Manufacturing	1,474	$15.51	$19.18
47-2031	Carpenters	Energy, Construction, and Utilities	1,470	$14.75	$21.72
31-9092	Medical Assistants	Health	1,305	$13.86	$16.72
43-6013	Medical Secretaries	Health	1,164	$14.67	$17.76
31-1014	Nursing Assistants	Health	1,130	$12.62	$14.24
53-3032	Heavy and Tractor-Trailer Truck Drivers	Advanced Transportation and Logistics	1,093	$16.95	$20.85
39-5012	Hairdressers, Hairstylists, and Cosmetologists	Business and Entrepreneurship	1,079	$11.55	$12.00
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	Life Sciences and Biotechnology	884	$14.46	$18.78
31-1011	Home Health Aides	Health	853	$11.07	$12.12
31-9091	Dental Assistants	Health	773	$14.70	$17.18
43-4131	Loan Interviewers and Clerks	Business and Entrepreneurship	734	$14.54	$20.22
49-3023	Automotive Service Technicians and Mechanics	Advanced Transportation and Logistics	721	$11.94	$16.74
31-9011	Massage Therapists	Health	711	$11.92	$14.08
39-9032	Recreation Workers	Retail, Hospitality, and Tourism	698	$11.17	$12.35
43-3071	Tellers	Business and Entrepreneurship	628	$12.61	$14.09

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed issues and challenges that cannot be captured by traditional labor market information. They also provided insight on the tactics colleges and employers are currently using to address supply gaps in all sectors.

Challenges in Expanding Programs

Focus group participants acknowledged the supply gaps for occupations across all sectors, but also reported several challenges at the community colleges in expanding programs to close the gaps:

Lack and cost of space and equipment

- Focus group participants conveyed that certain courses and programs are at capacity due to lack of physical space – especially for those that require lab classrooms. Much of the equipment for programs in all sectors tend to be large in size and require a significant amount of space. Even if companies are willing to donate machinery or other equipment, not all community college facilities have enough space to house it. In order to increase capacity, the community colleges would have to invest in developing new or expanding current facilities to accommodate training equipment.
- Additionally, resources for equipment repair and maintenance may fluctuate from year to year. While a college may use Strong Workforce Program (SWP) funds one year to purchase equipment and space, funding in subsequent years may decline, which would affect future equipment maintenance and repair.

Lack of qualified faculty

- Focus group participants in all sectors shared that it can be difficult to hire program-specific faculty Despite the fact that colleges would have to hire additional qualified staff in order to increase program capacity, finding qualified staff can be challenging. Focus group participants reported that the private sector often pays higher wages and offers more consistent hours and schedules than the community colleges, so potential candidates prefer to continue working in the private sector.
- Another challenge in staffing is the lack of teaching experience. Industry professionals may have a lot of work experience and be experts in their respective fields; however, not all industry professionals know how to appropriately and/or engagingly teach curriculum in the classroom.

Long program development/curriculum approval timelines

- Jobs and companies in all sectors are constantly affected by changes in technology. While the community colleges attempt to meet employers' demand for skills in a timely manner, developing new—or changing existing—programs and/or curriculum takes a significant amount of time to accomplish. In many cases, companies are not interested in partnering with community colleges to develop new programs or curriculum because creating a new program can take anywhere from one to two years. Companies cannot wait that long to get qualified workers according to the focus group participants.

Skills and Certifications

According to the focus group participants, many skills taught in community college career education programs are transferable and are not exclusive to a single/particular job. For example, the Advanced Manufacturing and Energy, Construction, and Utilities focus group participants shared that these two sectors are intersecting and overlapping due to technological advances. Additionally, faculty and administrators in the Life Sciences and Biotechnology shared that many skills taught in programs for quality assurance or quality control jobs can be used in other sectors such as the food and beverage industry or Advanced Manufacturing.

Focus group participants in all sectors said that Orange County community colleges provide numerous courses that are designed to add a skill or set of skills, but do not fully train for a specific occupation. Since this report uses awards as the measurement for supply, these courses are not captured in the data. In some sectors, such as Retail, Hospitality, and Tourism, faculty and administrators also said, in their experience, employers tend to hire based on skills, rather than degrees and certificates. Gaining a better understanding of the knowledge, skills, and abilities (also known as "KSAs") employers request for specific jobs could be useful for Orange County's community colleges.

Additionally, focus group participants identified dozens of state licenses or third-party certifications for which their programs train. One sector, Health, has a large number of occupations that require a state license. In all other sectors, third-party certifications such as those offered by the National Institute for Automotive Service Excellence (ASE), CompTIA, and ServSafe, provide another way for students to demonstrate skill attainment. However, focus group participants noted that it is difficult to determine the actual value of these certifications by employers and that they can be cost prohibitive for students.

Creative Ways Community Colleges are Offering Programs

Focus group participants in all sectors discussed several creative ways they are offering programs and some of the challenges they face when developing new means to offer them:

- All colleges are strategically scheduling in-person, hybrid, and online courses to accommodate a variety of students. Generally, offering career education courses in the evenings has been most successful, as evening classes allow working professionals to work during the day and take classes at night.
- In nearly all sectors, colleges currently have, or are in the process of developing, dual enrollment programs with K-12 partners within their service area. Focus group participants said that dual enrollment provides benefits for both the community colleges and high school students. Community colleges are able to make students aware of career education programs and get students acclimated to college-level coursework while they are still in high school and while able to earn college credit for free.
- Several colleges are working with local employers to develop internship programs in nearly all sectors. Some colleges currently have robust internship programs and plan to expand these programs due to past successes. However, focus group participants also noted that maintaining relationships with employers can be time consuming and difficult.

New Programs

Faculty and administrators identified dozens of new credit and noncredit programs that they are either in the process of creating or plan to create in the near future for all sectors. Several of these programs will address new and emerging areas such as automation, cybersecurity, data analytics, and environmental sustainability. Other programs, such as Certified Nursing Assistant (CNA), accounting and bookkeeping, and retail sales, will focus on traditional occupations that currently have supply gaps.

KEY FINDINGS: ORANGE COUNTY'S EIGHT PRIORITY AND EMERGING SECTORS

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. All priority and emerging sectors in Orange County have supply gaps.

2. The following occupations are the top five occupations across all sectors, by annual openings, that have entry-level wages below the California Family Needs Calculator, but have median wages near or above the California Family Needs Calculator:
    - Customer Service Representatives
    - Secretaries and Administrative Assistants, Except Legal, Medical, and Executive
    - Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products
    - First-Line Supervisors of Retail Sales Workers
    - First-Line Supervisors of Food Preparation and Serving Workers

3. Community college programs in Orange County reported noncredit awards in five of its eight priority and emerging sectors.

4. Across all 8 sectors analyzed in this brief, there is a labor market demand of 64,679 annual job openings, a program supply of 17,639 awards, which creates a sector supply gap of 47,040 awards.

64,679	17,639	47,040
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. Utilizing existing resources is an efficient way to mitigate recreating systems. For instance, rather than creating redundant tracking systems at each institution, the region should invest more resources to promote and use the CCCCO-approved CTE Outcomes Survey (CTEOS). Since this system has been in place for eight years, it is already established as a validated tracking system for student outcome data. By informing faculty and students about the CTEOS and its purpose, it is possible for the region to increase its response return rate. This information could help colleges better understand outcomes for students who leave a program before completing a degree or certificate.
2. While it is difficult to address structural issues such as lack of lab space on a college campus, colleges should collaborate with Orange County's seven Regional Directors for Employer Engagement who represent the region's eight priority and emerging sectors – in order to find out from industry employers which equipment is most important to the training of their prospective employees. Then colleges could focus their finite resources on the items that would be the most effective for students.

3. Leveraging existing regional Strong Workforce Program projects could be effective in addressing some of the across all sector challenges and issues. For instance, to address the issue of industry professionals who lack teaching experience, colleges could collaborate with the OC Careers in Education Pathway Collaborative project which is part of the Teacher Preparation Pipeline initiative to provide professional development for newly hired faculty.
4. The COE should work with colleges to better determine employers' demand for knowledge, skills, and abilities (KSAs) in addition to jobs in order provide a more complete approach to identifying labor market demand across all sectors.

APPENDIX A: METHODOLOGY AND LIFE SCIENCES AND BIOTECHNOLOGY DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in each brief, the COE first reviewed the TOP codes associated with each sector and then matched them with the SOC codes. The six-digit TOP codes for each sector are included in their respective briefs

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[4] system and identified approximately 300 occupational codes as middle-skill jobs.

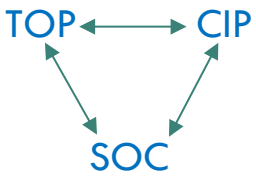
Middle-skill jobs include:

- 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.

For each sector, the COE analyzed occupations with a labor market demand of at least 50 annual job openings, with the exception of the Life Sciences and Biotechnology, which analyzed occupations with a demand of at least 28 annual openings. Life Sciences and Biotechnology is the smallest of all eight sectors and has a lower number of annual openings compared to those sectors. If the same 50 annual job openings threshold was used, there would have been only six occupations to analyze. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[5] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.
- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



[4] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.
[5] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

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Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of each study.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

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The COE conducted no more than two focus group sessions per day. During the focus groups the Orange County Sector Analysis Project was explained and then the information contained in the draft sector briefs was presented in detail. Participants were encouraged to ask questions and engage in dialogue throughout the entire focus group session. The COE took notes of each discussion as well as recorded the sessions, with permission of the participants and solely for transcription purposes.

Following the conclusion of the focus groups, the COE compiled the audio files, transcripts, notes, and pre-assignments to conduct a qualitative analysis of the themes for each focus group and to identify commonalities across multiple focus groups. The findings from this analysis have been highlighted throughout this report in the "Focus Group Insight" sections.

2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

ADVANCED MANUFACTURING

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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

ADVANCED MANUFACTURING
Demand and Supply Analysis: Orange County

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INTRODUCTION

This sector brief is a product of the Orange County Sector Analysis Project. It provides information about the Advanced Manufacturing sector in Orange County, one of Orange County's two emerging sectors; it compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in this report for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. One of these focus groups was specific to the Advanced Manufacturing sector. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

In this brief, 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.

In this brief, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of this report, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the purpose of this

[1] https://insightcced.org/2018-family-needs-calculator/

report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A.

FOCUS GROUP INSIGHTS

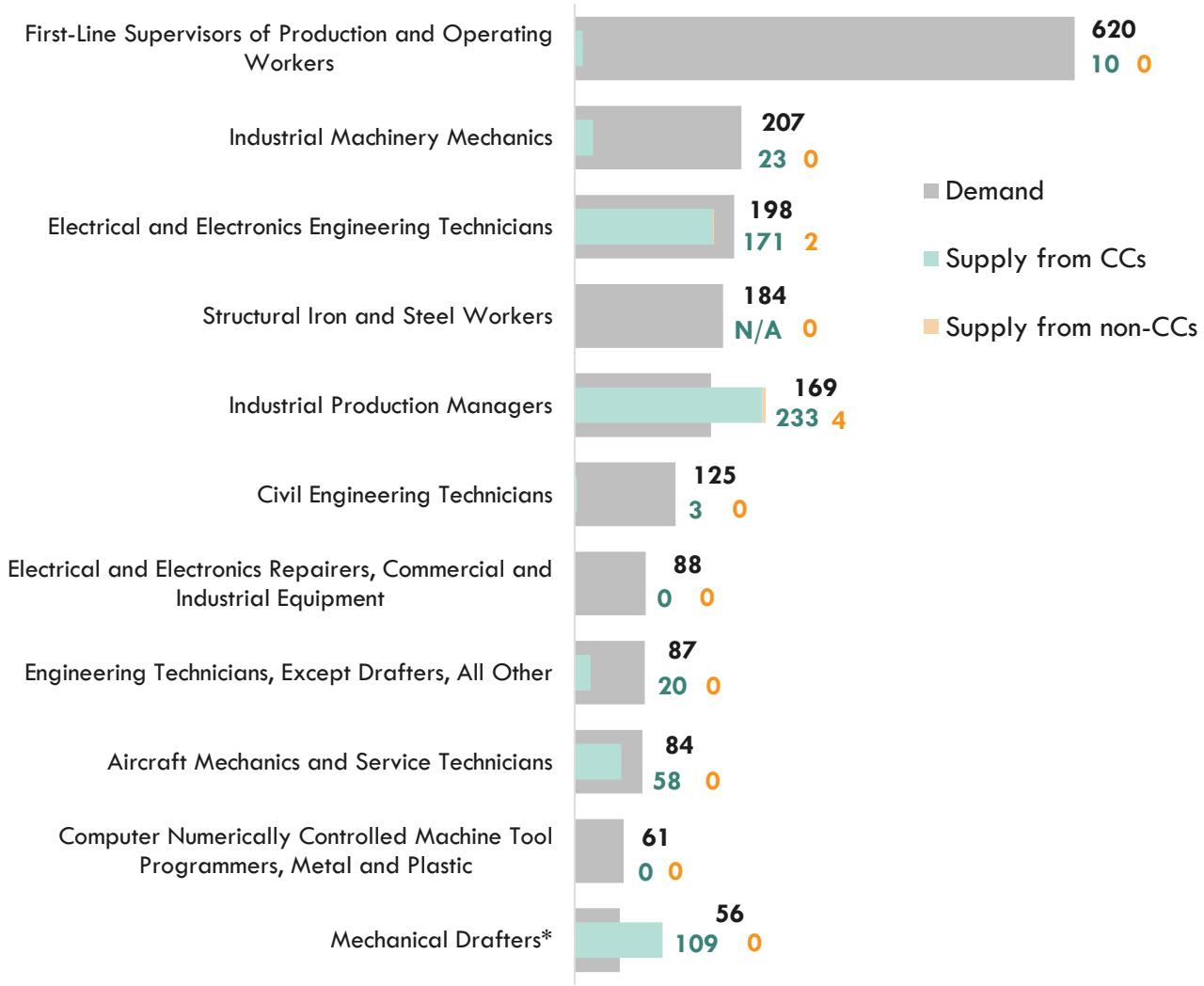
The Advanced Manufacturing sector focus group included three faculty members and four administrators from five of the seven institutions – six community colleges and one noncredit school – that offered Advanced Manufacturing programs in Orange County between 2015 and 2017. The regional director for employer engagement also attended the focus group.

Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to the Advanced Manufacturing sector. This sector-specific information is highlighted throughout this report in the Focus Group Insights and the Focus Group Insights – The Big Picture sections.

ADVANCED MANUFACTURING TOP MIDDLE-SKILL JOBS

This section compares Orange County's labor market demand for the top middle-skill jobs in Advanced Manufacturing with program supply from the region's community colleges and non-community college providers (Exhibit 1). As seen in Exhibit 2, the entry-level wages[2] for these top middle-skill jobs are higher than the $17.39 per hour living wage. Descriptions for each occupational title can be found in Appendix B. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix C.

Exhibit 1. Advanced Manufacturing Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Program Supply



*(Please note: * indicates that the occupation has an oversupply of labor, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)*

[2] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

FOCUS GROUP INSIGHTS

Local Low-Unit Certificates

The Advanced Manufacturing sector focus group participants felt that supply data from traditional labor market information is limited; it does not capture locally issued low-unit certificates that are not reported to, or approved by, the California Community Colleges Chancellor's Office (CCCCO). According to focus group participants, Advanced Manufacturing programs attract industry professionals who are interested in upskilling or learning new skills for their current jobs. However, the supply data does not capture students that take a small number of courses to gain additional skills if colleges do not report data for low-unit certificate programs. This could result in an under-reporting of the supply number.

Challenges in Identifying Supply for Management Positions

This brief analyzes labor market demand and supply data for the Advanced Manufacturing sector, using occupational codes from the Standard Occupational Classification (SOC) system for demand data and program codes from the Taxonomy of Programs (TOP) and Classification of Instructional Programs (CIP) systems for supply data (see Appendix A for more information). However, matching SOC codes to TOP and CIP codes has its limitations, particularly for management positions. Focus group participants pointed out that the TOP codes associated with the Industrial Production Managers occupation train for various managerial occupations, not just Industrial Production Managers. For this reason, the program supply numbers for Industrial Production Managers is likely overstated.

Low Completion Numbers

Focus group participants indicated that supply numbers for programs that actually report awards to the CCCCO are lower than expected. Manufacturing *courses* in Orange County tend to have high retention and success rates (91% and 82%, respectively, for all colleges, according to the CCCCO's dashboard tool, LaunchBoard[3]); however, completion numbers for certificates and degrees appear low. Focus group participants said that students may take one or two courses and exit the community college system without actually receiving a certificate or degree. Focus group participants agreed that it is very common for students to be hired before they complete a program. These explanations suggest that some programs may be overdesigned, meaning that programs require more courses than necessary for students to gain the necessary skills to obtain employment. An Orange Coast College administrator acknowledged that programs could be overdesigned, but pointed out that the Student Centered Funding Formula (SCFF)[4] incentivizes awards by weighing the number of points for degrees and certificates higher than other metrics, such as the completion of nine or more CTE units or attainment of the regional living wage. Colleges could still re-work overdesigned programs or consider moving these programs to enhanced noncredit, where the dollar per career development/college preparatory (CDCP) FTES has increased and is now the same as it is for credit. Additionally, noncredit certificates are included in the Strong Workforce Program metrics, Student Success Metrics, and Vision for Success.

> *"We know these programs are overdesigned, but it takes a long time to undo what already exists."*
> *– Orange Coast College Administrator*

[3] https://www.calpassplus.org/LaunchBoard/Community-College-Pipeline.aspx
[4] https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/College-Finance-and-Facilities-Planning/Student-Centered-Funding-Formula

Exhibit 2. Advanced Manufacturing Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages

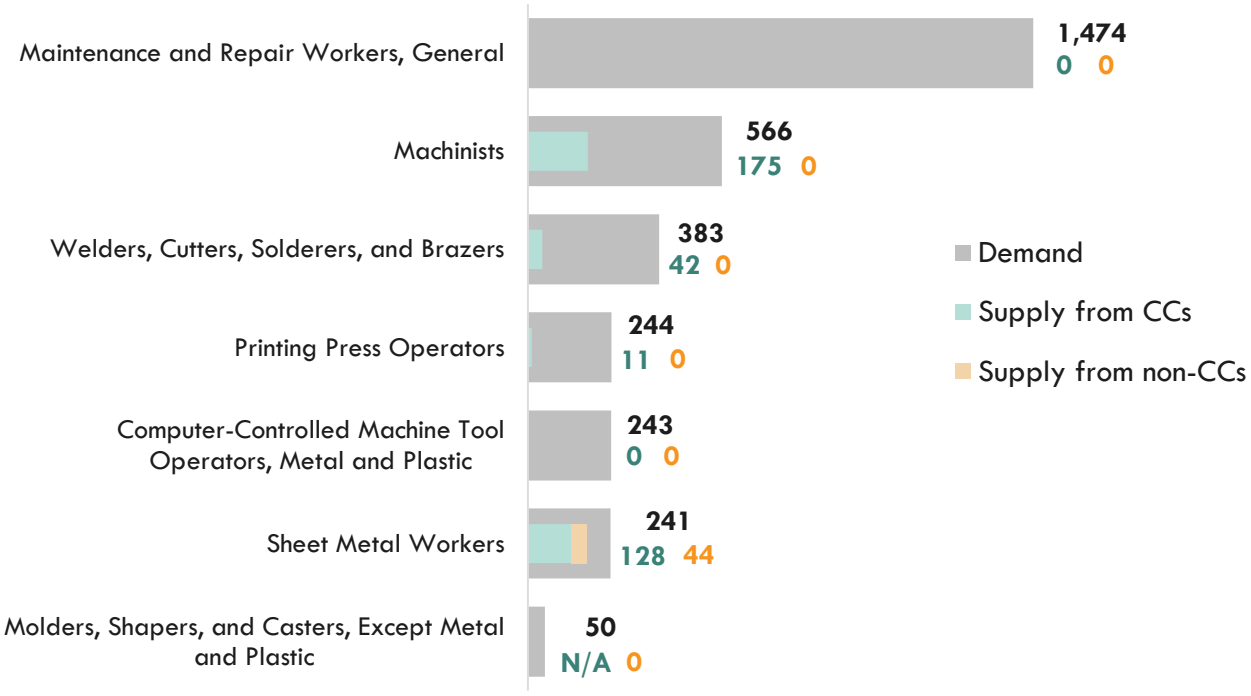
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
49-9071	First-Line Supervisors of Production and Operating Workers	620	$19.57	$26.77
51-4041	Industrial Machinery Mechanics	207	$19.18	$24.48
51-4121	Electrical and Electronics Engineering Technicians	198	$18.92	$26.08
51-5112	Structural Iron and Steel Workers	184	$25.22	$35.91
51-4011	Industrial Production Managers	169	$34.19	$46.47
47-2211	Civil Engineering Technicians	125	$24.28	$31.56
51-9195	Electrical and Electronics Repairers, Commercial and Industrial Equipment	88	$21.22	$25.36
17-3029	Engineering Technicians, Except Drafters, All Other	87	$21.64	$28.24
49-3011	Aircraft Mechanics and Service Technicians	84	$24.22	$29.94
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	61	$20.34	$26.75
17-3013	Mechanical Drafters	56	$22.58	$27.61

ADVANCED MANUFACTURING MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the regional living wage but median wages near or above it. Since wages generally increase from entry-level to median earnings with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibit 3, middle-skill Advanced Manufacturing jobs with entry-level wages below the regional living wage have a significant number of annual job openings (labor market demand).

Exihbit 3. Advanced Manufacturing Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand vs. Program Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

While these occupations have entry-level wages below the California Family Needs Calculator of $17.39 per hour, occupations such as Maintenance and Repair Workers, General; Machinists; Computer-Controlled Machine Tool Operators, Metal and Plastic; and Sheet Metal Workers have median wages higher than the regional living wage as denoted via the gray shading in Exhibit 4.

Exhibit 4. Advanced Manufacturing Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
49-9071	Maintenance and Repair Workers, General	1,474	$15.51	$19.18
51-4041	Machinists	566	$16.30	$21.17
51-4121	Welders, Cutters, Solderers, and Brazers	383	$13.87	$16.80
51-5112	Printing Press Operators	244	$12.41	$16.17
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	243	$13.74	$17.43
47-2211	Sheet Metal Workers	241	$15.70	$21.21
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	50	$12.57	$17.27

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed other issues and challenges that cannot be captured by traditional labor market information and provided insight on the tactics colleges and employers are currently using to address supply gaps in the Advanced Manufacturing sector.

How Employers are Filling Supply Gaps

Focus group participants across all sectors reported that employers recruit heavily at four-year colleges for potential workers, even if a position does not require a bachelor's degree. In the Advanced Manufacturing focus group, participants noted that there is anecdotal evidence that students taking community college courses tend to know how to work machines better than their four-year college counterparts who tend to be more theory-based.

Faculty and administrators also shared that employers utilize staffing agencies in order to meet their workforce needs because they pre-screen candidates and provide a low-risk, fast-moving, pipeline of workers for companies. Additionally, companies such as Oakley take current employees and re-train them. One faculty member said that, in some cases, employers engage in re-training by giving employees a two-year time period to gain necessary skills by completing community college training programs.

> *"Employers go to Adecco or another staffing agency and say 'send us everybody.' [The employer] would send them through a training program. Those who didn't like it would leave and those that stayed would have opportunities down the road…that's how they build supply."*
> *– Fullerton College Faculty Member*

Skills and Certifications

According to the focus group participants, many skills taught in community college Advanced Manufacturing programs are transferable and are not exclusive to a single/particular job. For example, the community colleges in the region are developing new programs around robotics, conversational programming, and maintenance that are not specific to the Advanced Manufacturing sector and are valuable to other sectors such as Energy, Construction, and Utilities.

In order to close labor market supply gaps in the sector, focus group participants said that companies tend to hire students before they complete their programs as long as students have the foundational skills needed for the job. Once on board, companies could provide training specific to the companies' products and processes. One focus group participant indicated that manufacturing firms tend to be small—some with fewer than 20 employees. Small manufacturers prefer workers with skills specific to their business and have developed in-house training to meet those specialized needs. Therefore, it may not be necessary for students to complete an entire program in order to be "job ready" for these types of manufacturers.

Certifications are another way to demonstrate skill attainment according to focus group participants. Faculty and administrators identified a number of certifications for which Orange County community college programs train. These certifications include Siemens Programmable Logic Controller (PLC), Level One Mechatronics, SOLIDWORKS, AutoCAD, Revit, and Additive Manufacturing.

Challenges in Expanding Programs

Focus group participants identified several challenges to expanding programs in the Advanced Manufacturing sector. Many of these challenges, including the lack of dedicated lab space, difficulty hiring faculty and staff, and high costs for equipment, cut across all sectors. However, a unique challenge for the Advanced Manufacturing sector is that Orange County's community colleges offer several Advanced Manufacturing courses—many of which have similar training goals or learning outcomes. However, each college has a different approach and curriculum, which can be confusing for students to navigate, should they desire to complete their education across multiple institutions. This fragmentation may cause students to take longer to actually complete programs, especially if courses do not articulate from one institution to another.

KEY FINDINGS: ADVANCED MANUFACTURING

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. Of the top middle-skill jobs in Orange County, there appears to be an oversupply of labor for *Mechanical Drafters*, with 56 annual job openings (demand) and 109 awards (supply).

2. The following occupations with entry-level wages below the California Family Needs Calculator have median wages at or above the California Family Needs Calculator:
    - Maintenance and Repair Workers, General
    - Machinists
    - Computer-Controlled Machine Tool Operators
    - Metal and Plastic; and Sheet Metal Workers

3. No community college programs in Orange County reported noncredit awards for the Advanced Manufacturing sector.

4. Of the 18 occupations (SOC codes) analyzed in this brief for the Advanced Manufacturing sector, there is a labor market demand of 5,080 annual job openings, a program supply of 1,033 awards, which creates a sector supply gap of 4,047 awards.

5,080	1,033	4,047
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. Only analyzing labor market demand for jobs does not provide a complete picture of employers' workforce needs. The COE should work with colleges to better determine employers' demand for knowledge, skills, and abilities (KSAs) in addition to jobs in order provide a more complete approach to identifying labor market demand.
2. Colleges should explore enhanced noncredit opportunities for programs that are potentially "overdesigned." Enhanced noncredit could be a way to satisfy student needs for short-term programs and still benefit the colleges.
3. To address the fragmentation of Advanced Manufacturing programs, the regional director for employer engagement could convene administrators, faculty, and counselors to discuss articulation agreements for courses and programs that have similar goals or learning outcomes.

APPENDIX A: METHODOLOGY AND ADVANCED MANUFACTURING DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in this brief, the COE first reviewed the TOP codes associated with the sector and then matched them with the SOC codes. According to the CCC, the following six-digit TOP codes define the Advanced Manufacturing sector:

TOP6 Program Name	TOP6 Code
Aeronautical and Aviation Technology	0950.00
Aircraft Electronics (Avionics)	0950.40
Aircraft Fabrication	0950.50
Appliance Repair	0935.10
Computer Electronics	0934.10
Electrical, Electronic, and Electro-Mechanical Drafting	0953.30
Electronics and Electric Technology	0934.00
Engineering Technology, General	0924.00
Fashion Production	1303.30
Industrial and Occupational Safety and Health	0956.70
Industrial Electronics	0934.20
Industrial Quality Control	0956.80
Industrial Systems Technology and Maintenance	0945.00
Instrumentation Technology	0943.30
Laser and Optical Technology	0934.80
Machining and Machine Tools	0956.30
Manufacturing and Industrial Technology	0956.00
Mechanical Drafting	0953.40
Ocean Technology	1920.00
Optics	0961.00
Petroleum Technology	0954.30
Plastics and Composites	0954.20
Printing and Lithography	0963.00
Surveying	0957.30
Technical Illustration	0953.60
Vacuum Technology	0943.30
Welding Technology	0956.50

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[5] system and identified approximately 300 occupational codes as middle-skill jobs.

[5] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.

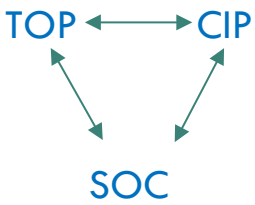
Middle-skill jobs include:

- 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.

For this study, the COE analyzed occupations with a labor market demand of at least 50 annual job openings. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[6] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.
- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



The 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 data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP 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.

Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of this study.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where

[6] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

To create the invite list of faculty and administrators, Regional Directors for Employer Engagement and career education deans at each college were asked to identify faculty and administrators that could represent their respective colleges in the sector-specific focus groups. Once this list was compiled, the career education deans invited faculty and administrators to express their interest in participating in a focus group via email. The email introduced the COE, provided an overview of the Orange County Sector Analysis Project, described the goals of the focus groups, and informed faculty that they would be compensated for their participation, and that lunch would be provided for all participants. All those that stated their interest were then connected with the COE who managed the focus groups scheduling and details.

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APPENDIX B: DEFINITIONS FOR ADVANCED MANUFACTURING MIDDLE-SKILL JOBS

Aircraft Mechanics and Service Technicians (SOC 49-3011): Diagnose, adjust, repair, or overhaul aircraft engines and assemblies, such as hydraulic and pneumatic systems. Includes helicopter and aircraft engine specialists. Sample job titles include:

- Airframe and Powerplant Mechanic
- Helicopter Mechanic
- Aircraft Maintenance Technician
- Aircraft Technician
- Aircraft Mechanic
- Aircraft Restorer

Civil Engineering Technicians (SOC 17-3022): Apply theory and principles of civil engineering in planning, designing, and overseeing construction and maintenance of structures and facilities under the direction of engineering staff or physical scientists. Sample job titles include:

- Civil Engineering Technician
- Engineering Specialist
- Engineering Assistant
- Engineer Technician
- Design Technician
- Civil Engineering Designer

Computer-Controlled Machine Tool Operators, Metal and Plastic (SOC 51-4011): Operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces. Sample job titles include:

- Computer Numerical Control Technician
- Computer Numerical Control Machine Operator
- Computer Numerical Control Set-Up and Operator
- Machinist
- Computer Numerical Control Machinist

Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic (SOC 51-4012): Develop programs to control machining or processing of metal or plastic parts by automatic machine tools, equipment, or systems. Sample job titles include:

- Computer Numerical Control Programmer
- Computer Numerical Control Machinist
- Programmer
- Process Engineer
- Machine Operator
- Computer Numerical Control Machining Center Operator

Electrical and Electronics Engineering Technicians (SOC 17-3023): Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions. Sample job titles include:

- Digital Tech
- Calibration Technician
- Test Technician
- Electrical Technician
- Equipment Specialist
- Results Technician

Electrical and Electronics Repairers, Commercial and Industrial Equipment (SOC 49-2094): Repair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas. Sample job titles include:

- Field Service Technician
- Technical Support Specialist
- Maintenance Technician
- Repair Technician
- Instrument and Control Technician
- Scale Technician

Engineering Technicians, Except Drafters, All Other (17-3029): All engineering technicians, except drafters, not listed separately. Sample job titles include:

- Electrical Engineering Technologists (17-3029.02): Assist electrical engineers in such activities as process control, electrical power distribution, or instrumentation design. May prepare layouts of electrical transmission or distribution systems, supervise the flow of work, estimate project costs, or participate in research studies.
- Industrial Engineering Technologists (17-3029.05): Assist industrial engineers in such activities as quality control, inventory control, or material flow methods. May conduct statistical studies or analyze production costs.
- Manufacturing Engineering Technologists (17-3029.06): Develop tools, implement designs, or integrate machinery, equipment, or computer technologies to ensure effective manufacturing processes.
- Photonics Technicians (17-3029.08): Build, install, test, or maintain optical or fiber optic equipment, such as lasers, lenses, or mirrors, using spectrometers, interferometers, or related equipment.

First-Line Supervisors of Production and Operating Workers (SOC 51-1011): Directly supervise and coordinate the activities of production and operating workers, such as inspectors, precision workers, machine setters and operators, assemblers, fabricators, and plant and system operators. Sample job titles include:

- Production Supervisor
- Operations Supervisor
- Molding Supervisor
- Paper Machine Supervisor
- Paper Products Supervisor
- Sawmill Supervisor

Industrial Machinery Mechanics (SOC 49-9041): Repair, install, adjust, or maintain industrial production and processing machinery or refinery and pipeline distribution systems. Sample job titles include:

- Overhauler
- Industrial Mechanic
- Master Mechanic
- Machine Adjuster
- Loom Technician
- Maintenance Technician

Industrial Production Managers (SOC 11-3051): Plan, direct, or coordinate the work activities and resources necessary for manufacturing products in accordance with cost, quality, and quantity specifications. Sample job titles include:

- Production Manager
- Site Manager
- Production Support Supervisor
- Quality Control Supervisor
- Biofuels Production Manager
- Power Project Manager

Machinists (SOC 51-4041): Set up and operate a variety of machine tools to produce precision parts and instruments. Includes precision instrument makers who fabricate, modify, or repair mechanical instruments. May also fabricate and modify parts to make or repair machine tools or maintain industrial machines, applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures. Sample job titles include:

- Tool Room Machinist
- Gear Machinist
- Senior Maintenance Machinist
- Production Machinist
- Utility Operator
- Manual Lathe Machinist

Maintenance and Repair Workers, General (SOC 49-9071): Perform work involving the skills of two or more maintenance or craft occupations to keep machines, mechanical equipment, or the structure of an establishment in repair. Duties may involve pipe fitting; boiler making; insulating; welding; machining; carpentry; repairing electrical or mechanical equipment; installing, aligning, and balancing new equipment; and repairing buildings, floors, or stairs. Sample job titles include:

- Plant Maintenance Technician
- Building Engineer
- Process Technician
- Facilities Engineer
- Stationary Engineer

Mechanical Drafters (SOC 17-3013): Prepare detailed working diagrams of machinery and mechanical devices, including dimensions, fastening methods, and other engineering information. Sample job titles include:

- Design Drafter
- Piping Designer
- Product Designer
- Tool Design Drafter
- Drafting Technician
- Installation Drafter

Molders, Shapers, and Casters, Except Metal and Plastic (SOC 51-9195): Mold, shape, form, cast, or carve products such as food products, figurines, tile, pipes, and candles consisting of clay, glass, plaster, concrete, stone, or combinations of materials. Sample job titles include:

- Granite Cutter
- Fabricator
- Neon Tube Bender
- Neon Glass Blower
- Mold Maker
- Caster

Printing Press Operators (SOC 51-5112): Set up and operate digital, letterpress, lithographic, flexographic, gravure, or other printing machines. Includes short-run offset printing presses. Sample job titles include:

- Digital Press Operator
- Offset Press Operator
- Flexographic Press Operator
- Web Offset Press Feeder
- Lithographic Press Operator
- Web Pressman

Sheet Metal Workers (SOC 47-2211): Fabricate, assemble, install, and repair sheet metal products and equipment, such as ducts, control boxes, drainpipes, and furnace casings. Work may involve any of the following: setting up and operating fabricating machines to cut, bend, and straighten sheet metal; shaping metal over anvils, blocks, or forms using hammer; operating soldering and welding equipment to join sheet metal parts; or inspecting, assembling, and smoothing seams and joints of burred surfaces. Includes sheet metal duct installers who install prefabricated sheet metal ducts used for heating, air conditioning, or other purposes. Sample job titles include:

- Sheet Metal Mechanic
- Sheet Metal Installer
- Sheet Metal Layout Mechanic
- Heating, Ventilation, and Air Conditioning Sheet Metal Installer
- Sheet Metal Apprentice
- Sheet Metal Fabricator

Structural Iron and Steel Workers (SOC 47-2221): Raise, place, and unite iron or steel girders, columns, and other structural members to form completed structures or structural frameworks. May erect metal storage tanks and assemble prefabricated metal buildings. Sample job titles include:

- Structural Steel Erector
- Fitter
- Tower Hand
- Rigger
- Iron Worker
- Steel Fabricator

Welders, Cutters, Solderers, and Brazers (SOC 51-4121): Use hand-welding, flame-cutting, hand soldering, or brazing equipment to weld or join metal components or to fill holes, indentations, or seams of fabricated metal products. Sample job titles include:

- Maintenance Welder
- Aluminum Welder
- Wirer
- Solderer
- Refrigeration Brazer/Solderer
- Production Welder

APPENDIX C: ADVANCED MANUFACTURING DEMAND AND SUPPLY DATA

The following tables compare labor market demand and program supply by occupation, and are the underlying information for the exhibits in this brief. Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for that occupation. Therefore, the COE de-duplicated TOP codes that train for more than one occupation to avoid counting program supply more than once. This de-duplication process is denoted by the "Already Accounted For" statements in the tables on the following pages.

Additionally, the COE reviewed program data from the LaunchBoard[7] and the statewide COE Supply Table[8] and identified conflicting information. For certain occupations, LaunchBoard indicates that a college has a program for that occupation, but the COE Supply Table does not show program data for that college, and vice versa. These discrepancies are marked with the following:

> +The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard
>
> *LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

The COE provided these markings for the community colleges in the region to review potential miscoded programs at their respective colleges.

The demand and supply tables in the following pages have three categories:

1. **Supply Gap** – If Average Annual Openings exceed Average Annual Awards by more than 25 percent, then the cell is shaded in green.
2. **Supply Met** – If Average Annual Openings is within 25 percent +/- of Average Annual Awards, then the cell is shaded in blue.
3. **Oversupply** – If Average Annual Awards exceed the Average Annual Openings by more than 25 percent, then the cell is shaded in red.

[7] calpassplus.org/LaunchBoard/Home.aspx
[8] coeccc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

DEMAND AND SUPPLY DATA FOR TOP ADVANCED MANUFACTURING MIDDLE-SKILL JOBS IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
First-Line Supervisors of Production and Operating Workers	620	Supply Gap	10	Industrial Systems Technology and Maintenance	0945.00	Fullerton+	2
						Santiago Canyon	8
Industrial Machinery Mechanics	207	Supply Gap	23	Industrial Systems Technology and Maintenance	0945.00	Already Accounted For	0
				Manufacturing and Industrial Technology	0956.00	Fullerton	6
						Irvine	8
						Saddleback	6
						Santa Ana	3
						Orange Coast*	0
Electrical and Electronics Engineering Technicians	198	Supply Met	173	Electronics and Electric Technology	0934.00	Coastline+	117
						Irvine	20
						Orange Coast	7
						Saddleback	17
						Santa Ana	10
						North Orange Adult*	0
					CIP 15.0399	Southern California Institute of Technology	2
Structural Iron and Steel Workers	184	Supply Gap	0	Sheet Metal and Structural Metal	0956.40	No Programs	0
Industrial Production Managers	169	Oversupply	237	Management Development and Supervision	0506.30	Coastline	207
						Irvine+	1
						Saddleback	25
						Golden West*	0
						Cypress*	0
						Orange Coast*	0
					CIP 52.0204	Allied American University	4

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Civil Engineering Technicians	125	Supply Gap	3	Engineering Technology, General	0924.00	Santa Ana	3
						Irvine*	0
						Fullerton*	0
Electrical and Electronics Repairers, Commercial and Industrial Equipment	88	Supply Gap	0	Electronics and Electric Technology	0934.00	Already Accounted For	0
					CIP 15.0399	Already Accounted For	0
				Industrial Electronics	0934.20	No Programs	0
Engineering Technicians, Except Drafters, All Other	87	Supply Gap	20	Engineering Technology, General	0924.00	Already Accounted For	0
				Industrial Electronics	0934.20	No Programs	0
				Plastics and Composites	0954.20	No Programs	0
				Other Engineering and Related Industrial Technologies	0999.00	Coastline	20
						Santa Ana*	0
Aircraft Mechanics and Service Technicians	84	Supply Gap	58	Aeronautical and Aviation Technology	0950.00	Orange Coast	29
				Aviation Airframe Mechanics	0950.10	Orange Coast	15
				Aviation Powerplant Mechanics	0950.20	Orange Coast	14
				Aircraft Fabrication	0950.50	Orange Coats*	0
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	61	Supply Gap	0	Manufacturing and Industrial Technology	0956.00	Already Accounted For	0
Mechanical Drafters	56	Oversupply	109	Architecture and Architectural Technology	0201.00	Fullerton	8
						Orange Coast	45
						Saddleback	8
				Drafting Technology	0953.00	Fullerton	7
						Golden West	17
						Irvine	3
						Saddleback	1
						Santa Ana	19
				Mechanical Drafting	0953.40	Irvine+	1

DEMAND AND SUPPLY DATA FOR ADVANCED MANUFACTURING MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Maintenance and Repair Workers, General	1,474	Supply Gap	0	Industrial Systems Technology and Maintenance	0945.00	Already Accounted For	0
Machinists	566	Supply Gap	175	Manufacturing and Industrial Technology	0956.00	Already Accounted For	0
				Machining and Machine Tools	0956.30	Fullerton	4
						Orange Coast	64
						Santa Ana	84
Welders, Cutters, Solderers, and Brazers	383	Supply Gap	42	Welding Technology	0956.50	Fullerton	14
						Orange Coast	8
						Santa Ana	20
Printing Press Operators	244	Supply Gap	11	Printing and Lithography	0936.00	Fullerton	11
						Saddleback*	0
Computer-Controlled Machine Tool Operators, Metal and Plastic	243	Supply Gap	0	Manufacturing and Industrial Technology	0956.00	Already Accounted For	0
				Machining and Machine Tools	0956.30	Already Accounted For	0
Sheet Metal Workers	241	Supply Gap	172	Environmental Control Technology	0946.00	Cypress	87
						Orange Coast	41
					CIP 47.0201	Brownson Technical School	13
						InterCoast Colleges-Anaheim	26
						InterCoast Colleges-Roseville	5
				Sheet Metal and Structural Metal	0956.40	No Programs	0
Molders, Shapers, and Casters, Except Metal and Plastic	50	Supply Gap	0	N/A	N/A	No Programs	0

2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

ADVANCED TRANSPORTATION AND LOGISTICS

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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

ADVANCED TRANSPORTATION AND LOGISTICS
Demand and Supply Analysis: Orange County

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Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; 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 the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host college/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.

INTRODUCTION

This sector brief is a product of the Orange County Sector Analysis Project. It provides information about the Advanced Transportation and Logistics sector in Orange County, one of Orange County's six priority sectors; it compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in this report for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. One of these focus groups was specific to the Advanced Transportation and Logistics sector. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

In this brief, 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.

In this brief, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of this report, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the purpose of this

[1] https://insightcced.org/2018-family-needs-calculator/

report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A.

FOCUS GROUP INSIGHTS

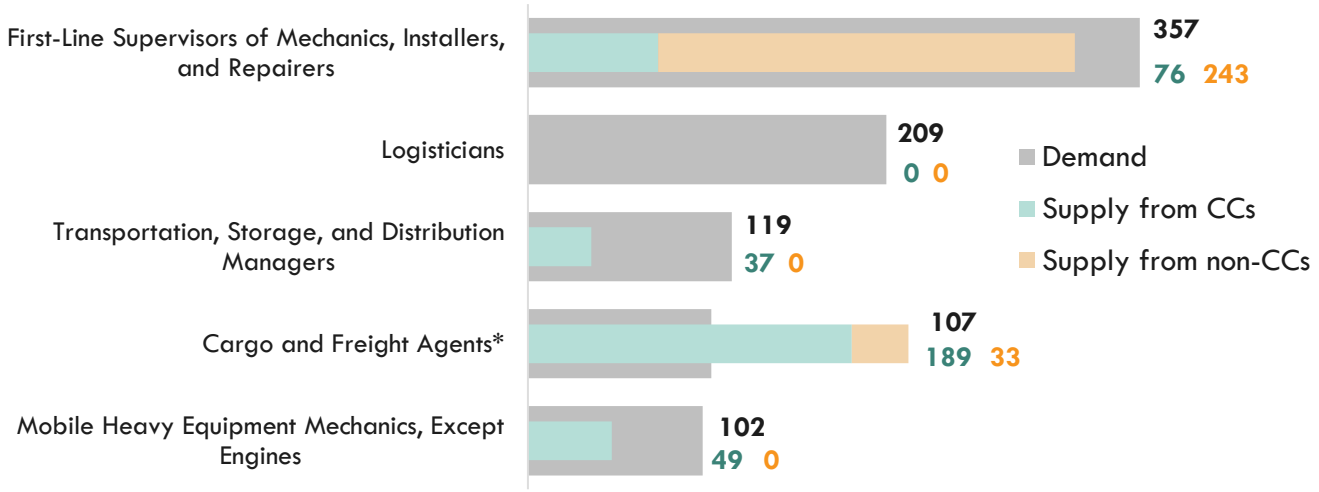
The Advanced Transportation and Logistics sector focus group included three faculty members – one counselor and two academic – and three administrators from four of the seven community colleges that offered Advanced Transportation and Logistics programs in Orange County between 2015 and 2017. The regional director for employer engagement also attended the focus group.

Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to the Advanced Transportation and Logistics sector. This sector-specific information is highlighted throughout this report in the Focus Group Insights and the Focus Group Insights – The Big Picture sections.

ADVANCED TRANSPORTATION AND LOGISTICS TOP MIDDLE-SKILL JOBS

This section compares Orange County's labor market demand for the top middle-skill jobs in Advanced Transportation and Logistics with program supply from the region's community colleges and non-community college providers (Exhibit 1). As seen in Exhibit 2, the entry-level wages[2] for these top middle-skill jobs are higher than the $17.39 per hour living wage. Descriptions for each occupational title can be found in Appendix B. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix C.

Exhibit 1. Advanced Transportation and Logistics Top Middle-Skill Jobs in Orange County
Labor Market Demand vs. Program Supply



*(Please note: * indicates that the occupation has an oversupply of labor.)*

FOCUS GROUP INSIGHTS

Unmanned Aerial Vehicles/Drones

Focus group participants pointed out that the supply and demand figures in this report did not include data for unmanned aerial vehicles (UAV), more commonly known as drones. Currently, there is no occupation in the Standard Occupational Classification (SOC) system for drones, and it is unlikely that an occupation will be added in the future. Previous research from the COE has shown that drone piloting is an additional skill that can be added to make students more marketable for existing occupations, such as those in public safety, photography and videography, and surveying and GIS.

Certifications

Faculty members and the regional director for employment engagement identified several certifications for which Orange County community college programs train. Certifications for piloting include Federal Aviation Administration (FAA) Airmen Certificate and, for drone pilots, FAA Part 107. Focus group participants also identified several automotive certifications: Automotive Emission Control Specialist, Automotive Service Excellence (ASE), and Mobile Air Conditioning Society (MACS) 609 Certification. It is important to note that the supply figures included in this report do not include individuals that already hold these certifications, so supply for some occupations may be understated.

[2] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

Exhibit 2. Advanced Transportation and Logistics Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages

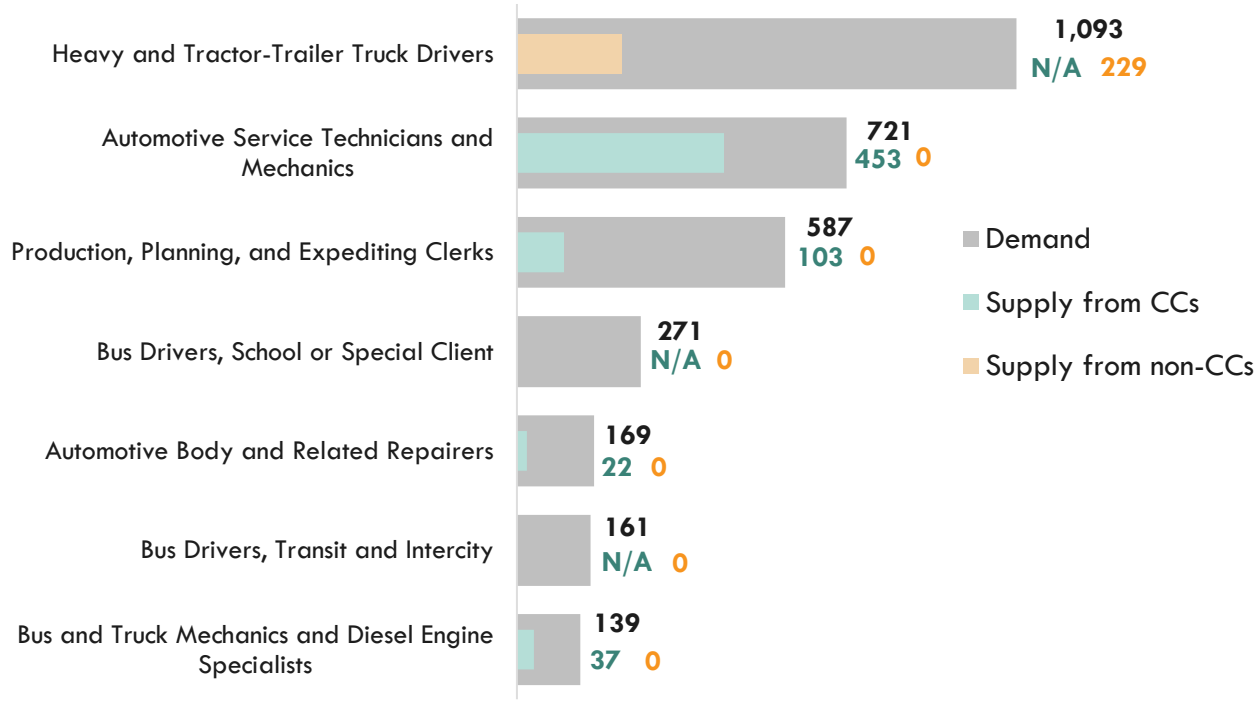
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	357	$28.33	$36.67
13-1081	Logisticians	209	$30.89	$40.09
11-3071	Transportation, Storage, and Distribution Managers	119	$30.96	$47.98
43-5011	Cargo and Freight Agents	107	$17.88	$22.48
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	102	$21.78	$28.11

ADVANCED TRANSPORTATION AND LOGISTICS MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the regional living wage but median wages above it. Since wages generally increase with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibit 3, middle-skill Advanced Transportation and Logistics jobs with entry-level wages below the regional living wage have a significant number of annual job openings (labor market demand).

Exhibit 3. Advanced Transportation and Logistics Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand vs. Program Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

While these occupations have entry-level wages below the California Family Needs Calculator of $17.39 per hour, occupations such as Heavy and Tractor-Trailer Truck Drivers; Production, Planning, and Expediting Clerks; Bus Drivers, School or Special Client; Automotive Body and Related Repairers; and Bus and Truck Mechanics and Diesel Engine Specialists have median wages higher than the regional living wage as denoted via the gray shading in Exhibit 4.

Exhibit 4. Advanced Transportation and Logistics Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,093	$16.95	$20.85
49-3023	Automotive Service Technicians and Mechanics	721	$11.94	$16.74
43-5061	Production, Planning, and Expediting Clerks	587	$17.38	$22.80
53-3022	Bus Drivers, School or Special Client	271	$15.57	$18.08
49-3021	Automotive Body and Related Repairers	169	$14.64	$22.46
53-3021	Bus Drivers, Transit and Intercity	161	$14.41	$17.11
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	139	$16.73	$21.90

FOCUS GROUP INSIGHTS

Wages for Automotive Service Technicians and Mechanics

Focus group participants said that wages for the Automotive Service Technicians and Mechanics occupation appeared low and that, in their experience, wages were much higher. While standardized occupational titles are useful for classifying, collecting, and disseminating data in general, they do not always provide a complete picture of the demand and wages for specific job titles. The Automotive Service Technicians and Mechanics occupation includes several roles and titles, including lube technicians, service technician, and automobile mechanic. Prolific positions that are typically considered entry-level and require less experience, like lube technicians, have low wages and bring the entry-level and median wages down for this occupation. Focus group participants said that colleges should train students on wage expectations for these different roles.

Additionally, wages for self-employed Automotive Service Technician and Mechanics are nearly two dollars lower. This could be because self-employed workers may underreport their income if they are paid in cash.

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed other issues and challenges that cannot be captured by traditional labor market information and provided insight on the tactics colleges and employers are currently using to address supply gaps in the Advanced Transportation and Logistics sector.

How Employers are Filling Supply Gaps

According to focus group participants, employers are primarily relying on internal training to address supply gaps. In many cases, particularly for automotive dealers, companies have manufacturer-specific training that workers go through when they are initially hired. Faculty members also noted that automation has required employers to re-train their workforce to keep up with current technology.

> *"In automotive, we focus on the fundamentals and employers actually have corporate training centers where they add on manufacture-specific training or skills."*
> *– Regional Director for Employer Engagement*

Employer Engagement

Faculty from multiple colleges noted that they are working to connect students with employers that have a need for qualified workers. Fullerton College has held recruitment events with the Orange County Automobile Dealers Association (OCADA) on their campus. Local industry partners, including new car dealerships, parts stores, and independent repair shops also contact Fullerton College's shop manager and request students to fill employment opportunities.

Creative Ways Community Colleges are Offering Programs

Focus group participants identified some creative ways they are offering programs and some of the challenges they face when developing new ways to offer programs. Faculty and administrators said that virtual reality training is becoming more prominent, but the cost of this equipment is prohibitive. According to one faculty member, virtual reality for commercial piloting technology is developing so quickly that new technology quickly becomes obsolete. An administrator suggested using Strong Workforce Program (SWP) funds to keep up with these technological advances.

Some colleges are also exploring the idea of an automotive internship class to help students build relationships with an employer and increase their chances of permanent employment.

Challenges in Expanding Programs

Focus group participants identified several challenges to expanding programs in the Advanced Transportation and Logistics sector. Many of these challenges, including the lack of dedicated space, difficulty hiring faculty and staff, and high costs for equipment, cut across all sectors. However, focus group participant's identified some unique challenges for this sector, such as the rapid development of new technology and automation. Another challenge specific to drone pilots is the changing regulatory landscape and uncertainty about future flight regulations. These advances make it difficult for faculty to define the specific training needed in these areas.

Automation

Focus group participants believe that automation will hurt this sector more than others. The regional director for employer engagement pointed to the recent decision by the Los Angeles Board of Harbor Commissioners decision to allow the Maersk shipping company to use automated electric cargo handlers at the Port of Los Angeles.[3] Additionally, there is currently high demand for Heavy and Tractor Trailer Truck Drivers, but future demand for this occupation could be greatly affected by self-driving trucks.

Though automation will likely impact the demand for many of the occupations in this report, it could also provide opportunities to teach new skills and re-train current workers. In the case of the Port of Los Angeles, dockworkers reached an agreement that provides training for workers to repair and service automated machines.[4] Similar training or re-training programs could put workers at a lower risk of losing their job to automation.

[3] https://abc7.com/business/port-of-las-largest-tenant-gets-green-light-to-automate-terminals/5389793/
[4] https://labusinessjournal.com/news/2019/jul/18/deal-reached-over-automation-port/

KEY FINDINGS: ADVANCED TRANSPORTATION AND LOGISTICS

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. Of the top middle-skill jobs in Orange County, *Cargo and Freight Agents* appear to have an oversupply of labor. However, the TOP code/program associated with this occupation is Office Technology/Office Computer Applications (0514.00), which trains for multiple managerial occupations, so the program supply numbers may be overestimated.

2. According to the demand and supply data (Appendix C), Logistics and Materials Transportation (TOP 0510.00) could train for several occupations with supply gaps.

3. The following occupations with entry-level wages below the California Family Needs Calculator have median wages at or above the California Family Needs Calculator:
    - Heavy and Tractor-Trailer Truck Drivers
    - Production, Planning, and Expediting Clerks
    - Bus Drivers, School or Special Client
    - Automotive Body and Related Repairers
    - Bus and Truck Mechanics and Diesel Engine Specialists

4. No community college programs in Orange County reported noncredit awards for the Advanced Transportation and Logistics sector.

5. Of the 12 occupations (SOC codes) analyzed in this brief for the Advanced Transportation sector, there is a labor market demand of 4,035 annual job openings, a program supply of 1,471 awards, which creates a sector supply gap of 2,564 awards.

4,035	1,471	2,564
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. While standardized occupational titles are useful for classifying, collecting, and disseminating data in general, they do not always provide a complete picture of the demand and wages for specific job titles. Some occupations, such as Automotive Service Technicians and Mechanics, include a variety of job titles that range from entry-level to mid-level. The regional director for employer engagement could work with faculty members to define common career paths and job titles within occupations to help students better understand their career options and earnings potential.
2. Faculty, administrators, and the regional director for employer engagement could work with key employers to identify which training technology and platforms would be most cost effective for providing the skills and training students need to meet employers' demand for workers.
3. Automation could provide an opportunity for colleges to create new training programs or re-training programs to provide students the necessary skills to succeed in working with autonomous vehicles and

machinery. The regional director for employer engagement could work with faculty members and employers to explore the need for training new workers or re-training incumbent workers in order to lower the risk of these workers losing their jobs to automation and meet employers' needs.

APPENDIX A: METHODOLOGY AND ADVANCED TRANSPORTATION AND LOGISTICS DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in this brief, the COE first reviewed the TOP codes associated with the sector and then matched them with the SOC codes. According to the CCC, the following six-digit TOP codes define the Advanced Transportation and Logistics sector:

TOP6 Program Name	TOP6 Code
Air Traffic Control	3020.30
Alternative Fuels and Advanced Transportation Technology	0948.40
Automotive Collision Repair	0949.00
Automotive Technology	0948.00
Aviation Airframe Mechanics	0950.10
Aviation and Airport Management	3020.10
Aviation and Airport Management and Services	3020.00
Aviation Powerplant Mechanics	0950.20
Diesel Technology	0947.00
Heavy Equipment Maintenance	0947.20
Heavy Equipment Operation	0947.30
Logistics and Materials Transportation	0510.00
Marine Technology	0959.00
Motorcycle, Outboard and Small Engine Repair	3020.20
Piloting	3020.20
Railroad and Light Rail Operations	0947.40
Recreational Vehicle Service	0948.50
Truck and Bus Driving	0947.50
Upholstery Repair – Automotive	0949.10

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[5] system and identified approximately 300 occupational codes as middle-skill jobs.

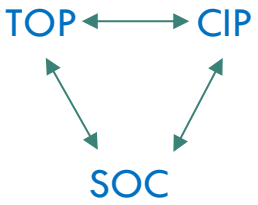
Middle-skill jobs include:

- 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.

For this study, the COE analyzed occupations with a labor market demand of at least 50 annual job openings. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[6] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.
- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



The 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 data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP 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.

Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of this study.

[5] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.
[6] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

To create the invite list of faculty and administrators, Regional Directors for Employer Engagement and career education deans at each college were asked to identify faculty and administrators that could represent their respective colleges in the sector-specific focus groups. Once this list was compiled, the career education deans invited faculty and administrators to express their interest in participating in a focus group via email. The email introduced the COE, provided an overview of the Orange County Sector Analysis Project, described the goals of the focus groups, and informed faculty that they would be compensated for their participation, and that lunch would be provided for all participants. All those that stated their interest were then connected with the COE who managed the focus groups scheduling and details.

In order to be as inclusive as possible, 12 focus groups were scheduled for the eight sectors – four sectors had one focus group each and four sectors had two focus groups each, during a three-week period from July to August 2019. All focus groups participants received a confirmation email before the event that included the focus group agenda, their sector-specific draft brief, and a pre-assignment with questions based off of the information contained in the draft sector briefs. Focus group participants were instructed to complete and bring the pre-assignment to the convening so that they were prepared to discuss the data, the challenges they face in their programs, and strategies to close supply gaps. Each focus groups was recorded, with permission of the participants, by the COE solely for transcription purposes.

The COE conducted no more than two focus group sessions per day. During the focus groups the Orange County Sector Analysis Project was explained and then the information contained in the draft sector briefs was presented in detail. Participants were encouraged to ask questions and engage in dialogue throughout the entire focus group session. The COE took notes of each discussion as well as recorded the sessions, with permission of the participants and solely for transcription purposes.

Following the conclusion of the focus groups, the COE compiled the audio files, transcripts, notes, and pre-assignments to conduct a qualitative analysis of the themes for each focus group and to identify commonalities across multiple focus groups. The findings from this analysis have been highlighted throughout this report in the "Focus Group Insight" sections

APPENDIX B: DEFINITIONS FOR ADVANCED TRANSPORTATION AND LOGISTICS MIDDLE-SKILL JOBS

The following definitions and sample job titles for each occupation are derived from O*NET, the nation's primary source of occupational information. The O*NET database contains hundreds of standardized and occupation-specific descriptors on nearly 1,000 occupations. O*NET is developed and sponsored by the U.S. Department of Labor[7]

Automotive Body and Related Repairers (SOC 49-3021): Repair and refinish automotive vehicle bodies and straighten vehicle frames. Sample job titles include:

- Collision Technician
- Body and Frame Technician
- Auto Body Painter
- Refinish Technician
- Collision Repair Technician
- Body Repairer

Automotive Service Technicians and Mechanics (SOC 49-3023): Diagnose, adjust, repair, or overhaul automotive vehicles. Sample job titles include:

- Transmission Rebuilder
- Service Technician
- Truck Technician
- Automobile Mechanic (Auto Mechanic)
- Lube Technician
- Trim Technician

Bus Drivers, School or Special Client (SOC 53-3022): Transport students or special clients, such as the elderly or persons with disabilities. Ensure adherence to safety rules. May assist passengers in boarding or exiting. Sample job titles include:

- School Bus Driver
- Special Needs Bus Driver
- Shuttle Bus Driver
- School Bus Driver/Mechanic
- School Bus Driver/Teacher Assistant
- School Bus Driver/Custodian

Bus Drivers, Transit and Intercity (SOC 53-3021): Drive bus or motor coach, including regular route operations, charters, and private carriage. May assist passengers with baggage. May collect fares or tickets. Sample job titles include:

- Motor Coach Operator
- Bus Operator
- Transit Operator
- Charter Coach Driver
- Tram Driver
- Tour Bus Driver

Bus and Truck Mechanics and Diesel Engine Specialists (SOC 49-3031): Diagnose, adjust, repair, or overhaul buses and trucks, or maintain and repair any type of diesel engines. Includes mechanics working primarily with automobile or marine diesel engines. Sample job titles include:

- Diesel Mechanic
- Trailer Mechanic
- Truck Mechanic
- Transit Mechanic
- Service Technician
- General Repair Mechanic

Cargo and Freight Agents (SOC 43-5011): Expedite and route movement of incoming and outgoing cargo and freight shipments in airline, train, and trucking terminals, and shipping docks. Take orders from customers and arrange pickup of freight and cargo for delivery to loading platform. Prepare and examine bills of lading to determine shipping charges and tariffs. Sample job titles include:

- Transportation Broker
- Yardmaster/Customer Service/Crew Dispatching
- Traffic Clerk
- Special Services Agent
- Ocean Forwarder
- Route Specialist

[7] https://www.onetonline.org/

First-Line Supervisors of Mechanics, Installers, and Repairer (SOC 49-1011): Directly supervise and coordinate the activities of mechanics, installers, and repairers. Excludes team or work leaders. Sample job titles include:

- Service Manager
- Maintenance Superintendent
- Equipment Maintenance Supervisor
- Maintenance Planner
- Maintenance Foreman
- Electrical Supervisor

Heavy and Tractor-Trailer Truck Drivers (SOC 53-3032): Drive a tractor-trailer combination or a truck with a capacity of at least 26,000 pounds Gross Vehicle Weight (GVW). May be required to unload truck. Requires commercial drivers' license. Sample job titles include:

- Semi-Truck Driver
- Mixer Driver
- Line Haul Driver
- Tractor Trailer Operator
- Roll Off Driver
- Log Truck Driver

Logisticians (SOC 13-1081): Analyze and coordinate the logistical functions of a firm or organization. Responsible for the entire life cycle of a product, including acquisition, distribution, internal allocation, delivery, and final disposal of resources. Sample job titles include:

- Production Planner
- Logistics Engineer
- Systems Engineer
- Supply Chain Analyst
- Logistics Analyst

Mobile Heavy Equipment Mechanics, Except Engines (SOC 49-3042): Diagnose, adjust, repair, or overhaul mobile mechanical, hydraulic, and pneumatic equipment, such as cranes, bulldozers, graders, and conveyors, used in construction, logging, and surface mining. Sample job titles include:

- Equipment Mechanic
- Construction Equipment Mechanic
- Shop Technician
- Mechanic
- Heavy Equipment Technician
- Heavy Equipment Field Mechanic

Production, Planning, and Expediting Clerks (SOC 49-3023): Coordinate and expedite the flow of work and materials within or between departments of an establishment according to production schedule. Duties include reviewing and distributing production, work, and shipment schedules; conferring with department supervisors to determine progress of work and completion dates; and compiling reports on progress of work, inventory levels, costs, and production problems. Sample job titles include:

- Production Assistant
- Production Scheduler
- Production Planner
- Production Controller
- Inventory Control Specialist
- Material Coordinator

Transportation Attendants, Except Flight Attendants (SOC 53-6061): Provide services to ensure the safety and comfort of passengers aboard ships, buses, trains, or within the station or terminal. Perform duties such as greeting passengers, explaining the use of safety equipment, serving meals or beverages, or answering questions related to travel. Sample job titles include:

- Conductor
- Bus Attendant
- Transportation Aide
- School Bus Monitor
- Monitor
- Fare Enforcement Officer

APPENDIX C: ADVANCED TRANSPORTATION AND LOGISTICS DEMAND AND SUPPLY DATA

The following tables compare labor market demand and program supply by occupation. Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for that occupation. Therefore, the COE de-duplicated TOP codes that train for more than one occupation to avoid counting program supply more than once. This de-duplication process is denoted by the "Accounted for Above" statements in the tables on the following pages.

Additionally, the COE reviewed program data from the LaunchBoard[8] and the statewide COE Supply Table[9] and identified conflicting information. For certain occupations, LaunchBoard indicates that a college has a program for that occupation, but the COE Supply Table does not show program data for that college, and vice versa. These discrepancies are marked with the following:

+ The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard

* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

The demand and supply tables in the following pages have three categories:

1. **Supply Gap** – If Average Annual Openings exceed Average Annual Awards by more than 25 percent, then the cell is shaded in light green.
2. **Supply Met** – If Average Annual Openings is within 25 percent +/- of Average Annual Awards, then the cell is shaded in light blue.
3. **Oversupply** – If Average Annual Awards exceed the Average Annual Awards by more than 25 percent, then the cell is shaded in red.

[8] calpassplus.org/LaunchBoard/Home.aspx
[9] coeccc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

DEMAND AND SUPPLY DATA FOR ADVANCED TRANSPORTATION AND LOGISTICS TOP MIDDLE-SKILL JOBS IN ORANGE COUNTY

+ The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
First-Line Supervisors of Mechanics, Installers, and Repairers	357	Supply Met	319	Electrical Systems and Power Transmission	0934.40	Santiago Canyon	46
					CIP 46.0301	InterCoast Colleges-Anaheim	16
				Recreational Vehicle Service	0948.50	No Programs	0
				Electrical	0952.20	Irvine	5
						Santiago Canyon	25
						North Orange Adult*	0
						Orange Coast*	0
					CIP 46.0302	InterCoast Colleges-Anaheim	10
						InterCoast Colleges-Roseville	4
						Southern California Institute of Technology	213
Logisticians	209	Supply Gap	0	Logistics and Materials Transportation	0510.00	Already Accounted For	0
Transportation, Storage, and Distribution Managers	119	Supply Gap	37	Logistics and Materials Transportation	0510.00	Already Accounted For	0
				Aviation and Airport Management and Services	3020.00	Orange Coast	15
				Aviation and Airport Management	3020.10	Cypress	22

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Cargo and Freight Agents	107	Oversupply	222	Logistics and Materials Transportation	0510.00	Already Accounted For	0
				Office Technology/Office Computer Applications	0514.00	Coastline	35
						Cypress	9
						Golden West	5
						Irvine	4
						Saddleback	7
						Santa Ana	65
						Santiago Canyon	64
						North Orange Adult*	0
					CIP 52.0401	InterCoast Colleges-Anaheim	1
					CIP 52.0408	United Education Institute-Anaheim	32
Mobile Heavy Equipment Mechanics, Except Engines	102	Supply Gap	49	Agricultural Power Equipment Technology	0116.00	No Programs	0
				Heavy Equipment Maintenance	0947.20	Santa Ana+	28
						Santiago Canyon*	0
				Heavy Equipment Operation	0947.30	Santiago Canyon	21

DEMAND AND SUPPLY DATA FOR ADVANCED TRANSPORTATION AND LOGISTICS MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Heavy and Tractor-Trailer Truck Drivers	1093	Supply Gap	229	Truck and Bus Driver/Commercial Vehicle Operator and Instructor	CIP 49.02.05	California Career School	229
Automotive Service Technicians and Mechanics	721	Supply Gap	453	Automotive Technology	0948.00	Cypress	183
						Fullerton	11
						Golden West	37
						Saddleback	35
						Santa Ana	181
				Alternative Fuels and Advanced Transportation Technology	0948.40	Saddleback+	6
						Golden West*	0
Production, Planning, and Expediting Clerks	587	Supply Gap	103	Logistics and Materials Transportation	0510.00	Coastline+	103
Bus Drivers, School or Special Client	271	Supply Gap	0	Truck and Bus Driving	CIP 49.0205	Already Accounted For	0
Automotive Body and Related Repairers	169	Supply Gap	22	Automotive Collision Repair	0949.00	Cypress	22
Bus Drivers, Transit and Intercity	161	Supply Gap	0	Truck and Bus Driving	CIP 49.0205	Already Accounted For	0
Bus and Truck Mechanics and Diesel Engine Specialists	139	Supply Gap	37	Diesel Technology	0947.00	Santa Ana	37

2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

BUSINESS AND ENTREPRENEURSHIP

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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

BUSINESS AND ENTREPRENEURSHIP
Demand and Supply Analysis: Orange County

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INTRODUCTION

This sector brief is a product of the Orange County Sector Analysis Project. It provides information about the Business and Entrepreneurship sector in Orange County, one of Orange County's six priority sectors; it compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in this report for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. Two of these focus groups were specific to the Business and Entrepreneurship sector. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

In this brief, 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.

In this brief, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of this report, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the purpose of this

[1] https://insightcced.org/2018-family-needs-calculator/

report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A.

FOCUS GROUP INSIGHTS

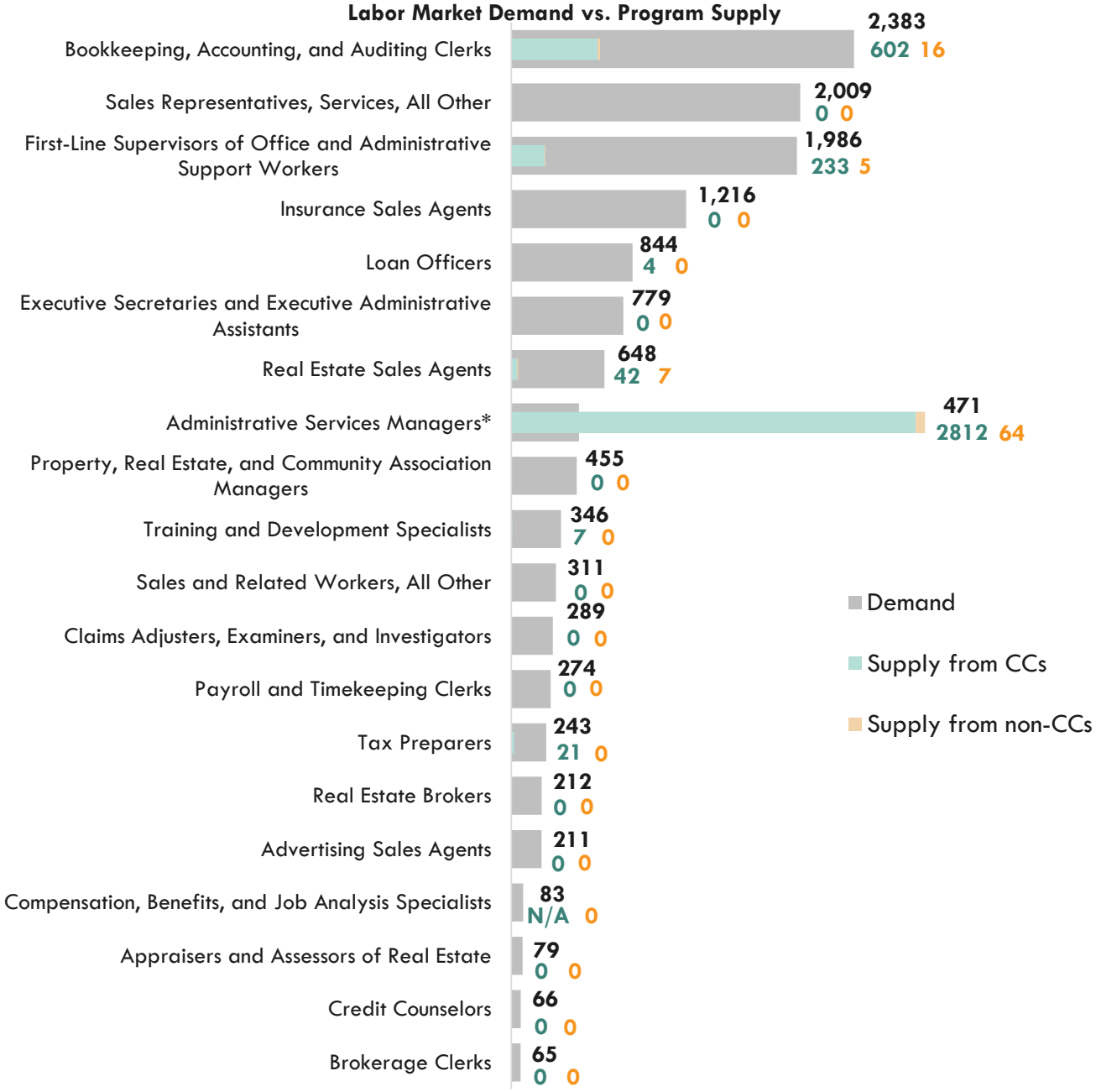
The Business and Entrepreneurship sector was split into two focus groups that were held on different days and included a total of eight faculty members – two counselors and six academic – and four administrators from seven institutions – six of the nine community colleges, and one noncredit school – that offered Business and Entrepreneurship programs in Orange County between 2015 and 2017. The regional director for employer engagement also attended one of the focus groups.

Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to the Business and Entrepreneurship sector. This sector-specific information is highlighted throughout this report in the Focus Group Insights and the Focus Group Insights – The Big Picture sections.

BUSINESS AND ENTREPRENEURSHIP TOP MIDDLE-SKILL JOBS

This section compares Orange County's labor market demand for the top middle-skill jobs in Business and Entrepreneurship with program supply from the region's community colleges and non-community college providers (Exhibit 1). As seen in Exhibit 2, the entry-level wages[2] for these top middle-skill jobs are higher than the $17.39 per hour living wage. Descriptions for each occupational title can be found in Appendix B. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix C.

Exhibit 1. Business and Entrepreneurship Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Program Supply



*(Please note: * indicates that the occupation has an oversupply of labor, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)*

[2] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

FOCUS GROUP INSIGHTS

Low Completion Numbers

According to the demand and supply in Exhibits 1 and 3, the community colleges in Orange County are undersupplying for both types of jobs analyzed in this brief: 1) top middle-skill jobs and 2) jobs that have entry-level wages below the California Family Needs Calculator – or living wage, but have median wages above the living wage. According to the California Community Colleges Chancellor's Office (CCCCO) dashboard tool, LaunchBoard[1], 31,648 (unduplicated) students took one or more courses in Business and Entrepreneurship programs in Program Year 2016-17. However, in that same year, only 3,441 students earned a certificate or degree.

Focus group participants provided some explanations as to why supply numbers were so low:

- Because Business and Entrepreneurship programs tend to attract working industry professionals, students may drop out or withdraw from the program before completing because they learned what they came to the program to learn. This has shown to be particularly true for students in sales, tax, and accounting courses.
- In order to close the many supply gaps in the sector, companies sometimes hire students who have the foundational skills needed for a particular job before they have completed their career education program. In some cases, students will participate in an internship program or work-based learning opportunity and receive a full-time job offer prior to completing their degree or certificate.
- Enrollment management decisions can sometimes mean a class is cut due to low enrollment, leaving students without options to complete their degree or certificate at their current community college.

Faculty and administrators said that though completion numbers appeared low, they know that many non-completers have positive employment outcomes. Some faculty members said that they are developing internal tracking systems to identify these students. Additionally, the CTE Outcomes Survey (CTEOS) could help colleges track and better understand outcomes for students who leave a program before completing a degree or certificate.

Experience Requirements

Focus group participants noted that some of these occupations, such as Administrative Services Managers and Executive Secretaries and Executive Administrative Assistants, meet the middle-skill definition used in this report, but are not entry-level occupations. Obtaining employment in these occupations is not realistic for students that are looking for a job with little experience "right out of college".

Challenges in Identifying Supply for Management Positions

This brief analyzes labor market demand and supply data for the Business and Entrepreneurship sector, using occupational codes from the Standard Occupational Classification (SOC) system for demand data and program codes from the Taxonomy of Programs (TOP) as well as Classification of Instructional Programs (CIP) systems for supply data (see Appendix A for more information). However, matching SOC codes to TOP and CIP codes has its limitations, particularly for management positions. Focus group participants noted that the TOP codes associated with the Administrative Services Managers occupation train for various managerial occupations, not just Administrative Service Managers. For this reason, the program supply numbers for Administrative Services Managers is likely overstated.

Entrepreneurship Skills

Focus group participants shared that finding information and data on entrepreneurship skills is a challenge when reviewing or creating programs. There is no TOP code for entrepreneurship and a comprehensive list of entrepreneurship programs does not currently exist. However, the skills taught in entrepreneurship classes can be applied across a variety of occupations. To address the need for these skills in other areas, Irvine Valley College has promoted entrepreneurship classes to disciplines other than Business across the college and hosts pitch competitions with students from all disciplines. Focus groups participants also explained that, while there is value in teaching these skills, entrepreneurship courses are non-transferable, so they are susceptible to being cut due to low enrollment.

> *"The lack of a TOP code [for entrepreneurship] is a problem. Where do you put it? Colleges may be coding similar programs differently, but we wouldn't know."*
> *– Saddleback College Faculty Member*

Licenses and Certifications

Focus group participants identified a number of occupations, including Real Estate Sales Agents and Hairdressers, Hairstylists, and Cosmetologists, that require a state license or certification. Other occupations, such as Bookkeeping, Accounting, and Auditing Clerks, do not require a state license or certification, but a Certified Public Accountant (CPA) certification makes students more attractive to employers and can lead to advancement opportunities. Focus group participants stated that many students enrolled in accounting courses previously graduated from a four-year institution and take additional courses at community colleges to sit for the CPA exam. According to the CCCCO LaunchBoard[3], in the 2016-17 academic year, three colleges had a significant percentage of students enrolled in accounting courses who previously graduated from a four-year institution: Coastline (22%), Saddleback (21%), and Irvine Valley (18%).

Other third-party certifications that Orange County community colleges train for are American Bar Association (ABA) Paralegal, Entrepreneurship and Small Business (ESB), Microsoft Office Specialist, and Project Management Professional (PMP).

[3] calpassplus.org/Launchboard/Community-College-Pipeline.aspx

Exhibit 2. Business and Entrepreneurship Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages

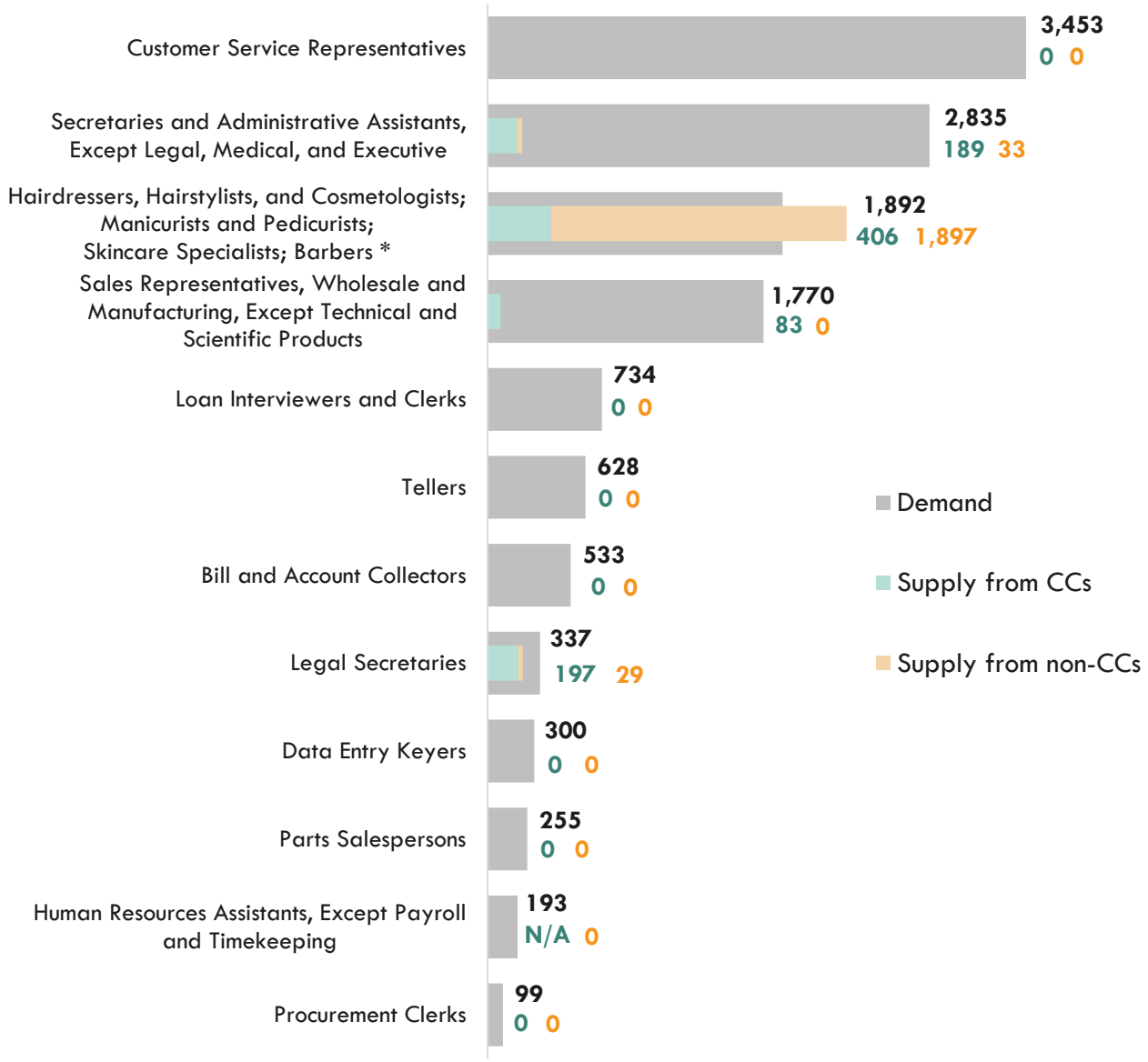
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
43-3031	Bookkeeping, Accounting, and Auditing Clerks	2,383	$17.61	$22.05
41-3099	Sales Representatives, Services, All Other	2,009	$18.32	$26.33
43-1011	First-Line Supervisors of Office and Administrative Support Workers	1,986	$22.80	$28.72
41-3021	Insurance Sales Agents	1,216	$17.50	$23.63
13-2072	Loan Officers	844	$18.53	$30.89
43-6011	Executive Secretaries and Executive Administrative Assistants	779	$25.93	$31.80
41-9022	Real Estate Sales Agents	648	$19.12	$20.16
11-3011	Administrative Services Managers	471	$41.40	$55.21
11-9141	Property, Real Estate, and Community Association Managers	455	$20.64	$26.36
13-1151	Training and Development Specialists	346	$24.29	$32.97
41-9099	Sales and Related Workers, All Other	311	$19.99	$24.56
13-1031	Claims Adjusters, Examiners, and Investigators	289	$23.82	$32.31
43-3051	Payroll and Timekeeping Clerks	274	$20.36	$25.40
13-2082	Tax Preparers	243	$17.99	$25.14
41-9021	Real Estate Brokers	212	$22.04	$24.89
41-3011	Advertising Sales Agents	211	$23.27	$27.89
13-1141	Compensation, Benefits, and Job Analysis Specialists	83	$25.32	$33.35
13-2021	Appraisers and Assessors of Real Estate	79	$22.50	$27.47
13-2071	Credit Counselors	66	$20.85	$24.10
43-4011	Brokerage Clerks	65	$22.19	$26.39

BUSINESS AND ENTREPRENEURSHIP MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the regional living wage but median wages near or above it. Since wages generally increase from entry-level to median earnings with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibit 3, middle-skill Business and Entrepreneurship jobs with entry-level wages below the regional living wage have a significant number of annual job openings (labor market demand).

Exhibit 3. Business and Entrepreneurship Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand vs. Program Supply



*(Please note: * indicates that the occupation has an oversupply of labor, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)*

While these occupations have entry-level wages below the California Family Needs Calculator of $17.39 per hour, occupations such as Customer Service Representatives; Secretaries and Administrative Assistants, Except Legal, Medical, and Executive; Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products; Loan Interviewers and Clerks; Bill and Account Collectors; Legal Secretaries; Parts Salespersons; Human Resources Assistants, Except Payroll and Timekeeping; and Procurement Clerks have median wages higher than the regional living wage, as denoted via the gray shading in Exhibit 4.

Exhibit 4. Business and Entrepreneurship Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
43-4051	Customer Service Representatives	3,453	$14.58	$17.83
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2,835	$15.69	$19.66
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1,770	$17.38	$25.34
39-5012	Hairdressers, Hairstylists, and Cosmetologists^	1,079	$11.55	$12.00
43-4131	Loan Interviewers and Clerks	734	$14.54	$20.22
43-3071	Tellers	628	$12.61	$14.09
39-5092	Manicurists and Pedicurists^	577	$10.24	$10.88
43-3011	Bill and Account Collectors	533	$16.22	$20.42
43-6012	Legal Secretaries	337	$16.41	$24.33
43-9021	Data Entry Keyers	300	$13.14	$16.55
41-2022	Parts Salespersons	255	$11.83	$18.11
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	193	$14.75	$17.76
39-5094	Skincare Specialists^	154	$12.22	$14.11
43-3061	Procurement Clerks	99	$16.67	$19.42
39-5011	Barbers^	82	$11.30	$11.82

(Please note: ^Indicates that demand and supply for these occupations were combined in Exhibit 3.

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed other issues and challenges that cannot be captured by traditional labor market information and provided insight on the tactics colleges and employers are currently using to address supply gaps in the Business and Entrepreneurship sector.

Employer Engagement

Faculty from multiple colleges noted that they are working to connect students with employers that have a need for qualified workers. However, developing and maintaining continuous relationships with industry partners is time consuming and difficult. In many cases, individual faculty, administrators, or staff are working with different employers and are unaware of each other's efforts. An Irvine Valley College faculty member said that they would like to bring in guest speakers or take students on field trips, but red tape and administrative regulations make this process long and cumbersome. Focus group participants felt that since employers are not used to the bureaucracy of the community college system, the paperwork and long waiting periods could be off-putting and damage relationships.

Focus group participants also noted that, though many employers prefer to hire students with four-year degrees, several employers are open to partnering with community colleges for internships. To respond to employer interest, Coastline and Golden West colleges are exploring partnerships with local companies for internships. Fullerton College currently has an internship program and is working to expand it due to positive feedback from employers and students. In some cases, employers have offered students full-time jobs after they complete their internship.

Creative Ways Community Colleges are Offering Programs

Focus group participants discussed several creative ways they are offering programs and some of the challenges they face when developing new means to offer programs:

- Several colleges, including Fullerton, Irvine Valley, and Santiago Canyon, offer dual-enrollment courses at high schools within their service area. Dual-enrollment makes high school students aware of business programs at the community colleges and creates a potential pipeline of students to increase enrollment.
- Irvine Valley College has promoted entrepreneurship classes to disciplines other than Business across the college and hosts pitch competitions with students from all disciplines. They also hold entrepreneurship events with business partners and run a summer entrepreneurship workshop.
- North Orange Continuing Education has been testing out Pearson's MyLab IT (also known as MyIT Lab) which is a teaching and learning platform with simulated scenarios for students in their Business Information Worker (BIW) and Administrative Professional programs.

New Programs

Faculty and administrators identified over a dozen new programs that they are either in the process of creating or plan to create in the near future. Several of these new programs will address new and emerging areas such as data/business analytics and entrepreneurship fields. Other programs will focus on accounting, bookkeeping, and human resources.

Challenges in Expanding Programs

Focus group participants identified several challenges to expanding programs in the Business and Entrepreneurship sector. Many of these challenges, including the lack of dedicated lab space, difficulty hiring faculty and staff, and high costs for equipment, cut across all sectors. However, focus groups participants identified a unique and significant challenge for the Business and Entrepreneurship sector. They stated that programs in this sector are often the "default" program for students who are unsure of their future plans. Lack of a clear path can discourage students from completing the program and in some cases, continuing their education. Focus group participants shared that this pattern of students dropping out negatively affects course enrollments and may lead to courses being cut. Furthermore, they explained that once enrollments begin declining, it is difficult to justify expanding a program.

KEY FINDINGS: BUSINESS AND ENTREPRENEURSHIP

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. The following occupations with entry-level wages below the California Family Needs Calculator have median wages at or above the California Family Needs Calculator:
    - Customer Service Representatives
    - Secretaries and Administrative Assistants, Except Legal, Medical, and Executive
    - Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products
    - Loan Interviewers and Clerks
    - Bill and Account Collectors
    - Legal Secretaries
    - Parts Salespersons
    - Human Resources Assistants, Except Payroll and Timekeeping
    - Procurement Clerks

2. The following programs in Orange County reported noncredit awards for the Business and Entrepreneurship sector:
    - Business Management (050600) at North Orange Continuing Education[4]
    - Other Business and Management (059900) at North Orange Continuing Education

3. Of the 35 occupations (SOC codes) analyzed in this brief for the Business and Entrepreneurship sector, there is a labor market demand of 25,999 annual job openings, a program supply of 6,655 awards, which creates a sector supply gap of 19,344 awards.

25,999	6,655	19,344
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. Because there is no TOP code for entrepreneurship, the COE could work with administrators, faculty, and the regional director for employer engagement to identify existing entrepreneurship courses, programs, and degrees in order to generate a list of associated regional TOP codes that could be used for regional alignment. This list of entrepreneurship-related TOP codes will not however, be recognized by the CCCCO for reporting and outcome metric purposes. Additionally, the COE should identify other data sources that can be used to help determine entrepreneurial activity, such as the number of small businesses in the region and demand for entrepreneurial knowledge, skills, and abilities (KSAs) in addition to jobs in order to provide a more complete approach to identifying labor market demand.

[4] Data for North Orange Continuing Education is captured as "North Orange Adult" in the California Community Colleges Chancellor's Office Management Information System DataMart

2. Use the CTE Outcomes Survey (CTEOS) to track completion numbers and outcomes for skills-builders in addition to traditional labor market information.

3. Focus group participants said that individual faculty and administrators at all colleges are engaging employers. Fragmentation could create confusion with employers and damage established relationships. Colleges could work with the regional director for employer engagement to build on current efforts in order to create a unified and consistent strategy for engaging employers at a regional level to develop internship and employment opportunities for students.

4. According to focus group participants, programs in the Business and Entrepreneurship sector are often the "default" major for students who are unsure of their career plans. Colleges could address this challenge by focusing regional and local efforts to help undecided students hone in on their interests so that they have a clear path to progression and completion.

BUSINESS AND ENTREPRENEURSHIP DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in this brief, the COE first reviewed the TOP codes associated with the sector and then matched them with the SOC codes. According to the CCC, the following six-digit TOP codes define the Business and Entrepreneurship sector:

TOP6 Program Name	TOP6 Code
Business and Commerce, General	0501.00
Accounting	0502.00
Tax Studies	0502.10
Banking and Finance	0504.00
Business Administration	0505.00
Business Management	0506.00
Management Development and Supervision	0506.30
Small Business and Entrepreneurship	0506.40
Marketing and Distribution	0509.00
Advertising	0509.10
Purchasing	0509.20
Sales and Salesmanship	0509.40
e-commerce (business emphasis)	0509.70
Real Estate	0511.00
Escrow	0511.10
Insurance	0512.00
Legal Office Technology	0514.10
Customer Service	0518.00
Other Business and Management	0599.00
Mortuary Science	1255.00
Massage Therapy	1262.00
Custodial Services	3005.00
Cosmetology and Barbering	3007.00

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[5] system and identified approximately 300 occupational codes as middle-skill jobs

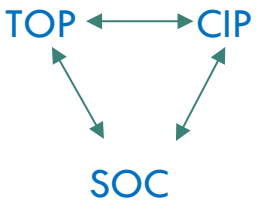
Middle-skill jobs include:

- 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.

For this study, the COE analyzed occupations with a labor market demand of at least 50 annual job openings. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[6] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.
- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



The 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 data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP 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.

Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of this study.

[5] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.
[6] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

To create the invite list of faculty and administrators, Regional Directors for Employer Engagement and career education deans at each college were asked to identify faculty and administrators that could represent their respective colleges in the sector-specific focus groups. Once this list was compiled, the career education deans invited faculty and administrators to express their interest in participating in a focus group via email. The email introduced the COE, provided an overview of the Orange County Sector Analysis Project, described the goals of the focus groups, and informed faculty that they would be compensated for their participation, and that lunch would be provided for all participants. All those that stated their interest were then connected with the COE who managed the focus groups scheduling and details.

In order to be as inclusive as possible, 12 focus groups were scheduled for the eight sectors – four sectors had one focus group each and four sectors had two focus groups each, during a three-week period from July to August 2019. All focus groups participants received a confirmation email before the event that included the focus group agenda, their sector-specific draft brief, and a pre-assignment with questions based off of the information contained in the draft sector briefs. Focus group participants were instructed to complete and bring the pre-assignment to the convening so that they were prepared to discuss the data, the challenges they face in their programs, and strategies to close supply gaps. Each focus groups was recorded, with permission of the participants, by the COE solely for transcription purposes.

The COE conducted no more than two focus group sessions per day. During the focus groups the Orange County Sector Analysis Project was explained and then the information contained in the draft sector briefs was presented in detail. Participants were encouraged to ask questions and engage in dialogue throughout the entire focus group session. The COE took notes of each discussion as well as recorded the sessions, with permission of the participants and solely for transcription purposes.

Following the conclusion of the focus groups, the COE compiled the audio files, transcripts, notes, and pre-assignments to conduct a qualitative analysis of the themes for each focus group and to identify commonalities across multiple focus groups. The findings from this analysis have been highlighted throughout this report in the "Focus Group Insight" sections.

APPENDIX B: DEFINITIONS FOR BUSINESS AND ENTREPRENEURSHIP MIDDLE SKILL JOBS

The following definitions and sample job titles for each occupation are derived from O*NET, the nation's primary source of occupational information. The O*NET database contains hundreds of standardized and occupation-specific descriptors on nearly 1,000 occupations. O*NET is developed and sponsored by the U.S. Department of Labor[7]

Administrative Services Managers (SOC 11-3011): Plan, direct, or coordinate one or more administrative services of an organization, such as records and information management, mail distribution, facilities planning and maintenance, custodial operations, and other office support services. Sample job titles include:

- Facilities Director
- Business Administrator
- Administrative Services Manager
- Office Manager
- Administrative Officer

Advertising Sales Agents (SOC 41-3011): Sell or solicit advertising space, time, or media in publications, signage, TV, radio, or Internet establishments or public spaces. Sample job titles include:

- Advertising Representative
- Display Advertising Sales Representative
- Advertising Consultant
- Sales Representative

Appraisers and Assessors of Real Estate (SOC 13-2021): Appraise real property and estimate its fair value. May assess taxes in accordance with prescribed schedules. Sample job titles include:

- Tax Assessor
- County Assessor
- City Assessor
- Staff Appraiser
- Residential Real Estate Appraiser
- Residential Fee Appraiser

Barbers (SOC 39-5011): Provide barbering services, such as cutting, trimming, shampooing, and styling hair, trimming beards, or giving shaves. Sample job titles include:

- Barber
- Stylist
- Barber Shop Operator
- Hairdresser

Bill and Account Collectors (SOC 43-3011): Locate and notify customers of delinquent accounts by mail, telephone, or personal visit to solicit payment. Duties include receiving payment and posting amount to customer's account; preparing statements to credit department if customer fails to respond; initiating repossession proceedings or service disconnection; and keeping records of collection and status of accounts. Sample job titles include:

- Debt Collector
- Collection Agent
- Collection Specialist
- Telephone Collector
- Patient Access Specialist
- Credit Clerk

Bookkeeping, Accounting, and Auditing Clerks (SOC 43-3031): Compute, classify, and record numerical data to keep financial records complete. Perform any combination of routine calculating, posting, and verifying duties to obtain primary financial data for use in maintaining accounting records. May also check the accuracy of figures, calculations, and postings pertaining to business transactions recorded by other workers. Sample job titles include:

- Accounts Receivable Clerk
- Accounts Payable Clerk
- Accounting Clerk
- Accounting Assistant
- Fiscal Technician

[7] https://www.onetonline.org/

Brokerage Clerks (SOC 43-4011): Perform duties related to the purchase, sale or holding of securities. Duties include writing orders for stock purchases or sales, computing transfer taxes, verifying stock transactions, accepting and delivering securities, tracking stock price fluctuations, computing equity, distributing dividends, and keeping records of daily transactions and holdings. Sample job titles include:

- Trading Assistant
- Client Administrator
- Sales Trader
- Sales Assistant
- Operations Clerk
- Client Service Associate

Claims Adjusters, Examiners, and Investigators (SOC 13-1031): Review settled claims to determine that payments and settlements are made in accordance with company practices and procedures. Confer with legal counsel on claims requiring litigation. May also settle insurance claims. Sample job titles include:

- Worker's Compensation Claims Examiner
- Reinsurance Claim Analyst
- Property Damage Claims Adjustor
- Claim Representative
- Investigator

Compensation, Benefits, and Job Analysis Specialists (SOC 13-1141): Conduct programs of compensation and benefits and job analysis for employer. May specialize in specific areas, such as position classification and pension programs. Sample job titles include:

- Position Classification Specialist
- Compensation Consultant
- Benefits Administrator
- Personnel Specialist
- Compensation/Benefits Specialist

Credit Counselors (SOC 13-2071): Advise and educate individuals or organizations on acquiring and managing debt. May provide guidance in determining the best type of loan and explaining loan requirements or restrictions. May help develop debt management plans, advise on credit issues, or provide budget, mortgage, and bankruptcy counseling. Sample job titles include:

- Financial Wellness Coach
- Financial Health Counselor
- Financial Aid Counselor
- Loan Counselor
- Financial Assistance Advisor
- Peer Financial Counselor

Customer Service Representatives (SOC 43-4051): Interact with customers to provide information in response to inquiries about products and services and to handle and resolve complaints. Excludes individuals whose duties are primarily installation, sales, or repair. Sample job titles include:

- Customer Service Agent
- Social Worker
- Sales Facilitator
- Member Services Representative
- Member Services Representative
- Patient Representative

Data Entry Keyers (SOC 43-9021): Operate data entry device, such as keyboard or photo composing perforator. Duties may include verifying data and preparing materials for printing. Sample job titles include:

- Data Entry Clerk
- Data Entry Operator
- Records Clerk
- Fiscal Assistant
- Data Transcriber
- Data Entry Machine Operator

Executive Secretaries and Executive Administrative Assistants (SOC 43-6011): Provide high-level administrative support by conducting research, preparing statistical reports, handling information requests, and performing clerical functions such as preparing correspondence, receiving visitors, arranging conference calls, and scheduling meetings. May also train and supervise lower-level clerical staff. Sample job titles include:

- Administrative Aide
- Executive Assistant
- Administrative Secretary
- Staff Assistant
- Personal Secretary
- Office Administrator

First-Line Supervisors of Office and Administrative Support Workers (SOC 43-1011): Directly supervise and coordinate the activities of clerical and administrative support workers. Sample job titles include:

- Payroll Supervisor
- Customer Service Manager
- Office Supervisor
- Clerical Supervisor
- Billing Department Supervisor
- Team Manager

Hairdressers, Hairstylists, and Cosmetologists (SOC 39-5012): Provide beauty services, such as shampooing, cutting, coloring, and styling hair, and massaging and treating scalp. May apply makeup, dress wigs, perform hair removal, and provide nail and skin care services. Sample job titles include:

- Hair Stylist
- Beautician
- Hairdresser
- Cosmetologist
- Cosmetologist

Human Resources Assistants, Except Payroll and Timekeeping (SOC 43-4161): Compile and keep personnel records. Record data for each employee, such as address, weekly earnings, absences, amount of sales or production, supervisory reports, and date of and reason for termination. May prepare reports for employment records, file employment records, or search employee files and furnish information to authorized persons. Sample job titles include:

- Personnel Assistant
- Human Resources Clerk
- Personnel Associate
- Human Resources Technician
- Employment Assistant
- Human Resources Generalist

Insurance Sales Agents (SOC 41-3021): Sell life, property, casualty, health, automotive, or other types of insurance. May refer clients to independent brokers, work as an independent broker, or be employed by an insurance company. Sample job titles include:

- Insurance Agent
- Agent
- Sales Representative
- Surety Bond Agent

Legal Secretaries (SOC 43-6012): Perform secretarial duties using legal terminology, procedures, and documents. Prepare legal papers and correspondence, such as summonses, complaints, motions, and subpoenas. May also assist with legal research. Sample job titles include:

- Secretary
- Paralegal
- Magistrate Assistant
- Litigation Assistant
- Legal Secretary
- Judicial Administrative Assistant

Loan Interviewers and Clerks (SOC 43-4131): Interview loan applicants to elicit information; investigate applicants' backgrounds and verify references; prepare loan request papers; and forward findings, reports, and documents to appraisal department. Review loan papers to ensure completeness, and complete transactions between loan establishment, borrowers, and sellers upon approval of loan. Sample job titles include:

- Mortgage Loan Processor
- Loan Processor
- Underwriter
- Mortgage Broker
- Loan Clerk
- Loan Analyst

Loan Officers (SOC 13-2072): Evaluate, authorize, or recommend approval of commercial, real estate, or credit loans. Advise borrowers on financial status and payment methods. Includes mortgage loan officers and agents, collection analysts, loan servicing officers, and loan underwriters. Sample job titles include:

- Mortgage Loan Officer
- Mortgage Broker
- Consumer Loan Officer
- Branch Lending Officer
- Small Business Banking Officer
- Personal Banking Officer

Manicurists and Pedicurists (SOC 39-5092): Clean and shape customers' fingernails and toenails. May polish or decorate nails. Sample job titles include:

- Pedicurist
- Manicurist
- Nail Artist
- Nail Technician
- Fingernail Technician

Parts Salespersons (SOC 41-2022): Sell spare and replacement parts and equipment in repair shop or parts store. Sample job titles include:

- Parts Clerk
- Parts Professional
- Parts Counterperson
- Salesperson
- Wholesale Parts Salesperson

Payroll and Timekeeping Clerks (SOC 43-3051): Compile and record employee time and payroll data. May compute employees' time worked, production, and commission. May compute and post wages and deductions or prepare paychecks. Sample job titles include:

- Timekeeper
- Personnel Assistant
- Payroll Specialist
- Payroll Technician

Procurement Clerks (SOC 43-3061): Compile information and records to draw up purchase orders for procurement of materials and services. Sample job titles include:

- Purchasing Clerk
- Procurement Assistant
- Warehouse Technician
- Purchasing Specialist

Property, Real Estate, and Community Association Managers (SOC 11-9141): Plan, direct, or coordinate the selling, buying, leasing, or governance activities of commercial, industrial, or residential real estate properties. Includes managers of homeowner and condominium associations, rented or leased housing units, buildings, or land (including rights-of-way). Sample job titles include:

- Property Manager
- Apartment Manager
- Lease Administration Supervisor
- Resident Manager
- On Site Property Manager

Real Estate Brokers (SOC 41-9021): Operate real estate office, or work for commercial real estate firm, overseeing real estate transactions. Other duties usually include selling real estate or renting properties and arranging loans. Sample job titles include:

- Broker
- Realtor
- Designated Broker
- Broker Associate
- Real Estate Sales Associate
- Broker Assistant

Real Estate Sales Agents (SOC 41-9022): Rent, buy, or sell property for clients. Perform duties, such as study property listings, interview prospective clients, accompany clients to property site, discuss conditions of sale, and draw up real estate contracts. Includes agents who represent buyer. Sample job titles include:

- Realtor
- Sales Agent
- Real Estate Broker Associate
- Real Estate Salesperson

Sales and Related Workers, All Other (SOC 41-9099): All sales and related workers not listed separately. Data is not available for this type of title.

Sales Representatives, Services, All Other (SOC 41-3099): All services sales representatives not listed separately. Sample job title includes:

- Energy Auditors (41-3099.01): Buy or sell energy products on the behalf of residential or commercial customers or utilities. Negotiate and oversee contracts for energy sales.

Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products (SOC 41-4012): Sell goods for wholesalers or manufacturers to businesses or groups of individuals. Work requires substantial knowledge of items sold. Sample job titles include:

- Account Executive
- Account Representative
- Sales Consultant
- Outside Sales Representative
- Account Manager

Secretaries and Administrative Assistants, Except Legal, Medical, and Executive (SOC 43-6014): Perform routine clerical and administrative functions such as drafting correspondence, scheduling appointments, organizing and maintaining paper and electronic files, or providing information to callers. Sample job titles include:

- Secretary
- School Attendance Secretary
- Office Assistant
- Department Secretary
- Administrative Associate
- Staff Assistant

Skincare Specialists (SOC 39-5094): Provide skincare treatments to face and body to enhance an individual's appearance. Includes electrologists and laser hair removal specialists. Sample job titles include:

- Esthetician
- Skin Care Specialist
- Facialist
- Spa Technician
- Skin Care Specialist

Tax Preparers (SOC 13-2082): Prepare tax returns for individuals or small businesses. Sample job titles include:

- Tax Specialist
- Tax Consultant
- Income Tax Preparer
- Tax Professional
- Tax Advisor

Tellers (SOC 43-3071): Receive and pay out money. Keep records of money and negotiable instruments involved in a financial institution's various transactions. Sample job titles include:

- Bank Teller
- Roving Teller
- Personal Banking Representative
- Member Services Representative
- Customer Service Associate
- Customer Relationship Specialist

Training and Development Specialists (SOC 13-1151): Design and conduct training and development programs to improve individual and organizational performance. May analyze training needs. Sample job titles include:

- Training Coordinator
- Training Specialist
- Technical Trainer
- Job Training Specialist
- Computer Training Specialist
- Corporate Trainer

APPENDIX C: BUSINESS AND ENTREPRENEURSHIP DEMAND AND SUPPLY DATA

The following tables compare labor market demand and program supply by occupation. Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for that occupation. Therefore, the COE de-duplicated TOP codes that train for more than one occupation to avoid counting program supply more than once. This de-duplication process is denoted by the "Accounted for Above" statements in the tables on the following pages.

Additionally, the COE reviewed program data from the LaunchBoard[8] and the statewide COE Supply Table[9] and identified conflicting information. For certain occupations, LaunchBoard indicates that a college has a program for that occupation, but the COE Supply Table does not show program data for that college, and vice versa. These discrepancies are marked with the following:

> +The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard
>
> *LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

The demand and supply tables in the following pages have three categories:

1. **Supply Gap** – If Average Annual Openings exceed Average Annual Awards by more than 25 percent, then the cell is shaded in light green.
2. **Supply Met** – If Average Annual Openings is within 25 percent +/- of Average Annual Awards, then the cell is shaded in light blue.
3. **Oversupply** – If Average Annual Openings exceed the Average Annual Awards by more than 25 percent, then the cell is shaded in red.

[8] calpassplus.org/LaunchBoard/Home.aspx
[9] coeccc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

DEMAND AND SUPPLY DATA FOR BUSINESS AND ENTREPRENEURSHIP TOP MIDDLE-SKILL JOBS IN ORANGE COUNTY

\+ The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table
~ Noncredit awards
^ North Orange Continuing Education is also known as North Orange Adult in the California Community Colleges Chancellor's Office Management Information System

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Bookkeeping, Accounting, and Auditing Clerks	2,383	Supply Gap	618	Accounting	0502.00	Coastline	73
						Cypress	8
						Fullerton	14
						Golden West	23
						Irvine	150
						Orange Coast	24
						North Orange Adult*	0
						Saddleback	32
						Santa Ana	274
						Santiago Canyon	4
					CIP 52.0302	InterCoast Colleges-Anaheim	7
						Southern California Institute of Technology	9
Sales Representatives, Services, All Other	2,009	Supply Gap	0	Sales and Salesmanship	0509.40	Orange Coast*	0
First-Line Supervisors of Office and Administrative Support Workers	1,986	Supply Gap	238	Management Development and Supervision	0506.30	Cypress*	0
						Coastline	207
						Golden West*	0
						Irvine+	1
						Orange Coast*	0
						Saddleback	25
					CIP 52.0204	Allied American University	4
					CIP 52.0205	University of Phoenix-California	1
				E-Commerce (business emphasis)	0509.70	Fullerton*	0
						Golden West*	0
						Santiago Canyon*	0
				Office Management	0514.40	No Programs	0
Insurance Sales Agents	1,216	Supply Gap	0	Sales and Salesmanship	0509.40	Orange Coast*	0
				Insurance	0512.00	No Programs	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Loan Officers	844	Supply Gap	4	Escrow	0511.10	Saddleback	4
						Irvine*	0
Executive Secretaries and Executive Administrative Assistants	779	Supply Gap	0	Office Technology/Office Computer Applications	0514.00	Already Accounted For	0
Real Estate Sales Agents	648	Supply Gap	49	Sales and Salesmanship	0509.40	Already Accounted For	0
				Real Estate	0511.00	Coastline	5
						Fullerton	1
						Irvine	13
						Orange Coast	4
						Saddleback	16
						Santiago Canyon	3
					CIP 52.1501	Allied American University	7
				Escrow	0511.10	Already Accounted For	0
Administrative Services Managers	471	Oversupply	2,876	Business and Commerce, General	0501.00	Coastline	1
						Fullerton*	0
						Golden West	2
						North Orange Adult*	0
						Orange Coast	4
						Saddleback	11
						Santa Ana*	0
						Santiago Canyon*	0
					52.01.01	Argosy University-Orange County	1
				Business Administration	0505.00	Coastline	760
						Cypress+	163
						Fullerton	182
						Golden West	145
						Irvine+	192
						Orange Coast+	330
						Saddleback	194
						Santa Ana	196
						Santiago Canyon	184
					CIP 52.0201	Allied American University	59
						Bristol University	2
						Trident University International	1

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
						University of Phoenix-California	1
				Business Management	0506.00	Coastline	218
						Cypress	4
						Fullerton	108
						Golden West	6
						Irvine	9
						North Orange Adult~^	15
						Orange Coast	5
						Santa Ana	32
						Santiago Canyon	6
				Management Development and Supervision	0506.30	Already Accounted For	0
				Small Business and Entrepreneurship	0506.40	Coastline	5
						Cypress	8
						Fullerton+	2
						Golden West	1
						Irvine	11
						Orange Coast*	0
						Saddleback	2
						Santa Ana	6
						Santiago Canyon+	2
				Other Business and Management	0599.00	North Orange Adult~^	8
						Santa Ana*	0
						Santiago Canyon*	0
				Office Management	0514.40	No Programs	0
Property, Real Estate, and Community Association Managers	455	Supply Gap	0	Real Estate	0511.00	Already Accounted For	0
Training and Development Specialists	346	Supply Gap	7	Educational Technology	0860.00	Saddleback+	7
Sales and Related Workers, All Other	311	Supply Gap	0	Sales and Salesmanship	0509.40	Already Accounted For	0
Claims Adjusters, Examiners, and Investigators	289	Supply Gap	0	Insurance	0512.00	No Programs	0
Payroll and Timekeeping Clerks	274	Supply Gap	0	Accounting	0502.00	Already Accounted For	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Tax Preparers	243	Supply Gap	21	Accounting	0502.00	Already Accounted For	0
				Tax Studies	0502.10	Coastline*	0
						Golden West*	0
						Irvine	17
						Orange Coast*	0
						Saddleback	4
						Santa Ana*	0
Real Estate Brokers	212	Supply Gap	0	Real Estate	0511.00	Already Accounted For	0
				Escrow	0511.10	Already Accounted For	0
Advertising Sales Agents	211	Supply Gap	0	Advertising	0509.10	Orange Coast*	0
						Cypress*	0
				Sales and Salesmanship	0509.40	Already Accounted For	0
Compensation, Benefits, and Job Analysis Specialists	83	Supply Gap	0	N/A	N/A	No Programs	0
Appraisers and Assessors of Real Estate	79	Supply Gap	0	Real Estate	0511.00	Already Accounted For	0
				Escrow	0511.10	Already Accounted For	0
Credit Counselors	66	Supply Gap	0	Banking and Finance	0504.00	Coastline*	0
						Fullerton*	0
						Golden West*	0
						Santa Ana*	0
Brokerage Clerks	65	Supply Gap	0	Accounting	0502.00	Already Accounted For	0

DEMAND AND SUPPLY DATA FOR BUSINESS AND ENTREPRENEURSHIP MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table
~ Noncredit awards
^ North Orange Continuing Education is also known as North Orange Adult in the California Community Colleges Chancellor's Office Management Information System

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Customer Service Representatives	3,453	Supply Gap	0	Sales and Salesmanship	0509.40	Already Accounted For	0
				Customer Service	0518.00	Santa Ana*	0
				Consumer Services	1301.10	Orange Coast*	0
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2,835	Supply Gap	222	Office Technology/Office Computer Applications	0514.00	Coastline	35
						Cypress	9
						Golden West	5
						Irvine	4
						North Orange Adult*^	0
						Saddleback	7
						Santa Ana	65
						Santiago Canyon	64
					CIP 52.0401	InterCoast Colleges-Anaheim	1
					CIP 52.0408	United Education Institute-Anaheim	32
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1,770	Supply Gap	86	International Business and Trade	0508.00	Fullerton	1
						Orange Coast	10
						Saddleback	5
						Santa Ana	40
				Marketing and Distribution	0509.00	Coastline*	0
						Cypress	9
						Fullerton	1
						Golden West	1
						Irvine*	0
						Orange Coast	7
						Saddleback	2
						Santa Ana	2
						Santiago Canyon	4
					CIP 52.1401	Allied American University	3

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Sales and Salesmanship	0509.40	Already Accounted For	0
				Display	0509.60	Orange Coast	1
Hairdressers, Hairstylists, and Cosmetologists	1,079	Oversupply	2,303	Cosmetology and Barbering	3007.00	Fullerton	120
						Golden West	100
						Saddleback	121
						Santiago Canyon	65
					CIPs Included 12.0401; 12.0402; 12.0406; 12.0409; 12.0410; 12.0413	Advance Beauty College	505
						Asian-American International Beauty College	452
						Career Academy of Beauty	141
						Coastline Beauty College	114
						Coba Cosmetology Academy	21
						Colleen O'Haras Beauty Academy	62
						CRU Institute of Cosmetology and Barbering	32
						Hair California Beauty Academy	20
						Paul Mitchell the School-Costa Mesa	169
						Real Barbers College	72
						Santa Ana Beauty Academy	33
						Santa Ana Beauty College	246
						Thanh Le College School of Cosmetology	30
Loan Interviewers and Clerks	734	Supply Gap	0	Banking and Finance	0504.00	Already Accounted For	0
Tellers	628	Supply Gap	0	Banking and Finance	0504.00	Already Accounted For	0
Manicurists and Pedicurists	577	Supply Gap	0	Cosmetology and Barbering	3007.00	Already Accounted For	0
Bill and Account Collectors	533	Supply Gap	0	Banking and Finance	0504.00	Already Accounted For	0
Legal Secretaries	337	Supply Gap	231	Legal Office Technology	CIP 22.0301	South Coast College	5
				Paralegal	1402.00	Coastline	71
						Fullerton	50
						Irvine	30
						Santa Ana	46
					CIP 22.0302	Bristol University	5
						InterCoast Colleges-Anaheim	1
						South Coast College	23

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Data Entry Keyers	300	Supply Gap	0	Office Technology/Office Computer Applications	0514.00	Already Accounted For	0
Parts Salespersons	255	Supply Gap	0	Sales and Salesmanship	0509.40	Already Accounted For	0
Human Resources Assistants, Except Payroll and Timekeeping	193	Supply Gap	0	N/A	N/A	No Programs	0
Skincare Specialists	154	Supply Gap	0	Cosmetology and Barbering	3007.00	Already Accounted For	0
Procurement Clerks	99	Supply Gap	0	Purchasing	0509.20	Coastline*	0
				Office Technology/Office Computer Applications	0514.00	Already Accounted For	0
Barbers	82	Supply Gap	0	Cosmetology and Barbering	3007.00	Already Accounted For	0

2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

ENERGY, CONSTRUCTION, AND UTILTIES

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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

ENERGY, CONSTRUCTION, AND UTILITIES
Demand and Supply Analysis: Orange County

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Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; 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 the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host college/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.

INTRODUCTION

This sector brief is a product of the Orange County Sector Analysis Project. It provides information about the Energy, Construction, and Utilities sector in Orange County, one of Orange County's six priority sectors; it compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in this report for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. Two of these focus groups were specific to the Energy, Construction, and Utilities sector. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

In this brief, 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.

In this brief, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of this report, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the purpose of this

[1] https://insightcced.org/2018-family-needs-calculator/

report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A.

FOCUS GROUP INSIGHTS

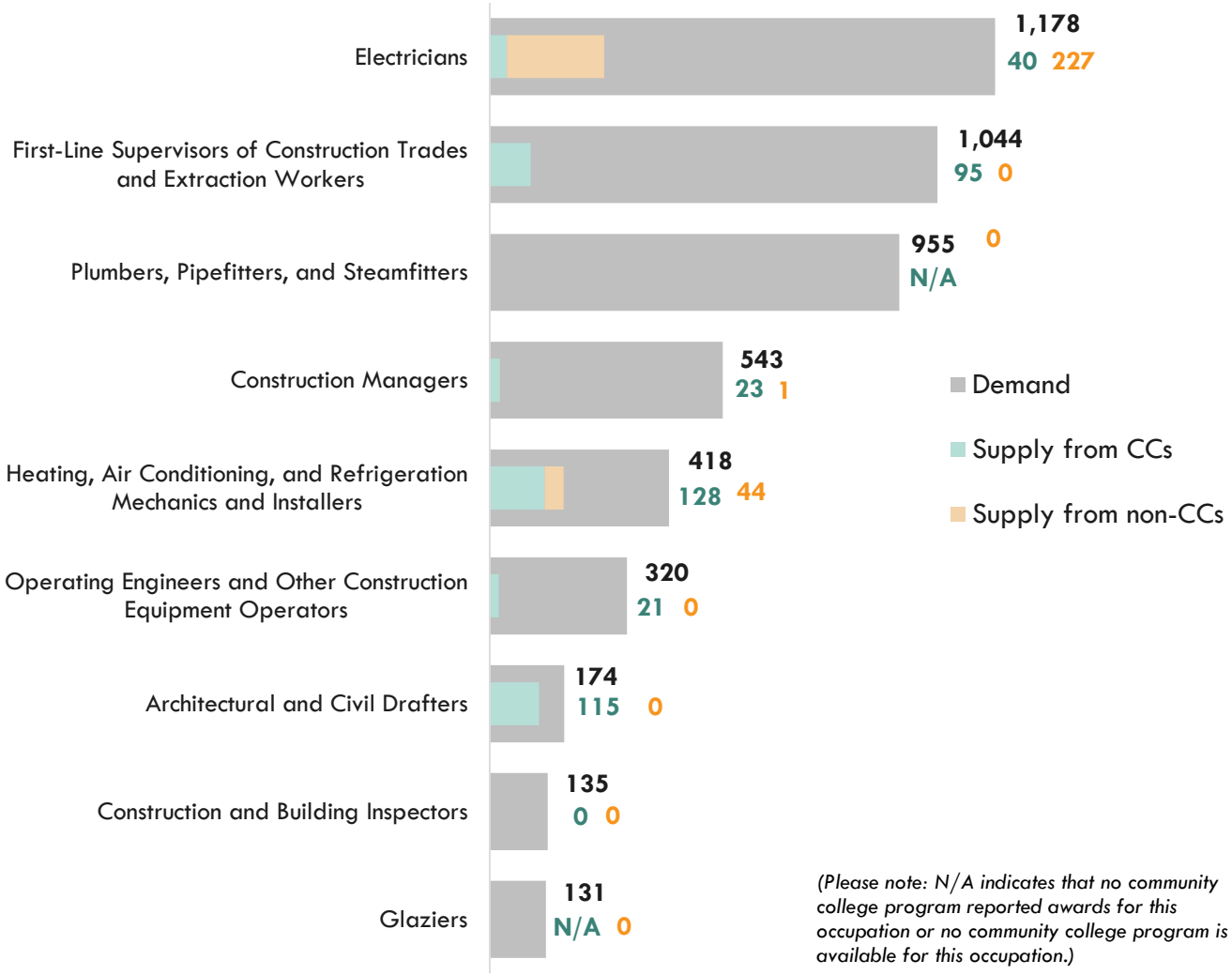
The Energy, Construction, and Utilities sector was split into two focus groups that were held on different days and included a total of two faculty members and two administrators from 10 institutions – five of the nine community colleges, and one noncredit school – that offered Energy, Construction, and Utilities programs in Orange County between 2015 and 2017. Both the statewide and regional director for employer engagement also attended one of the two focus groups.

Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to the Energy, Construction, and Utilities sector. This sector-specific information is highlighted throughout this report in the Focus Group Insights and the Focus Group Insights – The Big Picture sections.

ENERGY, CONSTRUCTION, AND UTILITIES TOP MIDDLE-SKILL JOBS

This section compares Orange County's labor market demand for the top middle-skill jobs in Energy, Construction, and Utilities with program supply from the region's community colleges and non-community college providers (Exhibit 1). As seen in Exhibit 2, the entry-level wages[2] for these top middle-skill jobs are higher than the $17.39 per hour living wage. Descriptions for each occupational title can be found in Appendix B. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix C.

Exhibit 1. Energy, Construction and Utilities Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

[2] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

FOCUS GROUP INSIGHTS

Missing TOP Codes, Occupations, and Cross-Sector Programs

Focus group participants pointed out that at least two programs, Electronics and Electric Technology (TOP code 0934.00) and Industrial Electronics (TOP code 0934.20) were not included in this sector brief. Because the California Community Colleges Chancellor's Office (CCCCO) only allows TOP codes to be assigned to one sector and they have determined that these programs, and occupations related to those programs, belong to the Advanced Manufacturing sector they are not included in this sector brief and are instead analyzed in their assigned sector's brief. Focus group participants acknowledged this shortcoming and pointed out that sectors, particularly Energy, Construction, and Utilities and Advanced Manufacturing, are being blended together as technology evolves. Though programs are assigned to sectors, the skills taught in these programs could transfer to several sectors and make students more attractive to employers.

> *"Technologies are being used in all sectors and are blending sectors together…what used to be Advanced Manufacturing has turned more into construction and utilities, which has elements of factory work because of the integration of technology"*
> *– Saddleback College Administrator*

All focus group participants agreed that there are several problems with the TOP code system. The statewide director for employer engagement said that skill sets, competencies, and student learning outcomes (SLOs), do not always align with the available TOP codes. Faculty members and administrators also pointed out that there is no TOP code for automation, so it is not possible to capture a full picture of supply from programs related to automation.

Additionally, one faculty member pointed out that the Water and Wastewater Treatment Plant and System Operators (SOC Code 51-8031) occupation was not included in the supply and demand analysis. Because this occupation had less than 50 annual job openings, it did not meet the threshold to be included, as defined in the methodology in Appendix A.

Local Low-Unit Certificates

Focus group participants felt that supply data from traditional labor market information is limited; it does not capture locally issued low-unit certificates that are not reported to, or approved by, the CCCCO. According to focus group participants, Energy, Construction, and Utilities programs attract industry professionals who are interested in upskilling or learning new skills for their current jobs. However, the supply data does not capture students that take a small number of courses to gain additional skills. If colleges do not report data for low-unit certificate programs. This could result in an under-reporting of the supply number.

Exhibit 2. Energy, Construction, and Utilities Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages

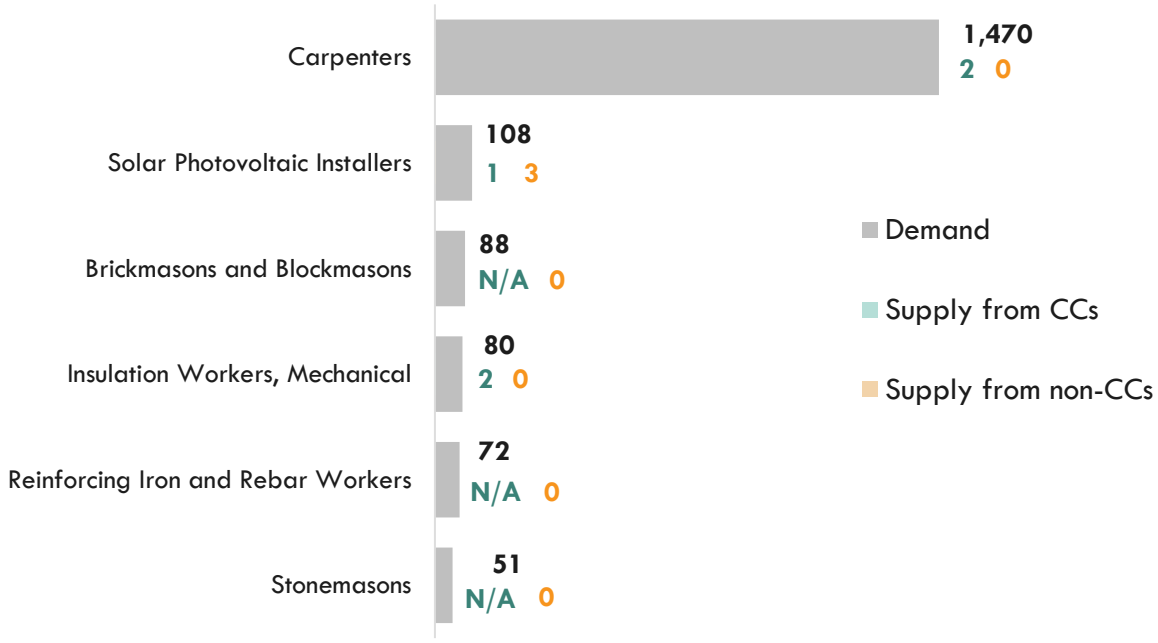
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
47-2111	Electricians	1,178	$17.93	$26.22
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	1,044	$26.88	$36.62
47-2152	Plumbers, Pipefitters, and Steamfitters	955	$17.52	$24.89
11-9021	Construction Managers	543	$20.89	$41.93
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	418	$17.57	$23.85
47-2073	Operating Engineers and Other Construction Equipment Operators	320	$26.93	$36.64
17-3011	Architectural and Civil Drafters	174	$22.65	$27.92
47-4011	Construction and Building Inspectors	135	$32.54	$39.80
47-2121	Glaziers	131	$20.70	$27.48

ENERGY, CONSTRUCTION, AND UTILITIES MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the California Family Needs Calculator, but median wages above it. Since wages generally increase with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibit 3, middle-skill Energy, Construction, and Utilities jobs with entry-level wages below the California Family Needs Calculator have a significant number of annual job openings (labor market demand).

Exhibit 3. Energy, Construction and Utilities Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand vs. Program Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

While these occupations have entry-level wages below the California Family Needs Calculator of $17.39 per hour, occupations such as Carpenters; Solar Photovoltaic Installers; Brickmasons and Blockmasons; and Insulation Workers, Mechanical have median wages higher than the regional living wage as denoted via the gray shading in Exhibit 4.

Exhibit 4. Energy, Construction, and Utilities Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
47-2031	Carpenters	1,470	$14.75	$21.72
47-2231	Solar Photovoltaic Installers	108	$16.86	$19.38
47-2021	Brickmasons and Blockmasons	88	$16.10	$23.75
47-2132	Insulation Workers, Mechanical	80	$16.80	$23.44
47-2171	Reinforcing Iron and Rebar Workers	72	$14.44	$16.47
47-2022	Stonemasons	51	$13.52	$15.02

FOCUS GROUP INSIGHTS

Low Completion Numbers

According to the demand and supply exhibits in this brief, the community colleges in Orange County are undersupplying for both top middle-skill jobs and jobs that have entry-level wages below the regional living wage, but median wages above the regional living wage. According to the CCCCO's dashboard tool, LaunchBoard[3], 7,953 (unduplicated) students took one or more courses in Energy, Construction, and Utilities programs in the 2016-17 program year in Orange County. However, in that same year, only 296 students earned a certificate or degree. Focus group participants explained that several students enroll in one or two courses to gain a skill, but do not complete the program. Some reasons that students do not complete the program is because they are "skills-builders" that have gained specific skills and do not need a degree or certificate to find employment, are currently working and go back to their current job after gaining skills, or because employers are hiring at a fast pace and it is easy for students to find a job. One faculty member suggested that, if students do not need to complete an existing full certificate to gain employment, some programs could be truncated to help improve completion and/or moved to noncredit.

> *"Right now, any CTE program is on the table to go to noncredit"*
> *– Saddleback College Administrator*

Faculty members noted that it is difficult to track these students after they leave. Additionally, faculty members said that colleges generally do not have good metrics on non-completers. Colleges could consider using the CTE Outcomes Survey (CTEOS) to help track outcomes for non-completers and skills-builders.

Noncredit Programs

Faculty and administrators said that low completion numbers could also be because noncredit awards are not being consistently reported for all Orange County colleges. If colleges are not reporting their noncredit awards, data for noncredit programs will not be included in Data Mart, LaunchBoard, or the COE's supply table. One administrator noted that the dollar per career development/college preparatory (CDCP) FTES for noncredit has increased and is now the same as it is for credit, so it is particularly important for colleges to look into their noncredit data and make sure it is being reported correctly.

[3] calpassplus.org/Launchboard/Community-College-Pipeline.aspx

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed other issues and challenges that cannot be captured by traditional labor market information and provided insight on the tactics colleges and employers are currently using to address supply gaps in the Energy, Construction, and Utilities sector.

How Employers are Filling Supply Gaps

According to focus group participants, employers are primarily relying on apprenticeships and poaching from other companies to fill supply gaps. Companies are also adding additional workload to their current workforce in order to meet production goals. Faculty members also noted that companies sometimes attend college career fairs or will reach out directly to colleges to find workers.

> *"We're hearing that employers are having a hard time filling positions. [Employers say] A lot of times it's just a situation of 'post and pray.'"*
> *– Statewide Director for Employer Engagement*

Creative Ways Community Colleges are Offering Programs

Focus group participants discussed several creative ways they are offering programs and some of the challenges they face when developing new ways to offer programs:

- The regional director for employer engagement and faculty noted that compressed schedules for eight weeks or during the four-week intersession work well for students.
- Fullerton College has created articulation agreements with the K-12 system within the North Orange County Community College District so that high school academy students can earn college units while in high school. It may be of interest to note that according to LaunchBoard. The Energy, Construction, and Utilities sector has the lowest percentage of students that are age 19 or younger (13%) across all priority and emerging sectors in Orange County. These efforts could help increase the number of young students taking courses in this sector.
- The regional director for employer engagement has been working with six community colleges throughout Orange County to create a collaborative Industrial Automation program. Articulation agreements will be developed so students will be able to take a sequence of core courses at any participating college in the region, then take specialty courses at another college, if they desire.
- One faculty member said that they are exploring simulations as an alternative to expensive training equipment. However, focus group participants agreed that there is no consensus from employers on whether or not simulation is an adequate form of training.

Challenges in Expanding Programs

Focus group participants identified several challenges to expanding programs in the Energy, Construction, and Utilities sector. Many of these challenges, including the lack of dedicated lab space, difficulty hiring faculty and staff, and high costs for equipment, cut across all sectors. However, a unique challenge for this sector is the difficulty in finding Heating, Ventilation, and Air Conditioning (HVAC) faculty members as well recruiting faculty that have sector-specific required industry certifications or credentials. One administrator noted that they are having difficulty finding construction safety instructors because candidates do not have OSHA 30 certification.

KEY FINDINGS: ENERGY, CONSTRUCTION, AND UTILITIES

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. All Energy, Construction, and Utilities middle-skill jobs in Orange County have supply gaps.
2. The following occupations with entry-level wages below the California Family Needs Calculator have median wages at or above the California Family Needs Calculator:
    - Carpenters
    - Solar Photovoltaic Installers
    - Brickmasons and Blockmasons
    - Insulation Workers, Mechanical
3. Only two programs in Orange County reported noncredit awards for the Energy, Construction, and Utilities sector:
    - Electrical (0952.20) at North Orange Continuing Education[4]
    - Construction Crafts Technology (0952.00) at Santa Ana College
4. Of the 15 occupations (SOC codes) analyzed in this brief for the Energy, Construction, and Utilities sector, there is a labor market demand of 6,767 annual job openings, a program supply of 702 awards, which creates a sector supply gap of 6,065 awards.

6,767	702	6,065
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. According to the focus groups, there is a significant amount of overlap in skills between the Energy, Construction, and Utilities and Advanced Manufacturing sectors. Faculty and the regional director for employer engagement in each sector could work with each other to develop cross-sector training programs that provides students with a diverse skill set that can be applied towards occupations in both sectors.
2. Based on the focus group discussion, a significant amount of noncredit awards are not being reported. To better understand noncredit reporting, faculty and administrators could use the data from this report and work with their Institutional Research offices to see how noncredit information is collected locally and reported to the CCCCO. More accurate reporting could increase the both the sector metrics and the amount of funding colleges receive while also helping the COE more accurately measure supply for each occupation.
3. According to LaunchBoard, the Energy, Construction, and Utilities sector has the lowest percentage of students that are age 19 or younger (13%) across all priority and emerging sectors in Orange County. Colleges could explore partnerships with the K-12 system and targeted marketing efforts to attract younger students to enroll in programs that will train them for in-demand, high wage jobs.

[4] Data for North Orange Continuing Education is captured as "North Orange Adult" in the California Community Colleges Chancellor's Office Management Information System DataMart

4. Colleges could consider using the CTE Outcomes Survey (CTEOS) to help track outcomes for non-completers and skills-builders.

APPENDIX A: METHODOLOGY AND ENERGY, CONSTRUCTION, AND UTILITIES DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in this brief, the COE first reviewed the TOP codes associated with the sector and then matched them with the SOC codes. According to the CCC, the following six-digit TOP codes define the Energy, Construction, and Utilities sector:

TOP6 Program Name	TOP6 Code
Architectural Drafting	0953.10
Architecture and Architectural Technology	0201.00
Carpentry	0952.10
Civil and Construction Management Technology	0957.00
Civil Drafting	0953.20
Construction Crafts Technology	0952.00
Construction Inspection	0957.20
Drafting Technology	0953.00
Drywall and Insulation	0952.80
Electrical	0952.20
Electrical Systems and Power Transmission	0934.40
Electro-Mechanical Technology	0935.00
Energy Systems Technology	0946.10
Environmental Control Technology	0946.00
Glazing	0952.40
Masonry, Tile, Cement, Lath and Plaster	0952.60
Mill and Cabinet Work	0952.50
Other Architecture and Environmental Design	0299.00
Painting, Decorating, and Flooring	0952.70
Plumbing, Pipefitting and Steamfitting	0952.30
Public Works	2102.10
Roofing	0952.90
Sheet Metal and Structural Metal	0956.40
Water and Wastewater Technology	0958.00

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[5] system and identified approximately 300 occupational codes as middle-skill jobs.

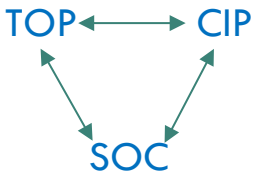
Middle-skill jobs include:

- 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.

For this study, the COE analyzed occupations with a labor market demand of at least 50 annual job openings. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[6] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.
- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



The 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 data comes from the California Community Colleges Chancellor's Office (CCCCO) MIS Data Mart (datamart.cccco.edu) and CIP 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.

Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of this study.

[5] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.
[6] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

To create the invite list of faculty and administrators, Regional Directors for Employer Engagement and career education deans at each college were asked to identify faculty and administrators that could represent their respective colleges in the sector-specific focus groups. Once this list was compiled, the career education deans invited faculty and administrators to express their interest in participating in a focus group via email. The email introduced the COE, provided an overview of the Orange County Sector Analysis Project, described the goals of the focus groups, and informed faculty that they would be compensated for their participation, and that lunch would be provided for all participants. All those that stated their interest were then connected with the COE who managed the focus groups scheduling and details.

In order to be as inclusive as possible, 12 focus groups were scheduled for the eight sectors – four sectors had one focus group each and four sectors had two focus groups each, during a three-week period from July to August 2019. All focus groups participants received a confirmation email before the event that included the focus group agenda, their sector-specific draft brief, and a pre-assignment with questions based off of the information contained in the draft sector briefs. Focus group participants were instructed to complete and bring the pre-assignment to the convening so that they were prepared to discuss the data, the challenges they face in their programs, and strategies to close supply gaps. Each focus groups was recorded, with permission of the participants, by the COE solely for transcription purposes.

The COE conducted no more than two focus group sessions per day. During the focus groups the Orange County Sector Analysis Project was explained and then the information contained in the draft sector briefs was presented in detail. Participants were encouraged to ask questions and engage in dialogue throughout the entire focus group session. The COE took notes of each discussion as well as recorded the sessions, with permission of the participants and solely for transcription purposes.

Following the conclusion of the focus groups, the COE compiled the audio files, transcripts, notes, and pre-assignments to conduct a qualitative analysis of the themes for each focus group and to identify commonalities across multiple focus groups. The findings from this analysis have been highlighted throughout this report in the "Focus Group Insight" sections.

APPENDIX B: DEFINITIONS FOR ENERGY, CONSTRUCTION, AND UTILITIES MIDDLE-SKILL JOBS

The following definitions and sample job titles for each occupation are derived from O*NET, the nation's primary source of occupational information. The O*NET database contains hundreds of standardized and occupation-specific descriptors on nearly 1,000 occupations. O*NET is developed and sponsored by the U.S. Department of Labor[7]

Architectural and Civil Drafters (SOC 17-3011): Prepare detailed drawings of architectural and structural features of buildings or drawings and topographical relief maps used in civil engineering projects, such as highways, bridges, and public works. Use knowledge of building materials, engineering practices, and mathematics to complete drawings. Sample job titles include:

- Architectural Technician
- Intern Architect
- Drafting Technician
- Computer-Aided Drafting and Design Operator

Brickmasons and Blockmasons (SOC 47-2021): Lay and bind building materials, such as brick, structural tile, concrete block, cinder block, glass block, and terra-cotta block, with mortar and other substances to construct or repair walls, partitions, arches, sewers, and other structures. Sample job titles include:

- Mason
- Bricklayer
- Block Layer
- Masonry Installer
- Concrete Finisher
- Brick and Block Mason

Carpenters (SOC 47-2031): Construct, erect, install, or repair structures and fixtures made of wood, such as concrete forms; building frameworks, including partitions, joists, studding, and rafters; and wood stairways, window and door frames, and hardwood floors. May also install cabinets, siding, drywall and batt or roll insulation. Includes brattice builders who build doors or brattices (ventilation walls or partitions) in underground passageways. Sample job titles include:

- Framer
- Production Worker
- Construction Worker
- Bridge Carpenter
- Form Carpenter
- Rough Carpenter

Construction and Building Inspectors (SOC 47-4011): Inspect structures using engineering skills to determine structural soundness and compliance with specifications, building codes, and other regulations. Inspections may be general in nature or may be limited to a specific area, such as electrical systems or plumbing. Sample job titles include:

- Plumbing Inspector
- Home Inspector
- Elevator Inspector
- Construction Inspector
- Building Inspector
- Construction Materials Testing Technician

Construction Managers (SOC 11-9021): Plan, direct, or coordinate, usually through subordinate supervisory personnel, activities concerned with the construction and maintenance of structures, facilities, and systems. Participate in the conceptual development of a construction project and oversee its organization, scheduling, budgeting, and implementation. Includes managers in specialized construction fields, such as carpentry or plumbing. Sample job titles include:

- Construction Superintendent
- General Contractor
- Construction Area Manager
- Senior Site Manager
- Project Superintendent
- Construction Foreman

[7] https://www.onetonline.org/

Electricians (SOC 47-2111): Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems. Sample job titles include:

- Maintenance Electrician
- Industrial Electrician
- Control Electrician
- Qualified Craft Worker, Electrician
- Mechanical Trades Specialist, Electrician
- Inside Wireman

First-Line Supervisors of Construction Trades and Extraction Workers (SOC 47-1011): Directly supervise and coordinate activities of construction or extraction workers. Sample job title includes:

- Construction Supervisor
- Field Supervisor
- Working Supervisor
- Welding Foreman
- Solar Installation Manager
- Residential Field Manager

Glaziers (SOC 47-2121): Install glass in windows, skylights, store fronts, and display cases, or on surfaces, such as building fronts, interior walls, ceilings, and tabletops. Sample job titles include:

- Glass Installer
- Commercial Glazier
- Glass Technician
- Automobile Glass Technician

Heating, Air Conditioning, and Refrigeration Mechanics and Installers (SOC 49-9021): Install or repair heating, central air conditioning, or refrigeration systems, including oil burners, hot-air furnaces, and heating stoves. Sample job titles include:

- Refrigeration Mechanic
- Systems Mechanic
- Service Technician
- Maintenance Mechanic
- Refrigeration Technician
- Transportation Refrigeration Technician

Insulation Workers, Mechanical (SOC 47-2132): Apply insulating materials to pipes or ductwork, or other mechanical systems in order to help control and maintain temperature. Sample job titles include:

- Pipe Coverer
- Sheet Metal Insulator
- Heat and Frost Insulator
- Scaffold Builder
- Mechanical Insulator
- Insulation Installer

Operating Engineers and Other Construction Equipment Operators (SOC 47-2073): Operate one or several types of power construction equipment, such as motor graders, bulldozers, scrapers, compressors, pumps, derricks, shovels, tractors, or front-end loaders to excavate, move, and grade earth, erect structures, or pour concrete or other hard surface pavement. May repair and maintain equipment in addition to other duties. Sample job titles include:

- Scraper Operator
- Motor Grader Operator
- Loader Operator
- Excavator Operator
- Heavy Equipment Operator
- Roller Operator

Plumbers, Pipefitters, and Steamfitters (SOC 47-2152): Assemble, install, alter, and repair pipelines or pipe systems that carry water, steam, air, or other liquids or gases. May install heating and cooling equipment and mechanical control systems. Includes sprinkler fitters. Sample job titles include:

- Sprinkler Fitter
- Pipe Fitter
- Steamfitter
- Service Plumber
- Residential Plumber
- Plumbing and Heating Mechanic

Reinforcing Iron and Rebar Workers (SOC 47-2171): Position and secure steel bars or mesh in concrete forms in order to reinforce concrete. Use a variety of fasteners, rod-bending machines, blowtorches, and hand tools. Includes rod busters. Sample job titles include:

- Rodbuster
- Steel Tier
- Ironworker Foreman
- Ironworker
- Rodman
- Field Ironworker

Solar Photovoltaic Installers (SOC 47-2231): Assemble, install, or maintain solar photovoltaic (PV) systems on roofs or other structures in compliance with site assessment and schematics. May include measuring, cutting, assembling, and bolting structural framing and solar modules. May perform minor electrical work such as current checks. Sample job titles include:

- Photovoltaic Installer
- Solar Technician
- Solar Tech
- Solar Installer Technician
- Solar Designer/Installer
- PV Installer Tech

Stonemasons (SOC 47-2022): Build stone structures, such as piers, walls, and abutments. Lay walks, curbstones, or special types of masonry for vats, tanks, and floors. Sample job titles include:

- Stone Setter
- Tile Setter
- Stone Repairer
- Stone Paver
- Monument Setter

APPENDIX C: ENERGY, CONSTRUCTION, AND UTILITIES DEMAND AND SUPPLY DATA

The following tables compare labor market demand and program supply by occupation. Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for that occupation. Therefore, the COE de-duplicated TOP codes that train for more than one occupation to avoid counting program supply more than once. This de-duplication process is denoted by the "Accounted for Above" statements in the tables on the following pages.

Additionally, the COE reviewed program data from the LaunchBoard[8] and the statewide COE Supply Table[9] and identified conflicting information. For certain occupations, LaunchBoard indicates that a college has a program for that occupation, but the COE Supply Table does not show program data for that college, and vice versa. These discrepancies are marked with the following:

+ The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard

* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

The demand and supply tables in the following pages have three categories:

1. **Supply Gap** – If Average Annual Openings exceed Average Annual Awards by more than 25 percent, then the cell is shaded in light green.
2. **Supply Met** – If Average Annual Openings is within 25 percent +/- of Average Annual Awards, then the cell is shaded in light blue.
3. **Oversupply** – If Average Annual Openings exceed the Average Annual Awards by more than 25 percent, then the cell is shaded in red.

[8] calpassplus.org/LaunchBoard/Home.aspx
[9] coeccc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

DEMAND AND SUPPLY DATA FOR TOP ENERGY, CONSTRUCTION, AND UTILITIES MIDDLE-SKILL JOBS IN ORANGE COUNTY

+ The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table
~ Noncredit awards
^ North Orange Continuing Education is also known as North Orange Adult in the California Community Colleges Chancellor's Office Management Information System

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Electricians	1,178	Supply Gap	267	Electrical	0952.20	Irvine	5
						Santiago Canyon	25
						North Orange Adult~^	10
						Orange Coast*	0
					CIP 46.0302	InterCoast Colleges-Anaheim	10
						InterCoast Colleges-Roseville	4
						Southern California Institute of Technology	213
First-Line Supervisors of Construction Trades and Extraction Workers	1,044	Supply Gap	95	Construction Crafts Technology	0952.00	Fullerton	7
						Orange Coast	40
						Santa Ana+~	10
						North Orange Adult~^	0
						Santiago Canyon*	0
				Construction Inspection	0957.20	Coastline	16
						Fullerton+	5
						Saddleback	3
						Orange Coast*	0
						Santiago Canyon*	0
				Public Works	2102.10	Santiago Canyon	14
Plumbers, Pipefitters, and Steamfitters	955	Supply Gap	0	Plumbing, Pipefitting and Steamfitting	0952.30	Orange Coast*	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Construction Managers	543	Supply Gap	24	Business and Commerce, General	0501.00	Coastline	1
						Golden West	2
						Orange Coast	4
						Saddleback	11
						Santa Ana*	0
						Santiago Canyon*	0
						Fullerton*	0
						North Orange Adult*	0
					CIP 52.0101	Argosy University-Orange County	1
				Civil and Construction Management Technology	0957.00	Fullerton	5
						Orange Coast*	0
						Santa Ana*	0
						Santiago Canyon*	0
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	418	Supply Gap	172	Environmental Control Technology	0946.00	Cypress	87
						Orange Coast	41
					CIP 47.0201	Brownson Technical School	13
						InterCoast Colleges-Anaheim	26
						InterCoast Colleges-Roseville	5
Operating Engineers and Other Construction Equipment Operators	320	Supply Gap	21	Heavy Equipment Operation	0947.30	Santiago Canyon	21

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Architectural and Civil Drafters	174	Supply Gap	115	Architecture and Architectural Technology	0201.00	Fullerton	8
						Orange Coast	45
						Saddleback	8
				Drafting Technology	0953.00	Fullerton	7
						Golden West	17
						Irvine	3
						Saddleback	1
						Santa Ana	19
				Architectural Drafting	0953.10	Santa Ana	6
						Irvine*	0
				Civil Drafting	0953.20	Irvine+	1
Construction and Building Inspectors	135	Supply Gap	0	Construction Inspection	0957.20	Already Accounted For	0
Glaziers	131	Supply Gap	0	Glazing	0952.40	No Programs	0

DEMAND AND SUPPLY DATA FOR ENERGY, CONSTRUCTION, AND UTILITIES MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Carpenters	1470	Supply Gap	2	Carpentry	0952.10	Fullerton+	1
						Santiago Canyon	1
				Mill and Cabinet Work	0952.50	No Programs	0
Solar Photovoltaic Installers	108	Supply Gap	4	Energy Systems Technology	0946.10	Golden West	1
						Cypress*	0
					CIP 15.0505	Allied American University	3
				Roofing	0952.90	No Programs	0
Brickmasons and Blockmasons	88	Supply Gap	0	Masonry, Tile, Cement, Lath and Plaster	0952.60	No Programs	0
Insulation Workers, Mechanical	80	Supply Gap	2	Drywall and Insulation	0952.80	Santiago Canyon	2
Reinforcing Iron and Rebar Workers	72	Supply Gap	0	Sheet Metal and Structural Metal	0956.40	No Programs	0
Stonemasons	51	Supply Gap	0	Masonry, Tile, Cement, Lath and Plaster	0952.60	No Programs	0

2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

HEALTH

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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FOR LABOR MARKET RESEARCH

HEALTH
Demand and Supply Analysis: Orange County

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Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; 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 the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host college/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.

INTRODUCTION

This sector brief is a product of the Orange County Sector Analysis Project. It provides information about the Health sector in Orange County, one of Orange County's six priority sectors; it compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in this report for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. One of these focus groups was specific to the Health sector. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

In this brief, 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.

In this brief, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of this report, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the

[1] https://insightcced.org/2018-family-needs-calculator/

purpose of this report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A.

FOCUS GROUP INSIGHTS

The Health sector focus group included three faculty members and three administrators from six of the 10 institutions – nine community colleges and one noncredit school – that offered Health programs in Orange County between 2015 and 2017. The regional director for employer engagement also attended the focus group.

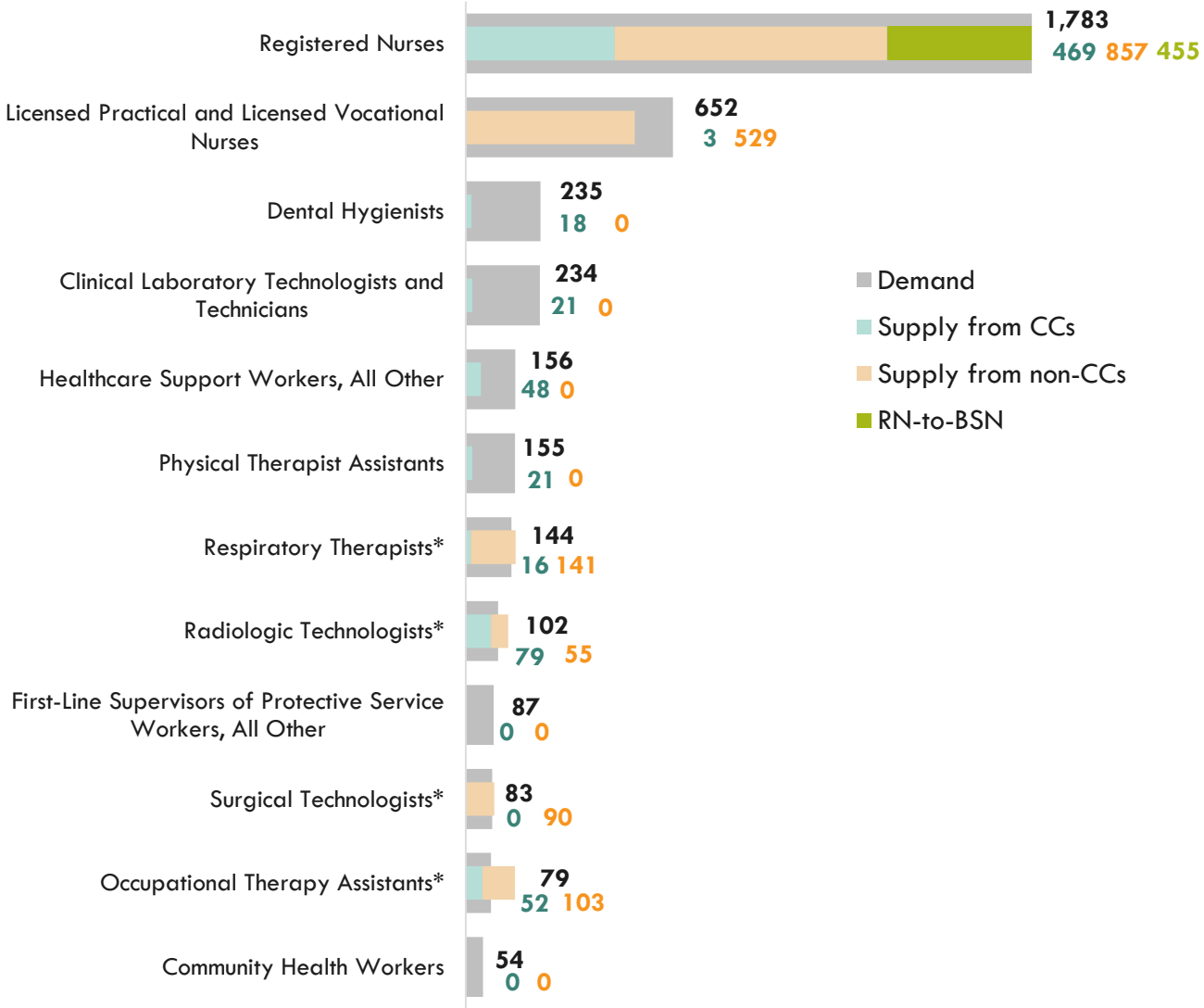
Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to the Health sector. This sector-specific information is highlighted throughout this report in the Focus Group Insights and the Focus Group Insights – The Big Picture sections.

HEALTH TOP MIDDLE-SKILL JOBS

This section compares Orange County's labor market demand for the top middle-skill jobs in Health with program supply from the region's community colleges and non-community college providers (Exhibit 1). It is important to note that a third category, Registered Nurse to Bachelors of Science in Nursing (RN-to-BSN), has been added to the Registered Nurses occupation because some institutions, such as University of Phoenix and Brandman University, provide programs for those who already are a registered nurse and have an associate's degree in nursing to earn their Bachelors of Science in Nursing; therefore, these programs are not training new nurses and are not creating additional supply.

As seen in Exhibit 2, the entry-level wages[2] for these top middle-skill jobs are higher than the $17.39 per hour living wage. Descriptions for each occupational title can be found in Appendix B. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix C.

Exhibit 1. Health Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Program Supply



*(Please note: * indicates that the occupation has an oversupply of labor, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)*

[2] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

FOCUS GROUP INSIGHTS

Registered Nurses and RN-to-BSN Programs

Focus group participants pointed out that the supply number for Registered Nurses is misleading because it overstates the number of *new* nurses that are being trained. The regional director for employment engagement explained that there are pre-licensure nursing programs, such as those provided by the community colleges, which are for students who do not currently hold a nursing license, and RN-to-BSN programs, which are for those who already are a registered nurse and have an associate's degree in nursing to earn their Bachelors of Science in Nursing. The institution with the highest number of awards for registered nurses, University of Phoenix, offers an RN-to-BSN program only; Brandman University also only offers an RN-to-BSN program.

Other institutions, such as California State University Fullerton, offer both types of programs. Due to the way IPEDS collects awards data, the COE cannot determine how many awards were conferred for pre-licensure programs versus RN-to-BSN programs at institutions that offer both programs (non-community college supply information is generated from CIP data which comes from the Integrated Postsecondary Education Data System [nces.ed.gov/ipeds/use-the-data], also known as IPEDS). Therefore, the data presented in Exhibit 1 overstates the supply for registered nurses by an undeterminable amount of at least 455 awards because it is double-counting current registered nurses.

Recently created programs, such as Vanguard University's new pre-licensure program, are not included in the supply figures because their awards were conferred after the years 2015 through 2017 which were analyzed in this report.

Focus group participants suggested that an alternative method of measuring supply for registered nurses is by using pass rates for the NCLEX-RN exam from the California Board of Registered Nursing.[3] From 2015 to 2017, an annual average of 1,755 individuals that attended an educational institution in Orange County passed the NCLEX-RN exam. Additionally, some institutions listed by the Board of Registered Nursing are missing from the supply figures in this report.

Missing Supply Data

Focus group participants noted that awards for the University of San Francisco's Orange County Campus, Western Governors University, University of California-Irvine, and Vanguard University were not reported in the supply figures. There are a variety of reasons for why these institutions are not included in the data. The University of San Francisco offers a pre-licensure Master of Science in Nursing (MSN) at its Orange County campus, which is beyond the scope of this report. Since Western Governors University is based in Utah, all awards, regardless of student location, are reported to IPEDS from the Utah campus; therefore, Western Governors University is not included in the supply figures in this report and the COE cannot determine the number of awards conferred to students in California. It is worth noting that Western Governors University is not currently accepting new applications for their pre-licensure nursing program "due to high demand and a limited number of clinical sites in Southern California."[4] Though University of California-Irvine and Vanguard University have students that passed the NCLEX RN exam, they do not use the Registered Nursing CIP code (51.3801) when reporting to IPEDS, so the COE cannot determine the number of awards conferred by these institutions.

> *"We are missing the ROPs. At the high school level, they are really providing that hands-on training for medical assistants. [Students] graduate as real medical assistants."*
> *– Regional Director for Employer Engagement*

The regional director for employer engagement said that the supply numbers in this report also do not include data from Regional Occupational Programs (ROP) and local adult schools such as Huntington Beach Adult School, North Orange ROP, and Santa Ana Adult School. These institutions have training programs for Dental Assistants, Medical Assistants, and Personal Care Aides. Since these institutions did not report awards to IPEDS, they are not included in the supply figures in this report; therefore the supply numbers for those occupations are likely understated.

TOP Code Miscoding

Focus group participants from the noncredit school, North Orange Continuing Education, noted that they are showing supply for the occupation, Physical Therapist Assistant (an average of 21 annual awards). However they do not have a

[3] https://www.rn.ca.gov/education/passrates.shtml
[4] https://www.wgu.edu/online-nursing-health-degrees/rn-prelicensure-nursing-bachelors-program.html

program corresponding to this occupation. They determined that this was a TOP code misalignment issue and would look into the matter locally. The removal of these awards does not alter the supply gap determination since the demand of 155 annual job openings for Physical Therapist Assistant is going unmet.

Other Related Occupations

Faculty members reported that some occupations for which they have programs were missing from this report. Some examples include Dietetic Technicians, Medical and Clinical Laboratory Technicians, and Morticians. There is a separate reason, however each is methodologically-based, why these three occupations are not specifically examined in this report. The first occupation mentioned, Dietetic Technicians, had less than 50 annual job openings and therefore, it did not meet the threshold to be included in the analysis, as defined in the methodology in Appendix A.

The second occupation, Medical and Clinical Laboratory Technicians was left out due to a change in how the Bureau of Labor Statistics (BLS) aggregates similar occupations. The Medical and Clinical Laboratory Technicians occupation (formerly SOC code 29-2012) was grouped into the broader Clinical Laboratory Technologists and Technicians (SOC Code 29-2010) occupation in 2017. Therefore, data for Medical and Clinical Laboratory Technician and Medical and Clinical Laboratory Technologists (formerly SOC code 29-2011), are included in the broader Clinical Laboratory Technologists and Technicians (SOC code 29-2010) occupation displayed in Exhibit 1.[5]

Finally, while the third occupation, Morticians is related to health programs, it is not included in this sector because it falls into a different sector based on the related TOP code, in this case, Business and Entrepreneurship. Even though these occupations are not specifically included in this report, the skills students learn in Health programs overall can be applied to several occupations and make students more employable across sectors.

Emerging Areas – Health IT and Nursing Informatics

Focus group participants identified emerging areas that are not fully captured in traditional labor market information such as Health Information Technology (HIT) and Nursing Informatics jobs and some of the career paths for these positions. According to the focus group participants, Nursing Informatics positions may be filled with nurses that have come from within the hospital or other frontline staff who cannot physically perform their role anymore due to physical limitations. These workers can then be re-trained in another area such as healthcare informatics. While HIT and Nursing Informatics are emerging areas, there is currently an oversupply of workers for Medical Records and Health Information Technicians (SOC code 29-2071), as displayed in Exhibit 3 on the following page. Additionally, while HIT workers are currently trained at the associate degree level, the regional director for employer engagement pointed out that the American Health Information Management Association (AHIMA), has been pushing to move education requirements to the bachelor's degree level. Furthermore, Nursing Informatics is primarily taught at the master's degree level and is considered above middle-skill.

Exhibit 2. Health Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
29-1141	Registered Nurses	1,783	$32.88	$42.47
29-2061	Licensed Practical and Licensed Vocational Nurses	652	$20.63	$25.57
29-2021	Dental Hygienists	235	$29.86	$45.68
29-2018	Clinical Laboratory Technologists and Technicians	234	$19.29	$27.21
31-9099	Healthcare Support Workers, All Other	156	$18.09	$21.23
31-2021	Physical Therapist Assistants	155	$21.86	$29.34

[5] https://www.bls.gov/oes/changes_2017.htm

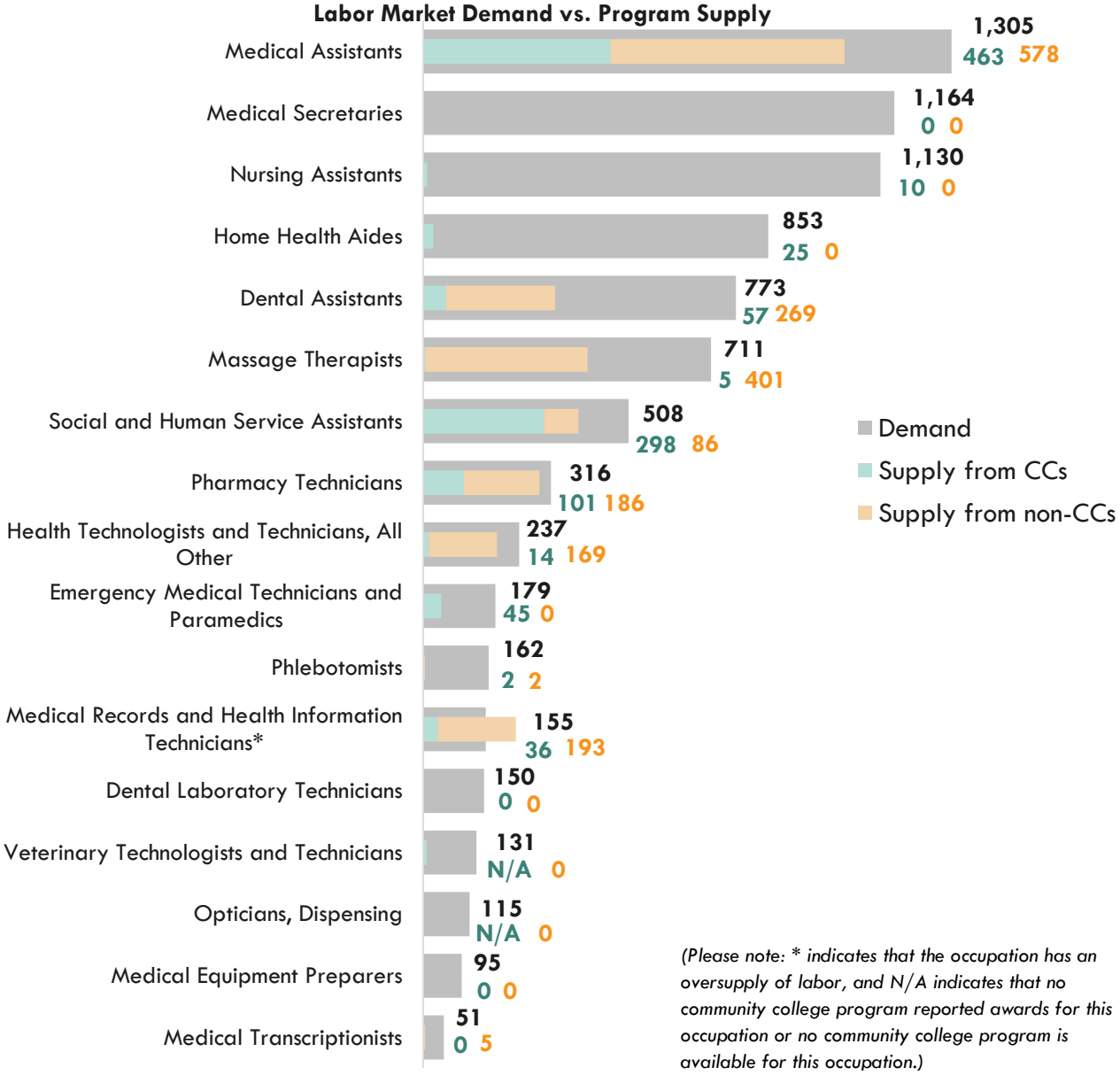
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
29-1126	Respiratory Therapists	144	$29.49	$35.32
29-2034	Radiologic Technologists	102	$31.19	$38.54
33-1099	First-Line Supervisors of Protective Service Workers, All Other	87	$23.33	$27.51
29-2055	Surgical Technologists	83	$22.48	$27.53
31-2011	Occupational Therapy Assistants	79	$18.42	$27.70
21-1094	Community Health Workers	54	$19.79	$23.58

HEALTH MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the regional living wage but median wages above it. Since wages generally increase with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibit 3, middle-skill Health jobs with entry-level wages below the regional living wage have a significant number of annual job openings (labor market demand).

Exhibit 3. Health Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand vs. Program Supply



*(Please note: * indicates that the occupation has an oversupply of labor, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)*

While these occupations have entry-level wages below the $17.39 per hour California Family Needs Calculator, occupations such as Medical Secretaries; Social and Human Service Assistants; Health Technologists and Technicians, All Other; Phlebotomists; Medical Records and Health Information Technicians; Dental Laboratory Technicians; Veterinary Technologists

and Technicians; Opticians, Dispensing; and Medical Equipment Preparers have median wages higher than the regional living wage as denoted via the gray shading in Exhibit 4.

Exhibit 4. Health Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
31-9092	Medical Assistants	1,305	$13.86	$16.72
43-6013	Medical Secretaries	1,164	$14.67	$17.76
31-1014	Nursing Assistants	1,130	$12.62	$14.24
31-1011	Home Health Aides	853	$11.07	$12.12
31-9091	Dental Assistants	773	$14.70	$17.18
31-9011	Massage Therapists	711	$11.92	$14.08
21-1093	Social and Human Service Assistants	508	$15.71	$18.17
29-2052	Pharmacy Technicians	316	$13.99	$16.88
29-2099	Health Technologists and Technicians, All Other	237	$17.14	$19.98
29-2041	Emergency Medical Technicians and Paramedics	179	$11.12	$12.06
31-9097	Phlebotomists	162	$16.95	$19.70
29-2071	Medical Records and Health Information Technicians*	155	$16.72	$23.08
51-9081	Dental Laboratory Technicians	150	$15.02	$20.94
29-2056	Veterinary Technologists and Technicians	131	$14.33	$18.50
29-2081	Opticians, Dispensing	115	$16.89	$19.35
31-9093	Medical Equipment Preparers	95	$16.07	$19.35
31-9094	Medical Transcriptionists	51	$13.94	$16.98

FOCUS GROUP INSIGHTS

Misalignment Between Titles and Duties

This sector brief uses occupational titles from the Standard Occupational Classification (SOC) system in the demand and supply exhibits, as identified and defined in Appendix B. Focus group participants noted that while the occupational title may match the job title used by employers, there is often a misalignment between the typical duties described in the occupational definition and in employers' job descriptions. For example, focus group participants said that Medical Secretaries typically answer the phones for patient inquiries and help the charge nurse. The regional director for employer engagement emphasized that Medical Secretaries are not typically involved with billing and coding, even though those duties are listed in the occupational definition. Regardless of whether or not the job title and occupational title align, actual job duties often differ from organization to organization and frequently do not align with the broad occupational definitions.

High Demand, Low Wages

Focus group participants acknowledged that there is high demand for several occupations, but many of them have low entry-level wages. Even though these occupations have low wages, focus group participants agreed that they are good pathway occupations that could help students gain experience for future advancement.

Additionally, the regional director for employer engagement stated that, in addition to education and experience, wages in the Health sector are also sometimes determined by the type of employer. Generally, Medical Assistants employed at a doctor's office will make less than at other places of employment, such as hospitals.

Licenses and Certifications

Focus group participants noted that several occupations analyzed in this report, such as Registered Nurse, Nursing Assistants, Pharmacy Technicians, and Dental Assistants require state licensure. However, there is no state licensure requirement for Medical Assistants. Faculty members pointed out that students tend to complete programs that have state licensure requirements because they need to graduate from a Board-approved educational program.in order to sit for the exam. Since students do not need a license or certification to work as a Medical Assistant, completion rates tend to be lower for those programs.

> *"For medical assistant, a state certification isn't required yet. While it is good to have [an award], [students] don't need it to get employed, so they don't complete the medical assisting program, they just take a job. I think most of our [student] fallout is from that. – North Orange Continuing Education Faculty Member*

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed other issues and challenges that cannot be captured by traditional labor market information and provided insight on the tactics colleges and employers are currently using to address supply gaps in the Health sector.

How Community Colleges are Filling Supply Gaps

Focus group participants acknowledged the large supply gaps for occupations like Nursing Assistants and Home Health Aides. To address these supply gaps, some colleges have already created new programs or are planning to create new programs in these areas. Saddleback, Santa Ana, and Santiago Canyon have created or plan to create a Certified Nursing Assistant (CNA) program. Saddleback and North Orange Continuing Education are also creating Personal Care Aide programs. In addition to those programs, Saddleback has also created Medical Scribe and Phlebotomy programs.

How Employers are Filling Supply Gaps

According to focus group participants, employers are using several methods to address supply gaps. Faculty members noted that hospitals usually train current nurses to become specialty nurses such as Operating Room Nurses, Neonatal Intensive Care Unit Nurses, and Critical Care Nurses. Acute care hospitals are training their current nurses for specialty areas using online modules provided by professional training organizations or hospital developed programs. Faculty members also noted that Kaiser Permanente is opening its own medical imaging technology college to create a worker pipeline for Radiologic Technologists that can operate machinery for x-rays, ultrasounds, CT/CAT scans, and MRIs.

Challenges in Expanding Programs

Focus group participants identified several challenges to expanding programs in the Health sector. Many of these challenges, including the lack of dedicated lab space, difficulty hiring faculty and staff, and high costs for equipment, cut across all sectors. However, some unique challenges for the Health sector are the increased competition from online programs and clinical displacement. While there is a supply gap for many of the top middle-skill jobs, increasing program supply will require increasing clinical placements for students. However, securing clinical placements is difficult because there are limited number of slots in the region. Therefore, the region may not have the capacity to meet those needs.

KEY FINDINGS: HEALTH

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. Four-year universities supply a significant number of awards for Registered Nurses. Based on the information in Appendix C, Exhibit 5 illustrates the institutions that supply program awards for this occupation:

Exhibit 5. Institutions that Supply Program Awards for Registered Nurses in Orange County

COLLEGE	COLLEGE SUPPLY (3-YR AVG)
University of Phoenix-California*	434
West Coast University-Orange County	397
California State University-Fullerton^	259
Saddleback Community College	212
Santa Ana Community College	93
Concordia University-Irvine	89
Golden West Community College	85
Career Networks Institute	84
Cypress Community College	79
Brandman University*	21
Pacific College	18
Stanbridge College	10

*RN-to-BSN Program
^Pre-Licensure and RN-to-BSN programs

2. The following occupations with entry-level wages below the California Family Needs Calculator have median wages at or above the California Family Needs Calculator:
    - Medical Secretaries
    - Social and Human Service Assistants
    - Health Technologists and Technicians, All Other
    - Phlebotomists
    - Medical Records and Health Information Technicians
    - Dental Laboratory Technicians
    - Veterinary Technologists and Technicians
    - Opticians, Dispensing
    - Medical Equipment Repairers

3. The following programs in Orange County reported noncredit awards for the Health sector:
    - Physical Therapist Assistant (1222.00) at North Orange Continuing Education[6]
    - Medical Assisting (1208.00) at North Orange Continuing Education
    - Administrative Medical Assisting (1208.20) at Santiago Canyon College
    - Pharmacy Technology (1221.00) at North Orange Continuing Education

4. Of the 29 occupations (SOC codes) analyzed in this brief for the Health sector, there is a labor market demand of 11,799 annual job openings, a program supply of 5,911 awards, which creates a sector supply gap of 5,888 awards.

11,799	**5,911**	**5,888**
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. According to the focus group participants, the supply numbers presented in this report are problematic for a number of reasons. They do not account for the differences between pre-licensure nursing programs and RN-to-BSN programs. They also do not include other training providers such as ROPs, Adult Schools, and some universities. The COE should work with faculty members and the regional director for employer engagement to build a complete list of training providers in Orange County for this sector.
2. Securing clinical placements is difficult because they are limited. Some institutions, such as Western Governors University, are not accepting applications for pre-licensure nursing programs due to a limited number of clinical sites. The region is currently considering hiring a regional clinical placement coordinator to work with employers and help place students.
3. There are several occupations that are in high demand, but pay low wages. Colleges could consider creating noncredit programs for these occupations and creating a noncredit-to-credit pipeline so students have a pathway for additional education and experience that will help them earn better wages and advance their careers.

[6] Data for North Orange Continuing Education is captured as "North Orange Adult" in the California Community Colleges Chancellor's Office Management Information System DataMart as seen in Appendix C.

APPENDIX A: METHODOLOGY AND HEALTH DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in this brief, the COE first reviewed the TOP codes associated with the sector and then matched them with the SOC codes. According to the CCC, the following six-digit TOP codes define the Health sector:

TOP6 Program Name	TOP6 Code
Administrative Medical Assisting	1208.20
Alcohol and Controlled Substances	2104.40
Athletic Training and Sports Medicine	1228.00
Cardiovascular Technician	1213.00
Certified Nurse Assistant	1230.30
Clinical Medical Assisting	1208.10
Community Health Care Worker	1261.00
Dental Assistant	1240.10
Dental Hygienist	1240.20
Dental Laboratory Technician	1240.30
Dental Occupations	1240.00
Diagnostic Medical Sonography	1227.00
Dietetic Services and Management	1306.20
Dietetic Technology	1306.60
Electrocardiography	1215.00
Electro-Neurodiagnostic Technology	1212.00
Emergency Medical Services	1250.00
Gerontology	1309.00
Health Facility Unit Coordinator	1208.30
Health Information Coding	1223.10
Health Information Technology	1223.00
Health Occupations, General	1201.00
Home Health Aide	1230.80
Hospital and Health Care Administration	1202.00
Hospital Central Service Technician	1209.00
Licensed Vocational Nursing	1230.20
Medical Assisting	1208.00
Medical Laboratory Technology	1205.00
Medical Office Technology	0514.20
Nursing	1230.00
Nutrition, Foods, and Culinary Arts	1306.00
Occupational Therapy Technology	1218.00
Optical Technology	1219.00
Orthopedic Assistant	1214.00
Other Health Occupations	1299.00

TOP6 Program Name	TOP6 Code
Paramedic	1251.00
Pharmacy Technology	1221.00
Phlebotomy	1205.10
Physical Therapist Assistant	1222.00
Physicians Assistant	1206.00
Polysomnography	1211.00
Psychiatric Technician	1239.00
Radiation Therapy Technician	1226.00
Radiologic Technology	1225.00
Registered Nursing	1230.10
Respiratory Care-Therapy	1210.00
School Health Clerk	1224.00
Speech-Language Pathology and Audiology	1220.00
Surgical Technician	1217.00

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[7] system and identified approximately 300 occupational codes as middle-skill jobs.

Middle-skill jobs include:

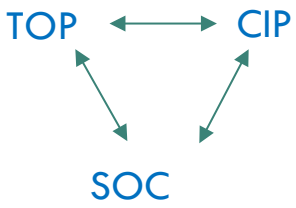
- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All 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.

For this study, the COE analyzed occupations with a labor market demand of at least 50 annual job openings. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[8] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.
- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

[7] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.
[8] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



The 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 data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP 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.

Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of this study.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

To create the invite list of faculty and administrators, Regional Directors for Employer Engagement and career education deans at each college were asked to identify faculty and administrators that could represent their respective colleges in the sector-specific focus groups. Once this list was compiled, the career education deans invited faculty and administrators to express their interest in participating in a focus group via email. The email introduced the COE, provided an overview of the Orange County Sector Analysis Project, described the goals of the focus groups, and informed faculty that they would be compensated for their participation, and that lunch would be provided for all participants. All those that stated their interest were then connected with the COE who managed the focus groups scheduling and details.

In order to be as inclusive as possible, 12 focus groups were scheduled for the eight sectors – four sectors had one focus group each and four sectors had two focus groups each, during a three-week period from July to August 2019. All focus groups participants received a confirmation email before the event that included the focus group agenda, their sector-specific draft brief, and a pre-assignment with questions based off of the information contained in the draft sector briefs. Focus group participants were instructed to complete and bring the pre-assignment to the convening so that they were prepared to discuss the data, the challenges they face in their programs, and strategies to close supply gaps. Each focus groups was recorded, with permission of the participants, by the COE solely for transcription purposes.

The COE conducted no more than two focus group sessions per day. During the focus groups the Orange County Sector Analysis Project was explained and then the information contained in the draft sector briefs was presented in detail. Participants were encouraged to ask questions and engage in dialogue throughout the entire focus group session. The COE

took notes of each discussion as well as recorded the sessions, with permission of the participants and solely for transcription purposes.

Following the conclusion of the focus groups, the COE compiled the audio files, transcripts, notes, and pre-assignments to conduct a qualitative analysis of the themes for each focus group and to identify commonalities across multiple focus groups. The findings from this analysis have been highlighted throughout this report in the "Focus Group Insight" sections.

APPENDIX B: DEFINITIONS FOR HEALTH MIDDLE-SKILL JOBS

The following definitions and sample job titles for each occupation are derived from O*NET, the nation's primary source of occupational information. The O*NET database contains hundreds of standardized and occupation-specific descriptors on nearly 1,000 occupations. O*NET is developed and sponsored by the U.S. Department of Labor[9]

Clinical Laboratory Technologists and Technicians (SOC 29-2018): Perform routine or complex medical laboratory tests for diagnosis, treatment, and prevention of disease.

- Microbiology Technologist
- Cytogenetic Technologist
- Cytotechnologist
- Histology Technician
- Specimen Processor

Community Health Workers (SOC 21-1094): Assist individuals and communities to adopt healthy behaviors. Conduct outreach for medical personnel or health organizations to implement programs in the community that promote, maintain, and improve individual and community health. May provide information on available resources, provide social support and informal counseling, advocate for individuals and community health needs, and provide services such as first aid and blood pressure screening. May collect data to help identify community health needs. Sample job titles include:

- Community Health Promoter
- Community Health Outreach Worker
- Community Health Program Coordinator/Representative
- HIV Counseling and Testing Services Specialist

Dental Assistants (SOC 31-9091): Assist dentist, set up equipment, prepare patient for treatment, and keep records. Sample job titles include:

- Surgical Dental Assistant
- Orthodontic Assistant/Technician
- Certified/Registered Dental Assistant (CDA or RDA)
- Oral Surgery Assistant
- Expanded Function Dental Assistant
- Expanded Duty Dental Assistant

Dental Hygienists (SOC 29-2021): Clean teeth and examine oral areas, head, and neck for signs of oral disease. May educate patients on oral hygiene, take and develop x rays, or apply fluoride or sealants. Sample job titles include:

- Registered Dental Hygienist (RDH)
- Implant Coordinator
- Pediatric Dental Hygienist
- Oral Hygienist
- Dental Nurse

Dental Laboratory Technicians (SOC 51-9081): Construct and repair full or partial dentures or dental appliances. Sample job titles include:

- Dental Ceramist
- Dental Technician
- Crown and Bridge Dental
- Porcelain Technician/Finisher
- Orthodontic Laboratory Technician

Emergency Medical Technicians and Paramedics (SOC 29-2041): Assess injuries, administer emergency medical care, and extricate trapped individuals. Transport injured or sick persons to medical facilities. Sample job titles include:

- Paramedic
- Flight Paramedic
- Multi Care Technician
- Emergency Medical Technician/Dispatcher
- Emergency Medical Technician/Driver
- First Responder

[9] https://www.onetonline.org/

First-Line Supervisors of Protective Service Workers, All Other (SOC 33-1099): All protective service supervisors not listed separately.

Health Technologists and Technicians, All Other (SOC 29-2099): All health technologists and technicians not listed separately. Sample job titles include:

- Neurodiagnostic Technologists (29-2099.01): Conduct electroneurodiagnostic (END) tests such as electroencephalograms, evoked potentials, polysomnograms, or electronystagmograms. May perform nerve conduction studies.
- Ophthalmic Medical Technologists (29-2099.05): Assist ophthalmologists by performing ophthalmic clinical functions and ophthalmic photography. Provide instruction and supervision to other ophthalmic personnel. Assist with minor surgical procedures, applying aseptic techniques and preparing instruments. May perform eye exams, administer eye medications, and instruct patients in care and use of corrective lenses. Not to be confused with Ophthalmic Medical Technicians (29-2057).
- Radiological Technicians (29-2099.06): Maintain and use equipment and supplies necessary to demonstrate portions of the human body on x-ray film or fluoroscopic screen for diagnostic purposes. Not to be confused with Radiological Technologists (29-2034).
- Surgical Assistants (29-2099.07): Assist surgeons during surgery by performing duties such as tissue retraction, insertion of tubes and intravenous lines, or closure of surgical wounds. Perform preoperative and postoperative duties to facilitate patient care. Not to be confused with Surgical Technologists (29-2055).

Healthcare Support Workers, All Other (SOC 31-9099): All healthcare support workers not listed separately. Sample job titles include:

- Speech-Language Pathology Assistants (31-9099.01): Assist speech-language pathologists in the assessment and treatment of speech, language, voice, and fluency disorders. Implement speech and language programs or activities as planned and directed by speech-language pathologists. Monitor the use of alternative communication devices and systems.
- Endoscopy Technicians (31-9099.02): Maintain a sterile field to provide support for physicians and nurses during endoscopy procedures. Prepare and maintain instruments and equipment. May obtain specimens.

Home Health Aides (SOC 31-1011): Provide routine individualized healthcare such as changing bandages and dressing wounds, and applying topical medications to the elderly, convalescents, or persons with disabilities at the patient's home or in a care facility. Monitor or report changes in health status. May also provide personal care such as bathing, dressing, and grooming of patient. Sample job titles include:

- Home Attendant
- Direct Care Professional
- Certified Home Health Aide
- Residential Counselor
- In Home Caregiver

Licensed Practical and Licensed Vocational Nurses (SOC 29-2061): Care for ill, injured, or convalescing patients or persons with disabilities in hospitals, nursing homes, clinics, private homes, group homes, and similar institutions. May work under the supervision of a registered nurse. Licensing required. Sample job titles include:

- Triage Licensed Practical Nurse
- Pediatric Licensed Practical Nurse
- Private Duty Nurse
- Office Nurse
- Clinic Nurse
- Charge Nurse

Massage Therapists (SOC 31-9011): Perform therapeutic massages of soft tissues and joints. May assist in the assessment of range of motion and muscle strength or propose client therapy plans. Sample job titles include:

- Medical/Registered/Clinical/ Licensed Massage Therapist
- Licensed Massage Practitioner (LMP)
- Certified Massage Therapist
- Bodywork Therapist

Medical Assistants (SOC 31-9092): Perform administrative and certain clinical duties under the direction of a physician. Administrative duties may include scheduling appointments, maintaining medical records, billing, and coding information for insurance purposes. Clinical duties may include taking and recording vital signs and medical histories, preparing patients for examination, drawing blood, and administering medications as directed by physician. Sample job titles include:

- Chiropractor Assistant
- Certified Medical Assistant
- Clinical Assistant
- Registered Medical Assistant
- Medical Office Assistant
- Doctor's Assistant

Medical Equipment Preparers (SOC 31-9093): Prepare, sterilize, install, or clean laboratory or healthcare equipment. May perform routine laboratory tasks and operate or inspect equipment. Sample job titles include:

- Sterilization Technician
- Sterile Processing and Distribution Technician
- Medical Supply Technician
- Certified Registered Central Service Technician
- Central Sterile Supply Technician (CSS Technician)
- Instrument Technician

Medical Records and Health Information Technicians (SOC 29-2071): Compile, process, and maintain medical records of hospital and clinic patients in a manner consistent with medical, administrative, ethical, legal, and regulatory requirements of the health care system. Process, maintain, compile, and report patient information for health requirements and standards in a manner consistent with the healthcare industry's numerical coding system. Sample job titles include:

- Health Information Specialist
- Registered Health Information Technician (RHIT)
- Release of Information Specialist
- Medical Records Technician
- Medical Coder
- Health Information Systems Technician

Medical Secretaries (SOC 43-6013): Perform secretarial duties using specific knowledge of medical terminology and hospital, clinic, or laboratory procedures. Duties may include scheduling appointments, billing patients, and compiling and recording medical charts, reports, and correspondence. Sample job titles include:

- Unit Clerk
- Medical Receptionist
- Medical Office Specialist
- Front Office Coordinator
- Unit Secretary

Medical Transcriptionists (SOC 31-9094): Transcribe medical reports recorded by physicians and other healthcare practitioners using various electronic devices, covering office visits, emergency room visits, diagnostic imaging studies, operations, chart reviews, and final summaries. Transcribe dictated reports and translate abbreviations into fully understandable form. Edit as necessary and return reports in either printed or electronic form for review and signature, or correction. Sample job titles include:

- Transcriptionist
- Radiology Transcriptionist
- Pathology Transcriptionist
- Medical Transcriber
- Radiology Transcriptionist/Radiology Clerk

Nursing Assistants (SOC 31-1014): Provide basic patient care under direction of nursing staff. Perform duties such as feed, bathe, dress, groom, or move patients, or change linens. May transfer or transport patients. Includes nursing care attendants, nursing aides, and nursing attendants. Sample job titles include:

- Certified or Licensed Nursing Assistant (CNA or LNA)
- Patient Care Technician (PCT)
- State Tested Nursing Assistant (STNA)
- Patient Care Assistant (PCA)
- Geriatric Nursing Assistant (GNA)
- Certified Nurse Aide (CNA)

Occupational Therapy Assistants (SOC 31-2011): Assist occupational therapists in providing occupational therapy treatments and procedures. May, in accordance with State laws, assist in development of treatment plans, carry out routine functions, direct activity programs, and document the progress of treatments. Generally requires formal training. Sample job titles include:

- Certified Occupational Therapist Assistant (COTA)
- Staff Certified Occupational Therapist Assistant/Licensed (Staff COTA/L)
- Certified Occupational Therapist Assistant/Licensed (COTA/L)

Opticians, Dispensing (SOC 29-2081): Design, measure, fit, and adapt lenses and frames for client according to written optical prescription or specification. Assist client with inserting, removing, and caring for contact lenses. Assist client with selecting frames. Measure customer for size of eyeglasses and coordinate frames with facial and eye measurements and optical prescription. Prepare work order for optical laboratory containing instructions for grinding and mounting lenses in frames. Verify exactness of finished lens spectacles. Adjust frame and lens position to fit client. May shape or reshape frames. Includes contact lens opticians. Sample job titles include:

- Optical Technician
- Licensed Dispensing Optician
- Optometric Technician
- Optometric Assistant

Pharmacy Technicians (SOC 29-2052): Prepare medications under the direction of a pharmacist. May measure, mix, count out, label, and record amounts and dosages of medications according to prescription orders. Sample job titles include:

- Certified Pharmacy Technician (CPhT)
- Senior Pharmacy Technician
- Lead Pharmacy Technician
- Accredited Pharmacy Technician

Phlebotomists (SOC 31-9097): Draw blood for tests, transfusions, donations, or research. May explain the procedure to patients and assist in the recovery of patients with adverse reactions. Sample job titles include:

- Registered Phlebotomist
- Phlebotomy Program Coordinator
- Phlebotomist, Medical Lab Assistant
- Phlebotomy Technician
- Patient Service Technician

Physical Therapist Assistants (SOC 31-2021): Assist physical therapists in providing physical therapy treatments and procedures. May, in accordance with State laws, assist in the development of treatment plans, carry out routine functions, document the progress of treatment, and modify specific treatments in accordance with patient status and within the scope of treatment plans established by a physical therapist. Generally requires formal training. Sample job titles include:

- Physical Therapy Assistant (PTA)
- Physical Therapy Technician
- Physical Therapist Assistant and Nurse Aide
- Per Diem Physical Therapist Assistant (Per Diem PTA)
- Certified Physical Therapist Assistant (CPTA)
- Licensed Physical Therapist Assistant

Radiologic Technologists (SOC 29-2034): Take x rays and CAT scans or administer nonradioactive materials into patient's blood stream for diagnostic purposes. Includes technologists who specialize in other scanning modalities. Sample job titles include:

- CAT Scan Technologist
- X-Ray Technologist
- Radiological Technologist
- Staff Radiographer
- Radiographer, Mammographer
- Mammography Technologist

Registered Nurses (SOC 29-1141): Assess patient health problems and needs, develop and implement nursing care plans, and maintain medical records. Administer nursing care to ill, injured, convalescent, or disabled patients. May advise patients on health maintenance and disease prevention or provide case management. Licensing or registration required. Includes Clinical Nurse Specialists. Sample job titles include:

- Clinical Nurse Specialist
- Staff Nurse
- Intensive Care Unit Nurse
- Critical Care Registered Nurse
- Pediatric/Psychiatric Clinical Nurse Specialist

Respiratory Therapists (SOC 29-1126): Assess, treat, and care for patients with breathing disorders. Assume primary responsibility for all respiratory care modalities, including the supervision of respiratory therapy technicians. Initiate and conduct therapeutic procedures; maintain patient records; and select, assemble, check, and operate equipment. Sample job titles include:

- Respiratory Care Practitioner
- Registered Respiratory Therapist
- Certified Respiratory Therapist
- Staff Therapist
- Cardiopulmonary Technician and EEG Tech (Cardiopulmonary Technician and Electroencephalogram Technician)

Social and Human Service Assistants (SOC 21-1093): Assist in providing client services in a wide variety of fields, such as psychology, rehabilitation, or social work, including support for families. May assist clients in identifying and obtaining available benefits and social and community services. May assist social workers with developing, organizing, and conducting programs to prevent and resolve problems relevant to substance abuse, human relationships, rehabilitation, or dependent care. Sample job titles include:

- Social Work Assistant
- Community Coordinator
- Residential Assistant
- Outreach Specialist
- Family Support Worker
- Addictions Counselor Assistant

Surgical Technologists (SOC 29-2055): Assist in operations, under the supervision of surgeons, registered nurses, or other surgical personnel. May help set up operating room, prepare and transport patients for surgery, adjust lights and equipment, pass instruments and other supplies to surgeons and surgeon's assistants, hold retractors, cut sutures, and help count sponges, needles, supplies, and instruments. Sample job titles include:

- Operating Room Technician/Technologist
- Certified Surgical Tech/First Assistant
- Certified Surgical Technologist (CST)
- Surgical Scrub Technician/Technologist
- Operating Room Surgical Technician
- Certified Surgical Technician

Veterinary Technologists and Technicians (SOC 29-2056): Perform medical tests in a laboratory environment for use in the treatment and diagnosis of diseases in animals. Prepare vaccines and serums for prevention of diseases. Prepare tissue samples, take blood samples, and execute laboratory tests, such as urinalysis and blood counts. Clean and sterilize instruments and materials and maintain equipment and machines. May assist a veterinarian during surgery. Sample job titles include:

- Veterinary Laboratory Technician
- Registered Veterinary Technician (RVT)
- Veterinary Nurse
- Veterinary Assistant
- Certified Veterinary Technician (CVT)
- Licensed Veterinary Technician (LVT)

APPENDIX C: HEALTH DEMAND AND SUPPLY DATA

The following tables compare labor market demand and program supply by occupation. Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for that occupation. Therefore, the COE de-duplicated TOP codes that train for more than one occupation to avoid counting program supply more than once. This de-duplication process is denoted by the "Accounted for Above" statements in the tables on the following pages.

Additionally, the COE reviewed program data from the LaunchBoard[10] and the statewide COE Supply Table[11] and identified conflicting information. For certain occupations, LaunchBoard indicates that a college has a program for that occupation, but the COE Supply Table does not show program data for that college, and vice versa. These discrepancies are marked with the following:

> +The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard
>
> *LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

The demand and supply tables in the following pages have three categories:

1. **Supply Gap** – If Average Annual Openings exceed Average Annual Awards by more than 25 percent, then the cell is shaded in light green.
2. **Supply Met** – If Average Annual Openings is within 25 percent +/- of Average Annual Awards, then the cell is shaded in light blue.
3. **Oversupply** – If Average Annual Openings exceed the Average Annual Awards by more than 25 percent, then the cell is shaded in red.

[10] calpassplus.org/LaunchBoard/Home.aspx
[11] coeccc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

DEMAND AND SUPPLY DATA FOR TOP HEALTH MIDDLE-SKILL JOBS IN ORANGE COUNTY

+ The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table
~ Noncredit awards
^ North Orange Continuing Education is also known as North Orange Adult in the California Community Colleges Chancellor's Office Management Information System
# RN-to-BSN program
‡ RN-to-BSN and pre-licensure programs

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Registered Nurses	1,783	Supply Met	1,781	Registered Nursing	1230.10	Cypress	79
						Golden West	85
						Saddleback	212
						Santa Ana	93
					CIP 51.3801	Brandman University#	21
						California State University-Fullerton‡	259
						Career Networks Institute	84
						Concordia University-Irvine	89
						Pacific College	18
						Stanbridge College	10
						University of Phoenix-California#	434
						West Coast University-Orange County	397
Licensed Practical and Licensed Vocational Nurses	652	Supply Met	532	Licensed Vocational Nursing	1230.20	Saddleback+	3
					CIP 51.3901	American Career College-Anaheim	116
						California Career Institute	43
						Career Networks Institute	121
						Pacific College	94
						Stanbridge College	155
Dental Hygienists	235	Supply Gap	18	Dental Assisting/Assistant	CIP 51.0601	Already Accounted For	0
				Dental Hygienist	1240.20	Cypress	18

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Clinical Laboratory Technologists and Technicians	234	Supply Gap	21	Biotechnology and Biomedical Technology	0430.00	Irvine Valley*	0
						Santa Ana*	0
						Santiago Canyon*	0
						Fullerton*	0
				Electron Microscopy	0934.70	No Programs	0
				Laboratory Science Technology	0955.00	Fullerton+	1
				Medical Laboratory Technology	1205.00	Saddleback	20
Healthcare Support Workers, All Other	156	Supply Gap	48	Health Facility Unit Coordinator	1208.30	No Programs	0
				Speech/Language Pathology and Audiology	1220.00	Orange Coast	23
						Santa Ana	25
Physical Therapist Assistants	155	Supply Gap	21	Physical Therapist Assistant	1222.00	North Orange Adult~^	21
Respiratory Therapists	144	Supply Met	157	Respiratory Care/Therapy	1210.00	Orange Coast	16
					CIP 51.0908	American Career College-Anaheim	65
						Concorde Career College-Garden Grove	76
Radiologic Technologists	102	Oversupply	134	Radiologic Technology	1225.00	Cypress	58
						Orange Coast	21
					CIP 51.0911	Modern Technology School	55
First-Line Supervisors of Protective Service Workers, All Other	87	Supply Gap	0	N/A	N/A	No Programs	0
Surgical Technologists	83	Supply Met	90	Surgical Technology/Technologist	CIP 51.0909	American Career College-Anaheim	48
						Career Networks Institute	41
						North-West College-Santa Ana	1
Occupational Therapy Assistants	79	Oversupply	155	Occupational Therapy Technology	1218.00	Santa Ana	52
					CIP 51.0803	American Career College-Anaheim	8
						Stanbridge College	95

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Community Health Workers	54	Supply Gap	0	Community Health Care Worker	1261.00	No Programs	0
				Gerontology	1309.00	Already Accounted For	0
				Human Services	2104.00	Already Accounted For	0
				Alcohol and Controlled Substances	2104.40	Already Accounted For	0
					CIP 51.1501	Already Accounted For	0
				Disability Services	2104.50	North Orange Adult*	0

DEMAND AND SUPPLY DATA FOR HEALTH MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table
~ Noncredit awards
^ North Orange Continuing Education is also known as North Orange Adult in the California Community Colleges Chancellor's Office Management Information System

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Medical Assistants	1,305	Supply Met	1,041	Medical Office Technology	0514.20	Coastline*	0
				Medical Assisting	1208.00	Orange Coast	34
						Saddleback	36
						North Orange Adult~^	106
						Santa Ana+	216
					CIP 51.0801	Allied American University	84
						American Career College-Anaheim	195
						California Career Institute	8
						Career Networks Institute	24
						Concorde Career College-Garden Grove	149
						InterCoast Colleges-Anaheim	7
						InterCoast Colleges-Roseville	4
						Modern Technology School	7
						North-West College-Santa Ana	21
						South Coast College	32
						United Education Institute-Anaheim	47
				Clinical Medical Assisting	1208.10	Saddleback	28
						Orange Coast*	0
						North Orange Adult*	0
				Administrative Medical Assisting	1208.20	Saddleback	22
						Santiago Canyon~	21
						Santa Ana*	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
						North Orange Adult*	0
Medical Secretaries	1,164	Supply Gap	0	Medical Office Technology	0514.20	Already Accounted For	0
				Administrative Medical Assisting	1208.20	Already Accounted For	0
						Already Accounted For	0
Nursing Assistants	1,130	Supply Gap	10	School Health Clerk	1224.00	California Career Institute+	10
				Certified Nurse Assistant	1230.30	No Programs	0
Home Health Aides	853	Supply Gap	25	Home Health Aide	1230.80	No Programs	0
				Gerontology	1309.00	Coastline	13
						Cypress	4
						Saddleback	8
						Santa Ana*	0
						Santiago*	0
Dental Assistants	773	Supply Gap	326	Dental Assistant	CIP 51.0601	American Career College-Anaheim	70
						Concorde Career College-Garden Grove	147
						United Education Institute-Anaheim	52
					1240.10	Cypress	27
						Orange Coast	30
Massage Therapists	711	Supply Gap	406	Massage Therapy	1262.00	Fullerton	5
					CIP 51.3501	Advance Beauty College	49
						American Career College-Anaheim	20
						American Institute of Massage Therapy	28
						Career Networks Institute	9
						Coastline Beauty College	94
						North-West College-Santa Ana	2
						Santa Ana Beauty College	199

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Social and Human Service Assistants	508	Supply Met	384	Community Health Care Worker	1261.00	No Programs	0
				Family and Consumer Sciences, General	1301.00	Orange Coast+	1
						Saddleback	1
						Santa Ana	1
				Parenting and Family Education	1305.60	North Orang Adult*	0
						Santiago Canyon	0
				Foster and Kinship Care	1305.70	No Programs	0
				Family Studies	1308.00	Saddleback	1
						North Orange Adult*	0
				Human Services	2104.00	Coastline	56
						Cypress	59
						Orange Coast+	15
						Saddleback	21
						Santa Ana+	86
						Golden West*	0
				Alcohol and Controlled Substances	2104.40	Cypress	24
						Saddleback	33
						Coastline*	0
						Santiago Canyon*	0
					CIP 51.1501	InterCoast Colleges-Anaheim	73
						InterCoast Colleges-Roseville	13
				Disability Services	2104.50	North Orange Adult*	0
Pharmacy Technicians	316	Supply Met	287	Pharmacy Technology	1221.00	Santa Ana	41
						North Orange Adult~^	60
					CIP 51.0805	Allied American University	63
						American Career College-Anaheim	109
						Career Networks Institute	11
						North-West College-Santa Ana	3

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Health Technologists and Technicians, All Other	237	Supply Met	183	Polysomnography	1211.00	Orange Coast	9
				Electro-Neurodiagnostic Technology	1212.00	Orange Coast	5
				Physical Therapy Technician/Assistant	CIP 51.0806	American Career College-Anaheim	14
						Concorde Career College-Garden Grove	32
						Stanbridge College	33
				Surgical Technology/Technologist	CIP 51.0909	American Career College-Anaheim	48
						Career Networks Institute	41
						North-West College-Santa Ana	1
Emergency Medical Technicians and Paramedics	179	Supply Gap	45	Emergency Medical Services	1250.00	Saddleback	20
						Santa Ana*	0
						Orange Coast*	0
				Paramedic	125100	Saddleback	25
Phlebotomists	162	Supply Gap	4	Phlebotomy	1205.10	Saddleback	2
					CIP 51.1009	Modern Technology School	2
Medical Records and Health Information Technicians	155	Oversupply	229	Medical Office Technology	0514.20	Already Accounted For	0
				Health Information Technology	1223.00	Cypress	17
						Saddleback	18
					CIP 51.0707	American Career College-Anaheim	13
				Health Information Coding	1223.10	Cypress	1
						North Orange Adult*	0
					CIP 51.0713	Allied American University	30
						American Career College-Anaheim	97
						InterCoast Colleges-Anaheim	7
						United Education Institute-Anaheim	46
Dental Laboratory Technicians	150	Supply Gap	0	Dental Assisting/Assistant	CIP 51.0601	Already Accounted For	0
				Dental Laboratory Technician	1240.30	No Programs	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Veterinary Technologists and Technicians	131	Supply Gap	9	Veterinary Technician (Licensed)	0102.10	Stanbridge College+	9
Opticians, Dispensing	115	Supply Gap	0	N/A	N/A	No Programs	0
Medical Equipment Preparers	95	Supply Gap	0	Hospital Central Service Technician	1209.00	No Programs	0
Medical Transcriptionists	51	Supply Gap	5	Medical Office Technology	0514.20	No Programs	0
				Hospital and Health Care Administration	1202.00	University of Phoenix-California	5
				Health Information Coding	1223.10	Already Accounted For	0
					CIP 51.0713	Already Accounted For	0

2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

ICT AND DIGITAL MEDIA

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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

INFORMATION & COMMUNICATION TECHNOLOGIES (ICT) AND DIGITAL MEDIA

Demand and Supply Analysis: Orange County

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Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; 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 the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host college/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.

INTRODUCTION

This sector brief is a product of the Orange County Sector Analysis Project. It provides information about the Information and Communication Technologies (ICT) and Digital Media sector in Orange County, one of Orange County's six priority sectors; it compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in this report for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. Two of these focus groups were specific to the ICT and Digital Media sector. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

In this brief, 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.

In this brief, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of this report, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the purpose of this

[1] https://insightcced.org/2018-family-needs-calculator/

report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A.

FOCUS GROUP INSIGHTS

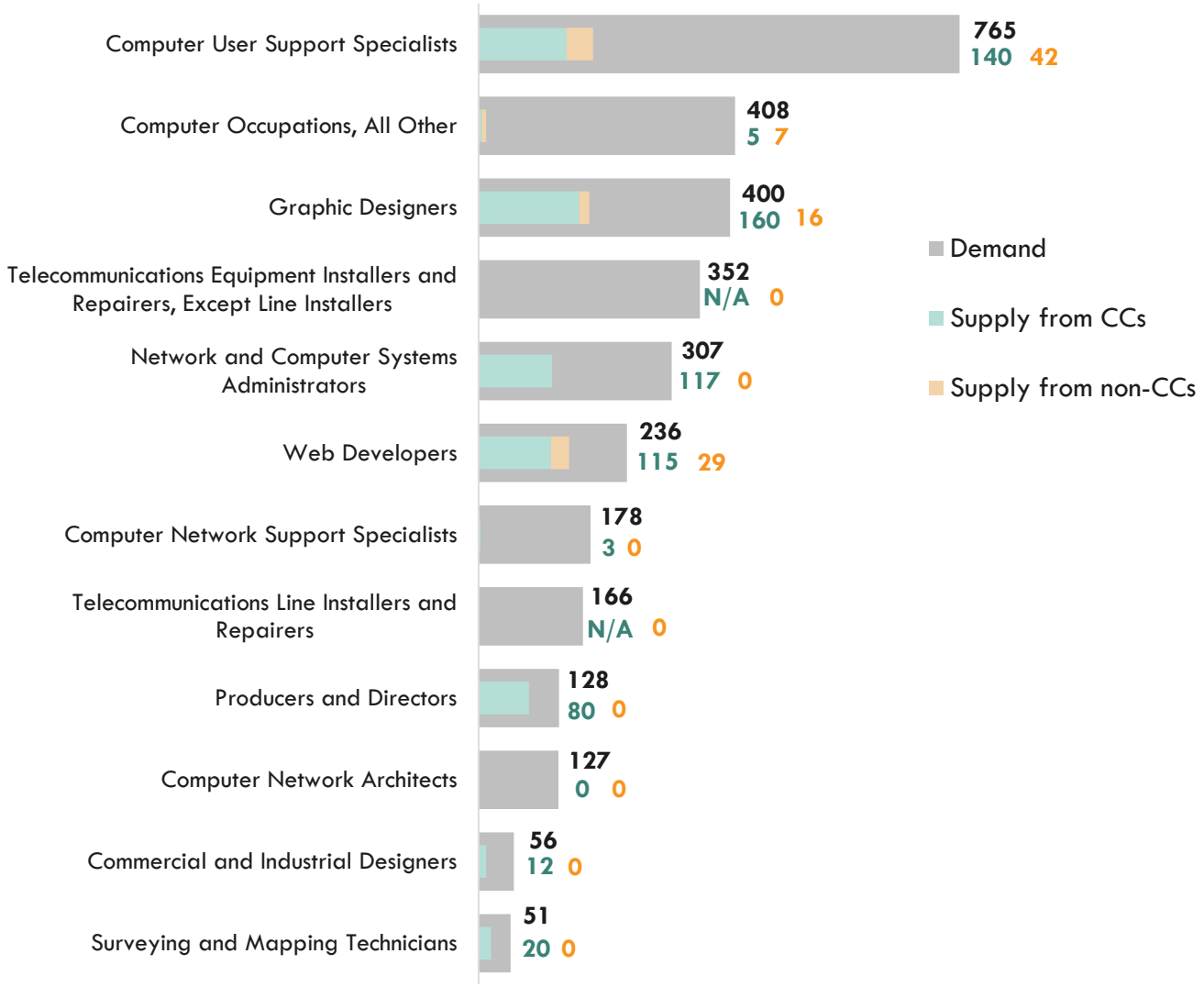
The Information and Communications Technology (ICT) and Digital Media was split into two focus groups that were held on different days and included a total of nine faculty members – one counselor and eight academic – and four administrators from six institutions, all of which were community colleges – that offered ICT and Digital Media programs in Orange County between 2015 and 2017. Both the statewide and regional director for employer engagement also attended one of the two focus groups.

Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to the ICT and Digital Media sector. This sector-specific information is highlighted throughout this report in the Focus Group Insights and the Focus Group Insights – The Big Picture sections.

ICT AND DIGITAL MEDIA TOP MIDDLE-SKILL JOBS

This section compares Orange County's labor market demand for the top middle-skill jobs in ICT and Digital Media with program supply from the region's community colleges and non-community college providers (Exhibit 1). As seen in Exhibit 2, the entry-level wages[2] for these top middle-skill jobs are higher than the $17.39 per hour living wage. Descriptions for each occupational title can be found in Appendix B. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix C.

Exhibit 1. ICT and Digital Media Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Program Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

[2] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

FOCUS GROUP INSIGHTS

Skills and Certifications

Focus group participants noted that there is not a four-year degree specific to information technology, so employers focus on skills and certifications when hiring workers. Faculty members and the regional director for employer engagement identified a number of certifications for which Orange County community college programs train. Certifications for IT programs include Cisco Network Assistant (CNA), Cisco Certified Network Associate (CCNA), Cisco Certified Entry Networking Technician (CCENT), Microsoft Certified Professional, and a variety of CompTIA certifications: A+, Linux+, Network+, and Security+. Digital Media certifications include Adobe and Avid certifications.

> *"I would say a majority of our students are in our classes because they're interested in earning a certification. They do not necessarily care about earning an award."*
> *– Irvine Valley College Faculty Member*

Faculty said that students will often take a class in order to gain the skills to pass a third-party certification test. Once these students gain the necessary skills and/or certifications to find employment, they leave the program and do not complete their degree or certificate.

New Programs

Faculty and administrators identified three program areas, cloud technology, cybersecurity, and data analytics, in which they are either in the process of creating or plan to create new programs in the future. Focus group participants said that demand is high enough in these areas to have duplicative programs. One faculty member agreed that there was high demand, but raised the question of whether or not Orange County community colleges should have areas of specialization. This approach would allow students to take a sequence of core courses at any participating college in the region, then take specialty courses at another college, if they desire.

Exhibit 2. ICT and Digital Media Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages

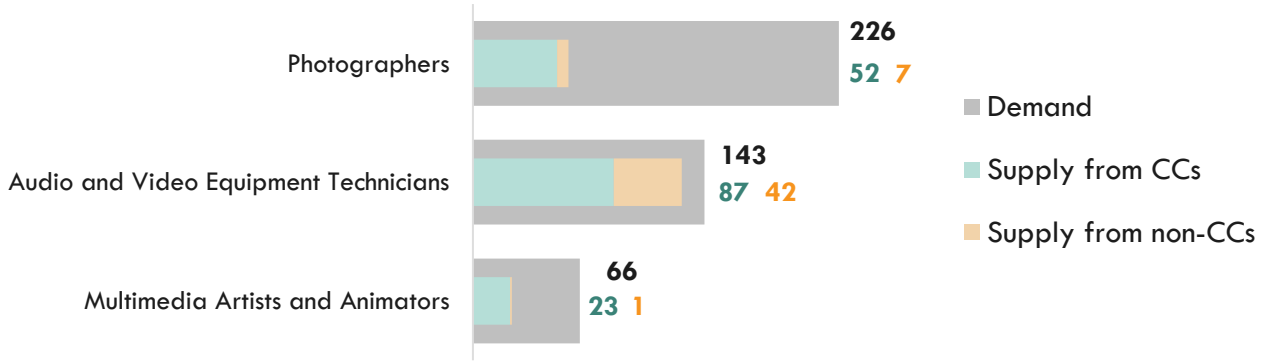
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
15-1151	Computer User Support Specialists	765	$21.70	$26.86
15-1199	Computer Occupations, All Other	408	$27.90	$40.40
27-1024	Graphic Designers	400	$18.37	$21.57
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	352	$20.62	$26.45
15-1142	Network and Computer Systems Administrators	307	$32.76	$42.51
15-1134	Web Developers	236	$21.85	$27.91
15-1152	Computer Network Support Specialists	178	$25.42	$34.04
49-9052	Telecommunications Line Installers and Repairers	166	$20.54	$28.18
27-2012	Producers and Directors	128	$23.40	$29.08
15-1143	Computer Network Architects	127	$38.56	$51.61
27-1021	Commercial and Industrial Designers	56	$24.45	$29.93
17-3031	Surveying and Mapping Technicians	51	$26.47	$33.04

ICT AND DIGITAL MEDIA MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the regional living wage but median wages near or above it. Since wages generally increase from entry-level to median earnings with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibit 3, middle-skill ICT and Digital Media jobs with entry-level wages below the regional living wage have a significant number of annual job openings (labor market demand).

Exhibit 3. ICT and Digital Media Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand vs. Program Supply



While these occupations have entry-level wages below the California Family Needs Calculator of $17.39 per hour, occupations such as Photographers; Audio and Video Equipment Technicians; and Multimedia Artists and Animators have median wages higher than the regional level wage, as denoted via the gray shading in Exhibit 4.

Exhibit 4. ICT and Digital Media Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
27-4021	Photographers	226	$16.25	$18.15
27-4011	Audio and Video Equipment Technicians	143	$15.24	$18.18
27-1014	Multimedia Artists and Animators	66	$14.46	$24.25

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed other issues and challenges that cannot be captured by traditional labor market information and provided insight on the tactics colleges and employers are currently using to address supply gaps in the ICT and Digital Media sector.

How Employers are Filling Supply Gaps

According to focus group participants, employers rely on expensive, third-party boot camps to find new workers. In general, boot camps can be a quick alternative to traditional educational programs offered at community colleges and four-year institutions. Focus group participants also noted that, in their experience, employers in this sector do not provide as much incumbent worker training as other areas.

Emerging Areas

Focus group participants identified a number of emerging areas for this sector, AR/VR, cloud technology, cybersecurity, data analytics, and game design. Faculty members pointed out that most of these fields should be considered multi-disciplinary and require skills from a variety of areas. For example, game design may involve character design, concept art, story development, and programming skills and data analytics skills can be used in a variety of business occupations. For these reasons, faculty members noted that programs have to be cross disciplinary to provide students with a variety of skills that will prepare them for multiple occupations.

Creative Ways Colleges are Offering Programs

Focus group participants discussed several creative ways they are offering programs and some of the challenges they face when developing new ways to offer programs:

- Faculty said that online courses with flexible schedules are appealing to students and have strong enrollment numbers. However, an Irvine Valley College faculty member noted that they are hesitant to move their courses online because students need hands on experience with equipment.
- Saddleback and Irvine Valley colleges reduced the length of their existing online courses from 16 weeks to eight weeks and found that enrollment increased in these courses. However, they found that students were able to pass the class, but were not able to pass the related certification exam.
- One college has created a 17 unit, semester-long certificate to help students gain skills and complete their award in a short amount of time. Similar semester-long programs could provide a less expensive alternative to boot camps. Other faculty members pointed out that this type of program would not be feasible if it includes courses that build on previous knowledge.
- Coastline College has created a cybersecurity apprenticeship program for students to learn cybersecurity techniques while training in a hands-on environment with an employer. Additionally, Coastline College also houses NetLab equipment so students throughout the region have access to training and virtual labs for IT and cybersecurity programs.
- In an effort to provide students with better career coaching, a Fullerton College faculty member works with counselors to walk them through requirements, course progression, and to get on the same page about transfer programs and requirements for students. While this effort is helpful, focus group participants noted that it is time-intensive and counseling offices have high turnover, so this knowledge will not always be passed on to other counselors.

Challenges in Expanding Programs

Focus group participants identified several challenges to expanding programs in the ICT and Digital Media sector. Many of these challenges, including the lack of dedicated lab space, difficulty hiring faculty and staff, and high costs for equipment, cut across all sectors. However, a unique challenge for the ICT and Digital Media sector is the difficulty in finding data for emerging areas, such as AR/VR, cloud technology, cybersecurity, and data analytics. Faculty and administrators said that data is not always clear for the skills, certifications, and education levels employers need to fill positions in these areas.

KEY FINDINGS: ICT AND DIGITAL MEDIA

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. Fourteen out of the fifteen ICT and Digital Media middle-skill jobs in Orange County have supply gaps.

2. The following occupations have entry-level wages below the California Family Needs Calculator, but have median wages at or above the California Family Needs Calculator:
   - Photographers
   - Audio and Video Equipment Technicians
   - Multimedia Artists and Animators

3. The following programs in Orange County reported noncredit awards for the ICT and Digital Media sector:
   - Computer Graphics and Digital Imagery (0614.60) at North Orange Continuing Education[3]
   - Website Design and Development (0614.30) at Santiago Canyon College

4. Of the 15 occupations (SOC codes) analyzed in this brief for the ICT and Digital Media sector, there is a labor market demand of 3,609 annual job openings, a program supply of 968 awards, which creates a sector supply gap of 2,641 awards.

3,609	968	2,641
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. Focus group participants said that employers in IT tend to hire based on skills and certifications, rather than degree. Faculty and the regional director for employer engagement could work with employers to identify which certifications they value most. Once these certifications are identified, colleges could consider providing students with vouchers to take certification exams after they complete a degree or certificate.
2. According to focus group participants, there are several program areas in this sector that could benefit from multi-disciplinary training. ICT and Digital Media faculty could work with their counterparts in other departments, such as business, to develop multi-disciplinary programs that will provide students with skills that could be used in multiple occupations.
3. Colleges could work with local employers to identify emerging areas for which they need workers and identify the skills, certifications, and education employers require. Colleges can then work with the COE to verify this information in order to re-tool or develop new training programs.

[3] Data for North Orange Continuing Education is captured as "North Orange Adult" in the California Community Colleges Chancellor's Office Management Information System DataMart as seen in Appendix C.

APPENDIX A: METHODOLOGY AND ICT AND DIGITAL MEDIA DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in this brief, the COE first reviewed the TOP codes associated with the sector and then matched them with the SOC codes. According to the CCC, the following six-digit TOP codes define the ICT and Digital Media sector:

TOP6 Program Name	TOP6 Code
Animation	0614.40
Applied Photography	1012.00
Broadcast Journalism	0604.30
Commercial Art	1013.00
Commercial Music	1005.00
Computer Graphics and Digital Imagery	0614.60
Computer Information Systems	0702.00
Computer Infrastructure and Support	0708.00
Computer Networking	0708.10
Computer Programming	0707.10
Computer Software Development	0707.00
Computer Support	0708.20
Computer Systems Analysis	0707.30
Database Design and Administration	0707.20
Desktop Publishing	0614.50
Digital Media	0614.00
E-Commerce (technology emphasis)	0709.10
Electronic Game Design	0614.20
Film Production	0612.20
Geographic Information Systems	2206.10
Graphic Art and Design	1030.00
Information Technology, General	0701.00
Journalism	0602.00
Mass Communications	0610.00
Multimedia	0614.10
Office Technology-Office Computer Applications	0514.00
Other Information Technology	0799.00
Other Media and Communications	0699.00
Radio	0604.10
Radio and Television	0604.00
Software Applications	0702.10
Technical Communication	0607.00
Telecommunications Technology	0934.30
Television (including combined TV-film-video)	0604.20
Website Design and Development	0614.30
World Wide Web Administration	0709.00

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[4] system and identified approximately 300 occupational codes as middle-skill jobs.

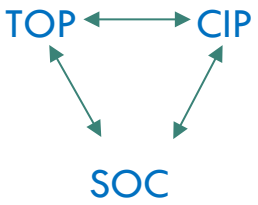
Middle-skill jobs include:

- 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.

For this study, the COE analyzed occupations with a labor market demand of at least 50 annual job openings. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[5] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.
- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



The 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 data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP 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.

Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of this study.

[4] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.
[5] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

To create the invite list of faculty and administrators, Regional Directors for Employer Engagement and career education deans at each college were asked to identify faculty and administrators that could represent their respective colleges in the sector-specific focus groups. Once this list was compiled, the career education deans invited faculty and administrators to express their interest in participating in a focus group via email. The email introduced the COE, provided an overview of the Orange County Sector Analysis Project, described the goals of the focus groups, and informed faculty that they would be compensated for their participation, and that lunch would be provided for all participants. All those that stated their interest were then connected with the COE who managed the focus groups scheduling and details.

In order to be as inclusive as possible, 12 focus groups were scheduled for the eight sectors – four sectors had one focus group each and four sectors had two focus groups each, during a three-week period from July to August 2019. All focus groups participants received a confirmation email before the event that included the focus group agenda, their sector-specific draft brief, and a pre-assignment with questions based off of the information contained in the draft sector briefs. Focus group participants were instructed to complete and bring the pre-assignment to the convening so that they were prepared to discuss the data, the challenges they face in their programs, and strategies to close supply gaps. Each focus groups was recorded, with permission of the participants, by the COE solely for transcription purposes.

The COE conducted no more than two focus group sessions per day. During the focus groups the Orange County Sector Analysis Project was explained and then the information contained in the draft sector briefs was presented in detail. Participants were encouraged to ask questions and engage in dialogue throughout the entire focus group session. The COE took notes of each discussion as well as recorded the sessions, with permission of the participants and solely for transcription purposes.

Following the conclusion of the focus groups, the COE compiled the audio files, transcripts, notes, and pre-assignments to conduct a qualitative analysis of the themes for each focus group and to identify commonalities across multiple focus groups. The findings from this analysis have been highlighted throughout this report in the "Focus Group Insight" sections.

APPENDIX B: DEFINITIONS FOR ICT AND DIGITAL MEDIA MIDDLE-SKILL JOBS

Audio and Video Equipment Technicians (SOC 27-4011): Set up, or set up and operate audio and video equipment including microphones, sound speakers, video screens, projectors, video monitors, recording equipment, connecting wires and cables, sound and mixing boards, and related electronic equipment for concerts, sports events, meetings and conventions, presentations, and news conferences. May also set up and operate associated spotlights and other custom lighting systems. Sample job titles include:

- Audio Visual Technician
- Videographer
- Video Editor
- Television Technician
- Technical Assistant
- Stagehand

Commercial and Industrial Designers (SOC 27-1021): Develop and design manufactured products, such as cars, home appliances, and children's toys. Combine artistic talent with research on product use, marketing, and materials to create the most functional and appealing product design. Sample job titles include:

- Package Designer
- Toy Designer
- Textile Designer
- Sign Designer
- Product Designer
- Product Design Engineer

Computer Network Architects (SOC 15-1143): Design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Perform network modeling, analysis, and planning. May also design network and computer security measures. May research and recommend network and data communications hardware and software. Sample job titles include:

- Network Analyst
- Network Engineer
- Telecommunications Analyst
- Telecommunication Systems Designer

Computer Network Support Specialists (SOC 15-1152): Analyze, test, troubleshoot, and evaluate existing network systems, such as local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Perform network maintenance to ensure networks operate correctly with minimal interruption. Sample job titles include:

- Systems Support Specialist
- Network Technician
- Network Technical Analyst
- Senior IT Assistant
- Personal Computer Network Analyst

Computer Occupations, All Other (SOC 15-1199): All computer occupations not listed separately. Sample job titles include:

- **Web Administrators (15-1199.03):** Manage web environment design, deployment, development and maintenance activities. Perform testing and quality assurance of web sites and web applications.
- **Geographic Information Systems Technicians (15-1199.05):** Assist scientists, technologists, or related professionals in building, maintaining, modifying, or using geographic information systems (GIS) databases. May also perform some custom application development or provide user support.
- **Database Architects (15-1199.06):** Design strategies for enterprise database systems and set standards for operations, programming, and security. Design and construct large relational databases. Integrate new systems with existing warehouse structure and refine system performance and functionality.
- **Business Intelligence Analysts (15-1199.08):** Produce financial and market intelligence by querying data repositories and generating periodic reports. Devise methods for identifying data patterns and trends in available information sources.

Computer User Support Specialists (SOC 15-1151): Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, or via telephone or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems. Sample job titles include:

- Help Desk Technician
- Desktop Support Specialist
- PC Tech
- Information Technology Support Specialist
- Information Technology Analyst or Technician
- Technical Support Specialist

Graphic Designers (SOC 27-1024): Design or create graphics to meet specific commercial or promotional needs, such as packaging, displays, or logos. May use a variety of mediums to achieve artistic or decorative effects. Sample job titles include:

- Visual Designer
- Publications Designer
- Production Artist
- Graphic Artist

Multimedia Artists and Animators (SOC 27-1014): Create special effects, animation, or other visual images using film, video, computers, or other electronic tools and media for use in products or creations, such as computer games, movies, music videos, and commercials. Sample job titles include:

- Digital Artist
- 3D Animator
- Videographer
- Prop and Effects Designer
- Web Designer
- Production Assistant

Network and Computer Systems Administrators (SOC 15-1142): Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Monitor network to ensure network availability to all system users and may perform necessary maintenance to support network availability. May monitor and test Web site performance to ensure Web sites operate correctly and without interruption. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software. May supervise computer user support specialists and computer network support specialists. May administer network security measures. Sample job titles include:

- WAN or LAN Administrator
- Server Administrator
- Network Coordinator
- Telecommunications Analyst
- Systems Operator
- Systems Administrator

Photographers (SOC 27-4021): Photograph people, landscapes, merchandise, or other subjects, using digital or film cameras and equipment. May develop negatives or use computer software to produce finished images and prints. Includes scientific photographers, aerial photographers, and photojournalists. Sample job titles include:

- Portrait Photographer
- Advertising Photographer
- Newspaper Photojournalist
- Commercial Photographer
- Photojournalist
- Photo Editor

Producers and Directors (SOC 27-2012): Produce or direct stage, television, radio, video, or motion picture productions for entertainment, information, or instruction. Responsible for creative decisions, such as interpretation of script, choice of actors or guests, set design, sound, special effects, and choreography. Sample job titles include:

- Television Producer
- Radio Producer
- Television Director
- Program Manager
- Casting Director
- Production Director

Surveying and Mapping Technicians (SOC 17-3031): Perform surveying and mapping duties, usually under the direction of an engineer, surveyor, cartographer, or photogrammetric to obtain data used for construction, mapmaking, boundary location,

mining, or other purposes. May calculate mapmaking information and create maps from source data, such as surveying notes, aerial photography, satellite data, or other maps to show topographical features, political boundaries, and other features. May verify accuracy and completeness of maps.. Sample job titles include:

- Chainman
- Survey Technician
- Photogrammetric Technician
- Tax Map Technician
- Stereoplotter Operator
- Photogrammetric Compilation Specialist

Telecommunications Equipment Installers and Repairers, Except Line Installers (SOC 49-2022): Install, set-up, rearrange, or remove switching, distribution, routing, and dialing equipment used in central offices or headends. Service or repair telephone, cable television, Internet, and other communications equipment on customers' property. May install communications equipment or communications wiring in buildings. Sample job titles include:

- Telephone Technician
- Communications Technician
- Satellite Specialist
- Telephone Repairer
- Broadband Technician

Telecommunications Line Installers and Repairers (SOC 49-9052): Install and repair telecommunications cable, including fiber optics. Sample job titles include:

- Lineman
- Cable Splicer
- Telecommunications Technician
- Splicing Technician
- Service Technician
- Outside Plant Technician

Web Developers (SOC 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. Sample job titles include:

- Web Designer
- Webmaster
- Web Development Instructor
- Web Design Specialist
- Web Content Developer
- Web Architect

APPENDIX C: ICT AND DIGITAL MEDIA DEMAND AND SUPPLY DATA

The following tables compare labor market demand and program supply by occupation. Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for that occupation. Therefore, the COE de-duplicated TOP codes that train for more than one occupation to avoid counting program supply more than once. This de-duplication process is denoted by the "Accounted for Above" statements in the tables on the following pages.

Additionally, the COE reviewed program data from the LaunchBoard[6] and the statewide COE Supply Table[7] and identified conflicting information. For certain occupations, LaunchBoard indicates that a college has a program for that occupation, but the COE Supply Table does not show program data for that college, and vice versa. These discrepancies are marked with the following:

> +The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard
>
> *LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

The demand and supply tables in the following pages have three categories:

1. **Supply Gap** – If Average Annual Openings exceed Average Annual Awards by more than 25 percent, then the cell is shaded in light green.
2. **Supply Met** – If Average Annual Openings is within 25 percent +/- of Average Annual Awards, then the cell is shaded in light blue.
3. **Oversupply** – If Average Annual Openings exceed the Average Annual Awards by more than 25 percent, then the cell is shaded in red.

[6] calpassplus.org/LaunchBoard/Home.aspx
[7] coeccc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

DEMAND AND SUPPLY DATA FOR TOP ICT AND DIGITAL MEDIA MIDDLE-SKILL JOBS IN ORANGE COUNTY

+ The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table
~ Noncredit awards
^ North Orange Continuing Education is also known as North Orange Adult in the California Community Colleges Chancellor's Office Management Information System

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Computer User Support Specialists	765	Supply Gap	192	Computer Information Systems	0702.00	Cypress	5
						Fullerton	7
						Santa Ana	19
						Santiago Canyon+	2
						Orange Coast*	0
						Irvine*	0
					CIP 11.0103	Argosy University-Orange County	1
						Stanbridge College	22
						University of Phoenix-California	1
				Software Applications	0702.10	Coastline+	10
						Cypress	1
						Fullerton	1
						Irvine	23
						Saddleback	8
						Santiago Canyon*	0
						Santa Ana*	0
						Orange Coast*	0
						North Orange Adult*	0
					CIP 11.0601	Allied American University	5
				Computer Infrastructure and Support	0708.00	Coastline	53
						Cypress	6
						Fullerton*	0
					CIP 11.1001	University of Phoenix-California	1

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Computer Support	0708.20	Cypress	5
					CIP 11.1006	Southern California Institute of Technology	22
Computer Occupations, All Other	408	Supply Gap	12	Electronic Game Design	0614.20	Golden West	1
						Irvine*	0
				Information Technology, General	0701.00	Coastline	1
						Cypress+	1
						Santa Ana*	0
						Orange Coast*	0
						Golden West*	0
						Fullerton*	0
						Santiago Canyon*	0
					CIP 11.0101	Allied American University	7
				Computer Information Systems	0702.00	Already Accounted For	0
					CIP 11.0103	Already Accounted For	0
				Other Information Technology	0799.00	Fullerton*	0
						North Orange Adult*	0
				E-Commerce (technology emphasis)	0709.10	Saddleback	2
						Irvine*	0
						Santa Ana*	0
						Santiago Canyon*	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Graphic Designers	400	Supply Gap	176	Advertising	0509.10	Cypress*	0
						Orange Coast*	0
				Digital Media	0614.00	Coastline	1
						Golden West	15
						Irvine	9
						Fullerton*	0
						Orange Coast*	0
						Santiago Canyon*	0
				Computer Graphics and Digital Imagery	0614.60	Coastline+	2
						Cypress+	8
						Fullerton	1
						Irvine+	2
						Orange Coast	30
						Saddleback	7
						Santa Ana	10
						Cypress*	0
						Golden West*	0
						Santiago Canyon*	0
						North Orange Adult~+^	1
				Graphic Art and Design	1030.00	Fullerton	10
						Golden West	34
						Irvine	1
						Saddleback	18
						Santa Ana	1
						Santiago Canyon	10
						Cypress*	0
						Orange Coast*	0
					CIP 50.0409	Argosy University-The Art Institute of California-Orange County	16

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Telecommunications Equipment Installers and Repairers, Except Line Installers	352	Supply Gap	0	Telecommunications Technology	0934.30	No Programs	0
Network and Computer Systems Administrators	307	Supply Gap	117	Computer Networking	0708.10	Coastline	49
						Cypress	28
						Fullerton+	1
						Irvine	19
						Saddleback	20
						Orange Coast*	0
				Telecommunications Technology	0934.30	No Programs	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Web Developers	236	Supply Gap	144	Website Design and Development	0614.30	Coastline	1
						Irvine	10
						Saddleback	8
						Santa Ana	1
						Santiago Canyon~	9
						Golden West*	0
						Cypress*	0
					CIP 11.0801	Allied American University	4
						Argosy University-The Art Institute of California-Orange County	8
						InterCoast Colleges-Anaheim	1
				Computer Software Development	0707.00	Cypress+	2
						Golden West	10
						Orange Coast	11
						Saddleback	6
					CIP 11.0201	Allied American University	15
						University of Phoenix-California	1
				Computer Programming	0707.10	Coastline	1
						Cypress	19
						Irvine+	21
						Orange Coast	14
						Santa Ana*	0
						Golden West*	0
						Santiago Canyon*	0
						Fullerton*	0
				World Wide Web Administration	0709.00	Saddleback	2
						Cypress*	0
						Orange Coast*	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Computer Network Support Specialists	178	Supply Gap	3	Computer Systems Analysis	0707.30	Cypress+	3
						Irvine*	0
				Computer Networking	0708.10	Already Accounted For	0
				Computer Support	0708.20	Already Accounted For	0
					CIP 11.1006	Already Accounted For	0
Telecommunications Line Installers and Repairers	166	Supply Gap	0	Telecommunications Technology	0934.30	No Programs	0
Producers and Directors	128	Supply Gap	80	Television (including combined TV/film/video)	0604.20	Fullerton	25
						Saddleback	3
						Santa Ana	10
				Film Production	0612.20	Orange Coast	34
						Saddleback	8
						Santiago Canyon*	0
Computer Network Architects	127	Supply Gap	0	Computer Information Systems	0702.00	Already Accounted For	0
					CIP 11.0103	Already Accounted For	0
				Computer Systems Analysis	0707.30	Already Accounted For	0
				Computer Infrastructure and Support	0708.00	Already Accounted For	0
					CIP 11.1001	Already Accounted For	0
				Computer Networking	0708.10	Already Accounted For	0
				Computer Support	0708.20	Already Accounted For	0
					CIP 11.1006	Already Accounted For	0
				World Wide Web Administration	0709.00	Already Accounted For	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Commercial and Industrial Designers	56	Supply Gap	12	Technical Illustration	0953.60	No Programs	0
				Applied Design	1009.00	Fullerton*	0
						Orange Coast*	0
						Saddleback*	0
						Santa Ana*	0
				Commercial Art	1013.00	Cypress	1
						Fullerton	4
						Orange Coast	7
						Santa Ana*	0
						Santiago*	0
Surveying and Mapping Technicians	51	Supply Gap	20	Surveying	0957.30	Santiago Canyon	17
				Geographic Information Systems	220.610	Cypress	3
						Saddleback*	0

DEMAND AND SUPPLY DATA FOR ICT AND DIGITAL MEDIA MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table
~Noncredit awards

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Photographers	226	Supply Gap	59	Applied Photography	1012.00	Cypress	22
						Fullerton	13
						Orange Coast	17
						Santiago Canyon*	0
					CIP 50.0406	Argosy University-The Art Institute of California-Orange County	7
Audio and Video Equipment Technicians	143	Supply Met	129	Radio and Television	0604.00	Fullerton	1
						Saddleback+	46
						Cypress*	0
						Orange Coast*	0
						Santiago Canyon*	0
					CIP 09.0701	The Academy of Radio and TV Broadcasting	22
					CIP 10.0202	The Academy of Radio and TV Broadcasting	20
				Commercial Music	1005.00	Cypress	12
						Fullerton	9
						Orange Coast	6
						Saddleback	1
						Santa Ana	2
						Irvine*	0
						Golden West*	0
				Radio	0604.10	Fullerton+	10

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Multimedia Artists and Animators	66	Supply Gap	24	Digital Media	0614.00	Already Accounted For	0
				Multimedia	0614.10	Cypress	1
						Orange Coast	3
						Santiago Canyon~	2
						Golden West*	0
						North Orange Adult*	0
						Santa Ana*	0
					CIP 10.0304	Laguna College of Art and Design	1
				Electronic Game Design	0614.20	Accounted for Above	0
				Animation	0614.40	Cypress	9
						Irvine+	1
						Santa Ana	7
						Golden West*	0
						Orange Coast*	0
				Computer Graphics and Digital Imagery	0614.60	Already Accounted For	0
				Graphic Art and Design	1030.00	Already Accounted For	0
					CIP 50.0409	Accounted for Above	0

2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

LIFE SCIENCES AND BIOTECHNOLOGY

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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

LIFE SCIENCES AND BIOTECHNOLOGY
Demand and Supply Analysis: Orange County

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Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; 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 the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host college/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.

INTRODUCTION

This sector brief is a product of the Orange County Sector Analysis Project. It provides information about the Life Sciences and Biotechnology sector in Orange County, one of Orange County's two emerging sectors; it compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in this report for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. One of these focus groups was specific to the Life Sciences and Biotechnology sector. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

In this brief, 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.

In this brief, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of this report, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the purpose of this

[1] https://insightcced.org/2018-family-needs-calculator/

report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A.

FOCUS GROUP INSIGHTS

The Life Sciences and Biotechnology sector focus group included three faculty members and two administrators from three of the four community colleges that offered Life Sciences and Biotechnology programs in Orange County between 2015 and 2017. Both the statewide and regional director for employer engagement also attended the focus group. Life Sciences and Biotechnology is a relatively new sector for community colleges and is, by number of occupations, the smallest sector of all eight priority and emerging sectors.

The occupations in this brief do not match the occupations reported in 2017's statewide "Supply and Demand Analysis: Life Sciences & Biotech Middle Skills Workforce in California" report due to differing methodology.[2] This sector brief focuses on middle-skill occupations, while the statewide report included "pathway" occupations that would require at least a bachelor's degree or significant experience to gain employment. While several of the occupations analyzed in the statewide report may not meet the middle-skill definition used in this report, it is important to acknowledge them because prior work has been done to identify other occupations that are relevant to the Life Sciences and Biotechnology sector.

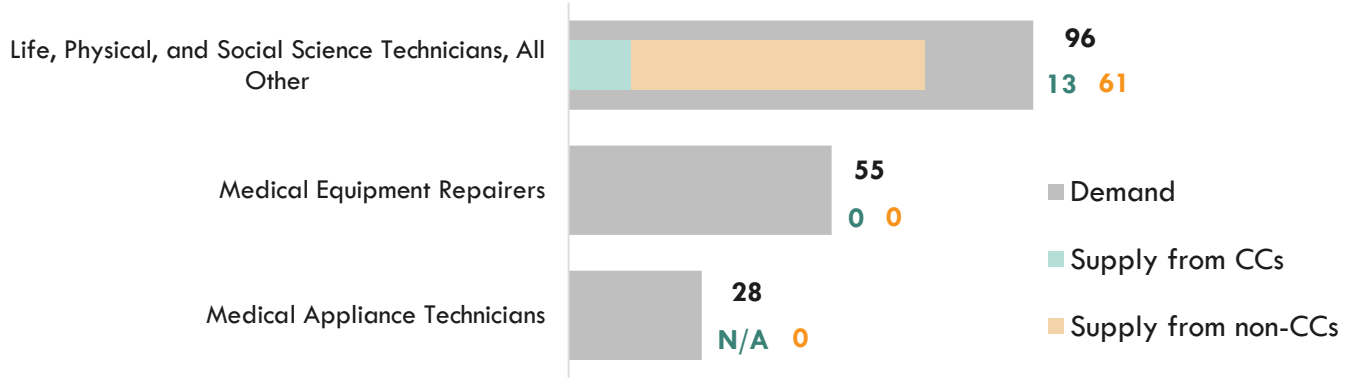
Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to the Life Sciences and Biotechnology sector. This sector-specific information is highlighted throughout this report in the Focus Group Insights and the Focus Group Insights – The Big Picture sections.

[2] coeccc.net/reports/Life_Sciences_Biotech_Middle_Skills_Workforce_1_1

LIFE SCIENCES AND BIOTECHNOLOGY TOP MIDDLE-SKILL JOBS

This section compares Orange County's labor market demand for the top middle-skill jobs in Life Sciences and Biotechnology with program supply from the region's community colleges and non-community college providers (Exhibit 1). As seen in Exhibit 2, the entry-level wages[3] for these top middle-skill jobs are higher than the $17.39 per hour living wage. Descriptions for each occupational title can be found in Appendix B. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix C.

Exhibit 1. Life Sciences and Biotechnology Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Program Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

FOCUS GROUP INSIGHTS

Occupational Titles and Data Definitions

This sector brief uses occupational titles from the Standard Occupational Classification (SOC) system in the demand and supply exhibits, as identified and defined in Appendix B. While standardized occupational titles are useful for classifying, collecting, and disseminating data in general, they may not be the exact job titles used by employers. According to the focus group discussion, companies often have "job titles" that are different than SOC occupational titles. While job descriptions may be similar, actual job titles differ from organization to organization, and employers may not provide accurate information about SOC occupational titles, especially if they do not match their company's job titles. This inconsistency highlights a shortcoming of the SOC system and could provide a challenge when attempting to validate data with employers.

Local Low-Unit Certificates

The Life Sciences and Biotechnology sector focus group participants felt that supply data from traditional labor market information is limited; it does not capture locally issued low-unit certificates that are not reported to, or approved by, the California Community Colleges Chancellor's Office (CCCCO). According to focus group participants, Life Sciences and Biotechnology programs primarily attract industry professionals who are interested in upskilling or learning new skills for their current jobs. However, the supply data does not capture students that take a small number of courses to gain additional skills if colleges do not report data for low-unit certificate programs. This could result in an under-reporting of the supply number.

> *"There was nothing [courses in this sector] back in 2012 and we started to build from there. We're seeing an uptick in enrollment, but it takes a while for people to realize what you're offering."*
> *–Santiago Canyon College Faculty Member*

[3] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

Low Completion Numbers

According to the demand and supply exhibits in this brief, the community colleges in Orange County are undersupplying for both top middle-skill jobs and jobs that have entry-level wages below the California Family Needs Calculator (CFNC), but median wages above the CFNC within this sector, as shown in the next section of this brief. According to the CCCCO's dashboard tool, LaunchBoard[4], 379 (unduplicated) students took one or more courses in Life Sciences and Biotechnology programs in the 2016-17 program year in Orange County. However, in that same year, only 21 students earned a certificate or degree. Focus group participants provided the explanations below as to why supply numbers are so low:

- Students sometimes do not know that they have to complete and submit paperwork in order to earn their award. Multiple faculty members said they have set aside class time for students to complete the necessary paperwork, then either walk the students to the appropriate office to submit their paperwork or in some cases, even submit themselves.
- The majority of community college students take courses part-time; therefore, they may take longer to complete certificates than full-time students. The focus group participants felt that the longer a student stays in a program, the lower the chance the student will complete the program.

> *"A lot of students aren't aware that they have to file paperwork to get their award. I set aside class time for students to fill out the necessary paperwork then walk it over to the graduation office."*
> *– Santa Ana College Faculty Member*

Exhibit 2. Life Sciences and Biotechnology Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
19-4099	Life, Physical, and Social Science Technicians, All Other	96	$17.45	$23.32
49-9062	Medical Equipment Repairers	55	$18.31	$22.61
51-9082	Medical Appliance Technicians	28	$18.56	$24.52

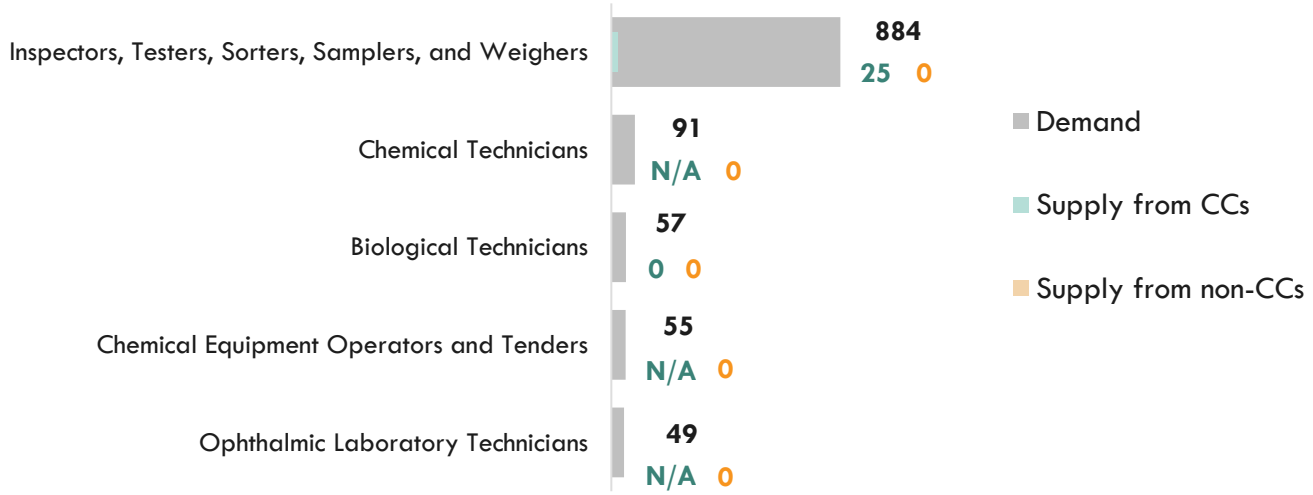
[4] calpassplus.org/Launchboard/Community-College-Pipeline.aspx

LIFE SCIENCES AND BIOTECHNOLOGY MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the regional living wage but median wages near or above it. Since wages generally increase from entry-level to median earnings with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibit 3, middle-skill Life Sciences and Biotechnology jobs with entry-level wages below the regional living wage have a significant number of annual job openings (labor market demand).

Exhibit 3. Life Sciences and Biotechnology Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand vs. Program Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

While these occupations have entry-level wages below the $17.39 per hour California Family Needs Calculator, occupations such as Inspectors, Testers, Sorters, Samplers, and Weighers; Chemical Technicians; Biological Technicians; and Ophthalmic Laboratory Technicians have median wages higher than the regional living wage, as denoted by the gray shading in Exhibit 4.

Exhibit 4. Life Sciences and Biotechnology Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	884	$14.46	$18.78
19-4031	Chemical Technicians	91	$16.64	$19.40
51-9011	Chemical Equipment Operators and Tenders	55	$12.46	$16.85
19-4021	Biological Technicians	57	$16.88	$19.57
51-9083	Ophthalmic Laboratory Technicians	49	$14.87	$17.44

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed other issues and challenges that cannot be captured by traditional labor market information and provided insight on the tactics colleges and employers are currently using to address supply gaps in the Life Sciences and Biotechnology sector.

How Employers are Filling Supply Gaps

Focus group participants across all sectors reported that employers recruit heavily at four-year colleges for potential workers, even if a position does not require a bachelor's degree. In the Life Sciences and Biotechnology focus group, participants noted that there is anecdotal evidence that students taking community college courses tend to have stronger lab skills than their four-year college counterparts, who tend to have good theoretical knowledge, but limited lab skills. Faculty members shared that, in their experience, some technical skills are not taught at the four-year level. Participants shared that employers utilize staffing agencies in order to meet their workforce needs because they pre-screen candidates and provide a low-risk, fast-moving, pipeline of workers for companies.

Employer Engagement

Faculty from multiple colleges noted that they are working to connect students with employers that have a need for qualified workers. However, they shared that developing and maintaining continuous relationships with industry partners is time consuming and difficult. In their experience, oftentimes, companies are not interested in partnering with community colleges for new programs because of the long program approval periods and additional time it would take for students to complete the program.

Skills and Certifications

According to the focus group participants, many skills taught in community college Life Sciences and Biotechnology programs are transferable and are not exclusive to a single/particular job. For example, they shared that many skills taught in programs for quality assurance or quality control jobs can be used in other sectors (e.g., the food and beverage industry), and not only in the Life Sciences and Biotech sector.

Certifications are another way to demonstrate skill attainment according to focus group participants. Faculty members indicated that they are starting to train students for certifications such as Certified Quality Improvement Associate (CQIA) and are exploring other certifications such as Lean Six Sigma. However, faculty members noted that many students are either not able or willing to pay the high fee for the exams. Focus group participants reported that the American Society for Quality (ASQ), the certifying body for CQIA, does not accept vouchers, so colleges cannot help students pay for the exam.

Challenges in Expanding Programs

Focus group participants identified several challenges to expanding programs in the Life Sciences and Biotechnology sector. Many of these challenges, including the lack of dedicated lab space, difficulty hiring faculty and staff, and high costs for equipment, cut across all sectors. However, a unique challenge for the Life Sciences and Biotechnology sector is the difficulty in finding dual enrollment partners and integrating the K-12 system into a pathway. Focus group participants said that local high schools seem interested in a pathway for their students, but additional marketing and recruiting is needed to attract students, particularly because of the emerging nature of this sector.

> *"Dual enrollment is also a way to get the word out early and help students understand the sector earlier, but it will take time for programs to develop."*
> *– Fullerton College Faculty Member*

KEY FINDINGS: LIFE SCIENCES AND BIOTECHNOLOGY

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. All middle-skill Life Sciences and Biotechnology jobs in Orange County have supply gaps.

2. The following occupations have entry-level wages below the California Family Needs Calculator, but have median wages at or above the California Family Needs Calculator:
   - Inspectors, Testers, Sorters, Samplers, and Weighers
   - Chemical Technicians
   - Biological Technicians
   - Ophthalmic Laboratory Technicians

3. No community college programs in Orange County reported noncredit awards for the Life Sciences and Biotechnology sector.

4. Of the 8 occupations (SOC codes) analyzed in this brief for the Life Sciences and Biotechnology sector, there is a labor market demand of 1,315 annual job openings, a program supply of 99 awards, which creates a sector supply gap of 1,216 awards.

1,315	99	1,216
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. According to the focus groups, it is difficult to track awards for programs that do not need to report to the CCCCO. To alleviate that, one college reported having auto-awarded certificates. Colleges could explore auto-awarding certificates, but should consider negative impacts, such as the loss of some types of financial aid, this process could have on students.
2. Many skills taught in Life Sciences and Biotechnology programs, such as quality assurance or quality control, can be used in other sectors like the food and beverage industry. The COE should work with colleges to better determine employers' demand for knowledge, skills, and abilities (KSAs) in addition to jobs in order provide a more complete approach to identifying labor market demand.
3. Use the CTE Outcomes Survey (CTEOS) to track completion numbers and outcomes for skills-builders in addition to traditional labor market information.
4. Life Sciences and Biotechnology is a relatively new sector and historically has primarily attracted working professionals according to focus group participants. Programs could be intentionally promoted to targeted audiences, such as younger students fresh out of high school, career counselors, and K-12 partners to increase enrollments.
5. Focus group participants suggested that internship coordinators can play a key role to break down the bachelor's degree requirement barrier with employers.

APPENDIX A: METHODOLOGY AND LIFE SCIENCES AND BIOTECHNOLOGY DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in this brief, the COE first reviewed the TOP codes associated with the sector and then matched them with the SOC codes. According to the CCC, the following six-digit TOP codes define the Life Sciences and Biotechnology sector:

TOP6 Program Name	TOP6 Code
Biomedical Instrumentation	0934.60
Biotechnology and Biomedical Technology	0430.00
Chemical Technology	0954.00
Electron Microscopy	0934.70
Laboratory Science Technology	0955.00

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[5] system and identified approximately 300 occupational codes as middle-skill jobs.

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.

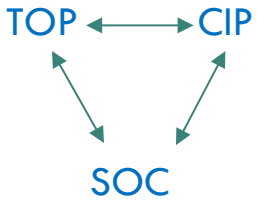
For this study, the COE analyzed occupations with a labor market demand of at least 28 annual job openings, which is less than the 50 annual openings threshold used in the seven other sectors. Life Sciences and Biotechnology is the smallest of all eight sectors and has a lower number of annual openings compared to those sectors. If the same 50 annual job openings threshold was used, there would have been only six occupations to analyze. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[6] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.

[5] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.
[6] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



The 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 data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP 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.

Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of this study.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

To create the invite list of faculty and administrators, Regional Directors for Employer Engagement and career education deans at each college were asked to identify faculty and administrators that could represent their respective colleges in the sector-specific focus groups. Once this list was compiled, the career education deans invited faculty and administrators to express their interest in participating in a focus group via email. The email introduced the COE, provided an overview of the Orange County Sector Analysis Project, described the goals of the focus groups, and informed faculty that they would be compensated for their participation, and that lunch would be provided for all participants. All those that stated their interest were then connected with the COE who managed the focus groups scheduling and details.

In order to be as inclusive as possible, 12 focus groups were scheduled for the eight sectors – four sectors had one focus group each and four sectors had two focus groups each, during a three-week period from July to August 2019. All focus groups participants received a confirmation email before the event that included the focus group agenda, their sector-specific draft brief, and a pre-assignment with questions based off of the information contained in the draft sector briefs. Focus group participants were instructed to complete and bring the pre-assignment to the convening so

that they were prepared to discuss the data, the challenges they face in their programs, and strategies to close supply gaps. Each focus groups was recorded, with permission of the participants, by the COE solely for transcription purposes.

The COE conducted no more than two focus group sessions per day. During the focus groups the Orange County Sector Analysis Project was explained and then the information contained in the draft sector briefs was presented in detail. Participants were encouraged to ask questions and engage in dialogue throughout the entire focus group session. The COE took notes of each discussion as well as recorded the sessions, with permission of the participants and solely for transcription purposes.

Following the conclusion of the focus groups, the COE compiled the audio files, transcripts, notes, and pre-assignments to conduct a qualitative analysis of the themes for each focus group and to identify commonalities across multiple focus groups. The findings from this analysis have been highlighted throughout this report in the "Focus Group Insight" sections.

APPENDIX B: DEFINITIONS FOR LIFE SCIENCES AND BIOTECHNOLOGY MIDDLE-SKILL JOBS

The following definitions and sample job titles for each occupation are derived from O*NET, the nation's primary source of occupational information. The O*NET database contains hundreds of standardized and occupation-specific descriptors on nearly 1,000 occupations. O*NET is developed and sponsored by the U.S. Department of Labor[7]

Biological Technicians (19-4021): Assist biological and medical scientists in laboratories. Set up, operate, and maintain laboratory instruments and equipment, monitor experiments, make observations, and calculate and record results. May analyze organic substances, such as blood, food, and drugs. Sample job titles include:

- Biological Science Laboratory Technician
- Biological Science Technician
- Laboratory Technician

Chemical Equipment Operators and Tenders (51-9011): Operate or tend equipment to control chemical changes or reactions in the processing of industrial or consumer products. Equipment used includes devulcanizers, steam-jacketed kettles, and reactor vessels. Sample job titles include:

- Chemical Operator
- Production Operator
- Production Technician

Chemical Technicians (19-4031): Conduct chemical and physical laboratory tests to assist scientists in making qualitative and quantitative analyses of solids, liquids, and gaseous materials for research and development of new products or processes, quality control, maintenance of environmental standards, and other work involving experimental, theoretical, or practical application of chemistry and related sciences. Sample job titles include:

- Chemical Analyst
- Laboratory Analyst
- Formulation Technician

Inspectors, Testers, Sorters, Samplers, and Weighers (51-9061): Inspect, test, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled parts or products for defects, wear, and deviations from specifications. May use precision measuring instruments and complex test equipment. Sample job titles include:

- Inspector, Picker/Packer
- Quality Assurance Auditor
- Quality Assurance Inspector
- Quality Control Inspector
- Quality Control Technician
- Quality Inspector/Technician

Life, Physical, and Social Science Technicians, All Other (19-4099): All life, physical, and social science technicians not listed separately. For the purpose of this brief, the selected middle-skill job for the Life Sciences sector is:

- **Quality Control Analysts (19-4099.01):** Conduct tests to determine quality of raw materials, bulk intermediate and finished products. May conduct stability sample tests. Sample job titles include:
  - Analyst Microbiology Lab
  - Analytical Lab Analyst
  - Quality Control Technician
  - Quality Control Analyst
  - Quality Assurance Technician

Medical Appliance Technicians (51-9082): Construct, fit, maintain, or repair medical supportive devices, such as braces, orthotics and prosthetic devices, joints, arch supports, and other surgical and medical appliances. Sample job titles include:

- Hearing Aid Repair Technician
- Prosthetic Technician
- Certified Pedorthotist

[7] https://www.onetonline.org/

Medical Equipment Repairers (49-9062): Test, adjust, or repair biomedical or electromedical equipment. Sample job titles include:

- Bio Medical Technician
- Biomedical Equipment Technician
- Biomedical Electronics Technician
- Biomedical Engineering Technician

Ophthalmic Laboratory Technicians (51-9083): Cut, grind, and polish eyeglasses, contact lenses, or other precision optical elements. Assemble and mount lenses into frames or process other optical elements. Includes precision lens polishers or grinders, centerer-edgers, and lens mounters. Sample job titles include:

- Edger Technician
- Finishing Lab Technician
- Optical Lab Technician

APPENDIX C: LIFE SCIENCES AND BIOTECHNOLOGY DEMAND AND SUPPLY DATA

The following tables compare labor market demand and program supply by occupation, and are the underlying information for the exhibits in this brief. Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for that occupation. Therefore, the COE de-duplicated TOP codes that train for more than one occupation to avoid counting program supply more than once. This de-duplication process is denoted by the "Already Accounted For" statements in the tables on the following pages.

Additionally, the COE reviewed program data from the LaunchBoard[8] and the statewide COE Supply Table[9] and identified conflicting information. For certain occupations, LaunchBoard indicates that a college has a program for that occupation, but the COE Supply Table does not show program data for that college, and vice versa. These discrepancies are marked with the following:

+ The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard

* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

The COE provided these markings for the community colleges in the region to review potential miscoded programs at their respective colleges.

The demand and supply tables in the following pages have three categories:

1. **Supply Gap** – If Average Annual Openings exceed Average Annual Awards by more than 25 percent, then the cell is shaded in green.
2. **Supply Met** – If Average Annual Openings is within 25 percent +/- of Average Annual Awards, then the cell is shaded in blue.
3. **Oversupply** – If Average Annual Awards exceed the Average Annual Openings by more than 25 percent, then the cell is shaded in red.

[8] calpassplus.org/LaunchBoard/Home.aspx
[9] coeccc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

DEMAND AND SUPPLY DATA FOR TOP LIFE SCIENCES AND BIOTECHNOLOGY MIDDLE-SKILL JOBS IN ORANGE COUNTY

+ The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
* LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Life, Physical, and Social Science Technicians, All Other	96	Supply Gap	74	Biotechnology and Biomedical Technology	0430.00	Fullerton	3
						Irvine	3
						Santa Ana	5
						Santiago Canyon	2
					CIP 15.0401	Southern California Institute of Technology	61
Medical Equipment Repairers	55	Supply Gap	0	Biotechnology and Biomedical Technology	0430.00	Already Accounted For	0
					CIP 15.0401	Already Accounted For	0
				Biomedical Instrumentation	0934.60	No Programs	0
Medical Appliance Technicians	28	Supply Gap	0	N/A	N/A	N/A	0

DEMAND AND SUPPLY DATA FOR LIFE SCIENCES AND BIOTECHNOLOGY MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Inspectors, Testers, Sorters, Samplers, and Weighers	884	Supply Gap	25	Biotechnology and Biomedical Technology	0430.00	Already Accounted For	0
					CIP 15.0401	Already Accounted For	0
				Laboratory Science Technology	0955.00	Fullerton+	1
				Manufacturing and Industrial Technology	0956.00	Fullerton	6
						Irvine	8
						Saddleback	6
						Santa Ana	3
						Orange Coast*	0
				Industrial Quality Control	0956.80	Santiago Canyon	1
Chemical Technicians	91	Supply Gap	0	Chemical Technology	0954.00	No Programs	0
				Laboratory Science Technology	0955.00	Already Accounted For	0
Chemical Equipment Operators and Tenders	55	Supply Gap	0	Chemical Technology	0954.00	No Programs	0
Biological Technicians	57	Supply Gap	0	Laboratory Science Technology	0955.00	Already Accounted For	0
				Biotechnology and Biomedical Technology	0430.00	Already Accounted For	0
Ophthalmic Laboratory Technicians	49	Supply Gap	0	Optics	0961.00	No Programs	0
				Optical Technology	1219.00	No Programs	0

2019

ORANGE COUNTY SECTOR ANALYSIS PROJECT

RETAIL, HOSPITALITY, AND TOURISM

Prepared by the
Orange County
Center of Excellence

ORANGE COUNTY
CAREER EDUCATION
Future BUILT

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CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

RETAIL, HOSPITALITY, AND TOURISM
Demand and Supply Analysis: Orange County

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INTRODUCTION

This sector brief is a product of the Orange County Sector Analysis Project. It provides information about the Retail, Hospitality, and Tourism sector in Orange County, one of Orange County's six priority sectors; it compares labor market demand with educational program supply for middle-skill jobs and provides qualitative information from experts in the field. Orange County community colleges could use the information in this report for strategic planning and discussions about program development, career pathways work, sector strategies, noncredit-to-credit pipelines, apprenticeship programs, and work-based learning opportunities.

All of the Orange County Sector Analysis Project briefs began with quantitative labor market demand and supply analysis; however, they also include qualitative information derived from the project's focus group discussions. Between July and August 2019, the Orange County Center of Excellence for Labor Market Research (COE) hosted a total of 12 sector-specific focus groups with regional stakeholders, including faculty and deans, as well as regional and state directors for employer engagement. Two of these focus groups were specific to the Retail, Hospitality, and Tourism sector. The objectives of the focus groups were to identify labor market supply gaps (supply gaps) in middle-skill jobs; understand where programs exist or do not exist to fill in the supply gaps; and discuss how Orange County's community colleges could close the supply gaps. Focus group participants reviewed the demand and supply analysis prior to meeting and provided intelligence regarding how they are working to close supply gaps as well as the challenges they encounter in their programs; this valuable information could not be captured via traditional labor market research methods. The COE recorded then analyzed these discussions which resulted in the "Focus Group Insights" sections throughout this brief, supplementing traditional, quantitative labor market data with important, qualitative information.

Middle-Skill Jobs and Living Wage Introduction

In this brief, 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.

In this brief, top middle-skill jobs are defined as jobs that have both the most labor market demand (annual job openings) and entry-level wages at or above the California Family Needs Calculator[1] (commonly known as a "living wage"). The living wage is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently $17.39 per hour. The living wage is defined by the California Family Needs Calculator, which calculates the income necessary to cover costs including housing, food, transportation, health care, and other basic necessities.

Entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in that occupation earn equal to or below this amount. Percentile wages represent the distribution of wages for each occupation. Generally, workers with minimal education and experience can expect to earn wages near the 10th percentile. With the additional education and training students receive in community college programs, they are more likely to earn wages at the 25th percentile, rather than the 10th percentile. Generally, with even more education and experience, students could expect to progress and earn the median wage, which is defined as the 50th percentile hourly wage.

Demand Introduction

For the purpose of this report, labor market demand is determined by the number of annual job openings employers expect to fill due to job growth and employee turnover between 2018 and 2023. Job growth is when an employer experiences increased demand for products and hires new employees to increase production, while employee turnover is when an employer hires replacement workers for employees who leave the workforce or change occupations.

Supply Introduction

Supply is determined by the average annual-number of related awards (e.g., certificates, degrees) generated between 2015 and 2017 by the region's community colleges and other educational institutions (e.g., private providers) for the purpose of this

[1] https://insightcced.org/2018-family-needs-calculator/

report. However, it should be noted that a student may earn more than one award; therefore, supply may be overestimated for certain occupations.

Whether or not there is a supply gap is determined by the difference between the demand and supply. The methodology regarding how these numbers are calculated is described in Appendix A.

FOCUS GROUP INSIGHTS

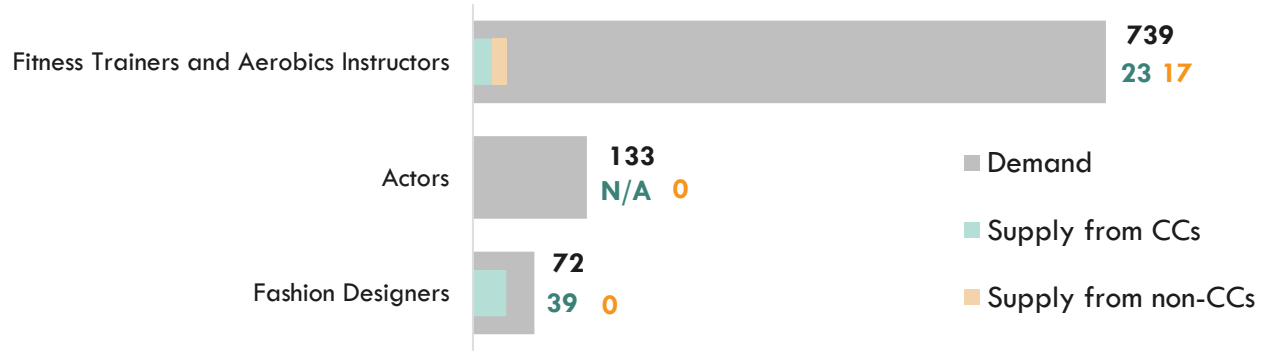
The Retail, Hospitality, and Tourism sector was split into two focus groups that were held on different days and included a total of eight faculty members and four administrators from eight institutions – six of the seven community colleges, and one noncredit school –that offered Retail, Hospitality, and Tourism programs in Orange County between 2015 and 2017. Both the statewide and regional director for employer engagement also attended one of the two focus groups.

Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive Summary report. Focus group participants also reported on limitations and challenges that were unique to the Retail, Hospitality, and Tourism sector. This sector-specific information is highlighted throughout this report in the Focus Group Insights and the Focus Group Insights – The Big Picture sections.

RETAIL, HOSPITALITY, AND TOURISM TOP MIDDLE-SKILL JOBS

This section compares Orange County's labor market demand for the top middle-skill jobs in Retail, Hospitality, and Tourism with program supply from the region's community colleges and non-community college providers (Exhibit 1). As seen in Exhibit 2, the entry-level wages[2] for these top middle-skill jobs are higher than the $17.39 per hour living wage. Descriptions for each occupational title can be found in Appendix B. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix C.

Exhibit 1. Retail, Hospitality, and Tourism Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Program Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

FOCUS GROUP INSIGHTS

Skills and Certifications

Focus group participants noted that the community colleges provide numerous courses that are designed to add a skill or set of skills, but do not fully train for a specific occupation. Since this report uses awards as the measurement for supply, these courses are not captured in the data in this report. Focus group participants also noted that, in their experience, employers tend to higher based on skills rather than the degree or certificate students earn.

> *"[Employers] are looking for a specific skill. You could have an associate's degree, but if you don't have that skill, they would rather go with someone with that specific skill."*
> *- Fullerton College Faculty Member*

Certifications are another way to demonstrate skill attainment according to focus group participants. Faculty members indicated that they train students for certifications including Western Association of Food Chains (WAFC) Retail Management, ServSafe Food Handler and Manager, Council for Interior Design Qualification (CDIQ), FAA Flight Attendant Certification, Travel Agents Proficiency (TAP), and Personal Trainer (Sabre). At least one college, Orange Coast, offers advanced certificate programs in Culinary Arts and Baking/Pastry that are accredited by the American Culinary Federation (ACF). Students completing these certificates can also earn ACF Certification upon graduation.

Flight Attendants and Fashion Occupations

One faculty member pointed out that supply and demand data for Flight Attendants (SOC code 53-2031) was not included in the supply and demand analysis. Because this occupation had less than 50 annual job openings in Orange County, it did not meet the threshold to be included, as defined in the methodology in Appendix A. Another faculty member said that the demand for Fashion Designers (SOC code 27-1022) seemed low. There is a small demand for both these occupations in Orange County, but demand for these occupations is much larger in Los Angeles County. While this report focuses on Orange

[2] In this report, entry-level wage is defined as the 25th percentile hourly wage, which means that 25% of all workers in the field earn equal to or below this amount. Generally, workers with less experience earn lower wages.

County, colleges should keep in mind that students live and work in surrounding counties where there may be greater demand for certain occupations.

Low Completion Numbers

According to the demand and supply exhibits in this brief, the community colleges in Orange County are undersupplying for both top middle-skill jobs and jobs that have entry-level wages below the California Family Needs Calculator (CFNC), but median wages above the CFNC within this sector, as shown in the next section of this brief. According to the CCCCO's dashboard tool, LaunchBoard[3], 5,632 (unduplicated) students took one or more courses in Retail, Hospitality, and Tourism programs in the 2016-17 program year in Orange County. However, in that same year, only 279 students earned a certificate or degree.

One reason for low completion numbers that some faculty members cited is that there is a high degree of turnover, particularly in retail and culinary, in this sector. Employers need workers to fill the high demand for jobs in these areas and it is relatively easy for students to find a job in the current labor market.

Other faculty members noted that it is common for students to find employment before completing their program, but upfront counseling to help students understand the importance of completing has helped increase persistence rates. Additionally, Orange Coast and Saddleback colleges have added a work experience component towards the end of their culinary and tourism programs to incentivize students to complete the program.

Exhibit 2. Retail, Hospitality, and Tourism Top Middle-Skill Jobs in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
39-9031	Fitness Trainers and Aerobics Instructors	739	$17.45	$20.97
27-2011	Actors	133	$20.91	$22.94
27-1022	Fashion Designers	72	$22.61	$29.41

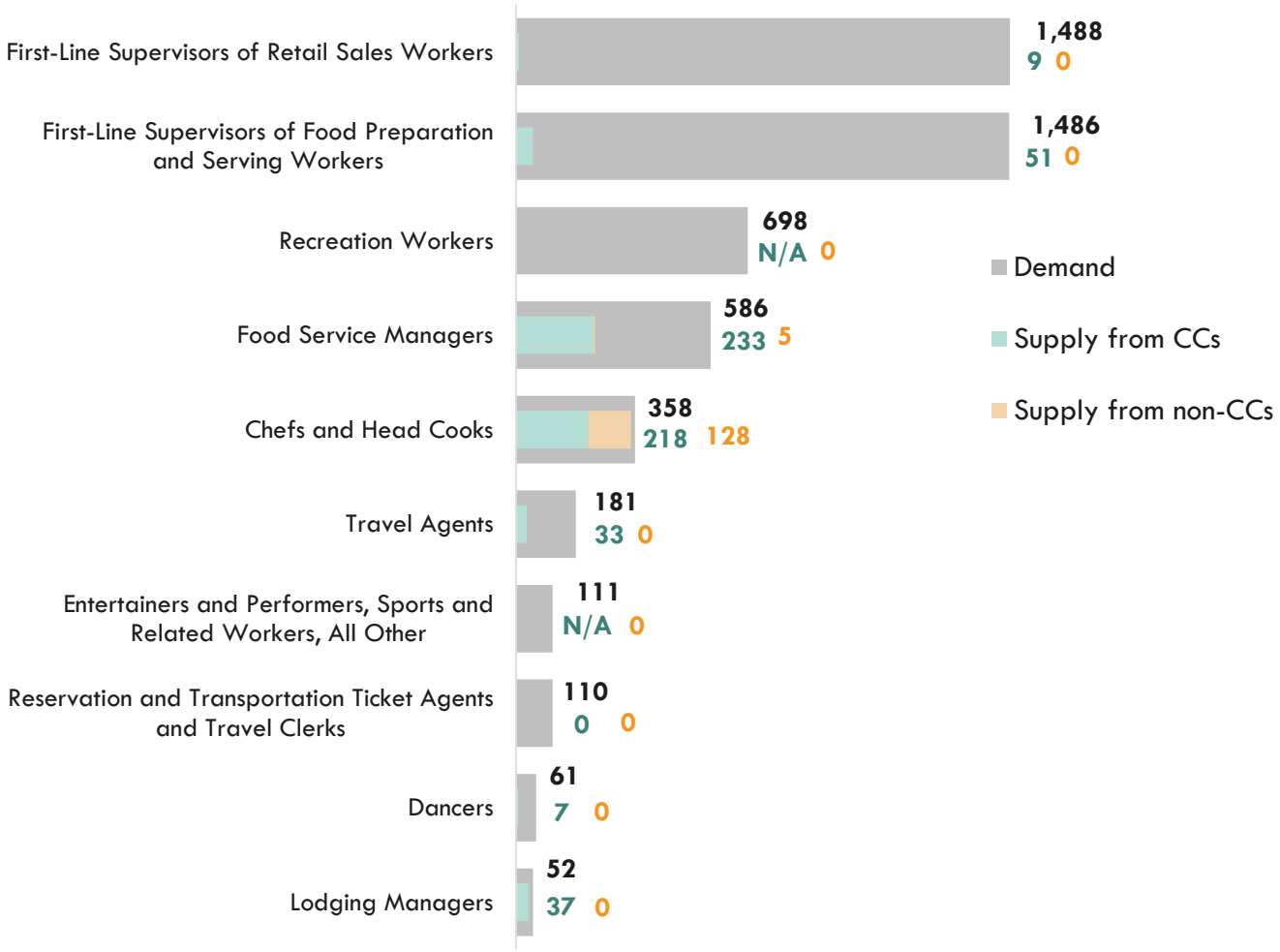
[3] https://www.calpassplus.org/LaunchBoard/Home.aspx

RETAIL, HOSPITALITY, AND TOURISM MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR

While it is important to understand which top middle-skill jobs have opportunities for increased program supply, it is also important to consider middle-skill occupations that have entry-level wages below the California Family Needs Calculator but median wages above it. Since wages generally increase with additional experience and training, students could potentially earn self-sustaining wages with additional apprenticeship or work-based learning opportunities.

As seen in Exhibit 3, middle-skill Retail, Hospitality, and Tourism jobs with entry-level earnings below the California Family Needs Calculator have a significant number of annual job openings (labor market demand).

Exhibit 3. Retail, Hospitality, and Tourism Middle-Skill Jobs with Entry-Level Wages Below the California Family Needs Calculator in Orange County: Labor Market Demand vs. Program Supply



(Please note: N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

While these occupations have entry-level wages below the California Family Needs Calculator of $17.39 per hour, occupations such as Food Service Managers; Chefs and Head Cooks; Travel Agents; Entertainers and Performers, Sports and Related Workers, All Other; Dancers; and Lodging Managers have median wages higher than the California Family Needs Calculator as denoted via the gray shading in Exhibit 4.

Exhibit 4. Retail, Hospitality, and Tourism Middle-Skill Jobs with Entry-Level Earnings Below the California Family Needs Calculator in Orange County: Entry-Level and Median Wages

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25th Percentile)	Median Wage
41-1011	First-Line Supervisors of Retail Sales Workers	1,488	$13.15	$16.63
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	1,486	$12.60	$15.01
39-9032	Recreation Workers	698	$11.17	$12.35
11-9051	Food Service Managers	586	$13.24	$20.71
35-1011	Chefs and Head Cooks	358	$15.96	$21.55
41-3041	Travel Agents	181	$16.43	$20.30
27-2099	Entertainers and Performers, Sports and Related Workers, All Other	111	$14.48	$19.58
43-4181	Reservation and Transportation Ticket Agents and Travel Clerks	110	$13.71	$17.09
27-2031	Dancers	61	$16.93	$19.70
11-9081	Lodging Managers	52	$15.88	$25.38

FOCUS GROUP INSIGHTS

High Demand, Low Wages

Focus group participants acknowledged that there is high demand for several occupations, but many of them have low entry-level wages. However, focus group participants agreed that they are good pathway occupations that would help students gain experience for future advancement, despite the low wages. An administrator from Saddleback College suggested that current credit programs for these low wage occupations could be restructured and moved to noncredit programs to help create noncredit-to-credit pipelines. Both Saddleback and Santa Ana colleges are currently exploring this option.

Wages for Chefs and Head Cooks

Focus group participants said that wages for the Chefs and Head Cooks occupation appeared low and that, in their experience, wages were much higher. While standardized occupational titles are useful for classifying, collecting, and disseminating data in general, they do not always provide a complete picture of the demand and wages for specific job titles. The Chefs and Head Cooks occupation includes several roles and titles, ranging from line cook, head cook, to executive chef. Entry-level positions that typically require less experience, like line cook, have low wages and bring the entry-level and median wages down for this occupation. Focus group participants said that colleges should train students on wage expectations for these different roles and how to progress from entry-level to higher-level positions.

Supply for Chefs and Head Cooks

A faculty member pointed out that at least one non-community college institution, Argosy University, has closed and will not be contributing to the supply numbers in the future. Since this report focuses on a historical time period, Argosy University is counted in the supply numbers and conferred an average of 124 awards annually for Chefs and Head Cooks from 2015 to 2017. Because Argosy will no longer provide training in the future, the supply for Chefs and Head Cooks will likely fall to

234 awards annually which may change the "Supply Met" classification to "Supply Gap" since the demand of 358 annual openings will no longer be met.

FOCUS GROUP INSIGHTS – THE BIG PICTURE

Focus group participants addressed other issues and challenges that cannot be captured by traditional labor market information and provided insight on the tactics colleges and employers are currently using to address supply gaps in the Retail, Hospitality, and Tourism sector.

How Employers are Filling Supply Gaps

Focus group participants across all sectors reported that employers recruit heavily at four-year colleges for potential workers, even if a position does not require a bachelor's degree. In the Retail, Hospitality, and Tourism focus group, participants noted the employers in this sector primarily rely on in-house training programs, such as the Disney University program, to fill supply gaps. While in-house program development may be possible for some large companies like Disney, focus group participants said that this practice is not necessarily widespread. They noted that hotels have only recently started strengthening their internal training programs. Faculty members also remarked that employers hold onsite job fairs as well as attend on-campus job fairs at the community colleges. Additionally, focus group participants shared that some employers have begun paying higher wages and/or offering bonuses in order to attract more workers.

> *"Many students get jobs with skills or a certificate. But in the job listing itself, what they [employers] are listing is a bachelor's degree."*
> *– Orange Coast College Faculty Member*

Creative Ways Community Colleges are Offering Programs

Focus group participants discussed several creative ways they are offering programs and some of the challenges they face when developing new ways to offer their programs:

- For many Orange County community colleges, their retail management, tourism, and fashion courses are now offered exclusively online in order to accommodate working students. Faculty and administrators noted that their all-online classes tend to fill faster than hybrid or in-person courses.
- At Saddleback College, one faculty member said that they invite former culinary students back to class to discuss their experiences and give advice to current students.
- Santa Ana College has created dual enrollment culinary courses for students enrolled in Santa Ana Unified and Orange Unified school districts so that high school students can earn college credit.

Challenges in Expanding Programs

Focus group participants identified several challenges to expanding programs in the Retail, Hospitality, and Tourism sector. Many of these challenges, including the lack of dedicated lab space, difficulty hiring faculty and staff, and high costs for equipment, cut across all sectors. Historically, a challenge unique to this sector is the competition from private culinary schools. However, faculty members noted that a number of private culinary schools have recently closed, which may provide an opportunity for community colleges to expand their programs.

New Programs

Faculty and administrators identified over a dozen new programs that they are either in the process of creating or plan to create in the near future. Several of these new programs will address new and emerging areas such as Farm-to-Table and environmental sustainability in both the culinary and fashion fields. Other programs will focus on the business and management side of hospitality and culinary and a fashion apprenticeship.

KEY FINDINGS: RETAIL, HOSPITALITY, AND TOURISM

Demand and Supply

Based on the demand and supply data analyzed in this brief, the COE identified the following key research findings:

1. All middle-skill Retail, Hospitality, and Tourism jobs in Orange County have supply gaps.

2. The following occupations have entry-level wages below the California Family Needs Calculator, but have median wages at or above the California Family Needs Calculator:
    - Food Service Managers
    - Chefs and Head Cooks
    - Travel Agents
    - Entertainers and Performers, Sports and Related Workers, All Other
    - Dancers
    - Lodging Managers

3. One program in Orange County reported noncredit awards for the Retail, Hospitality, and Tourism sector:
    - Culinary Arts (1306.30) at Santiago Canyon College

4. Of the 13 occupations (SOC codes) analyzed in this brief for the Retail, Hospitality, and Tourism sector, there is a labor market demand of 6,075 annual job openings, a program supply of 800 awards, which creates a sector supply gap of 5,275 awards.

6,075	800	5,275
annual job openings (labor market demand)	average annual program awards (labor market supply)	supply gap (number of awards needed to close the gap)

Focus Group Insights – Implications for Practice

1. According to focus group participants, colleges offer several courses that are designed to provide students with additional skills, rather than train them for a specific occupation. Faculty and administrators also said, in their experience, employers tend to hire based on skills, rather than degrees and certificates. The COE should work with colleges to better determine employers' knowledge, skills, and abilities (also known as "KSAs") for specific jobs in order to provide colleges with information that can be used to better prepare students for meeting employer's expectations and labor market demand.
2. While standardized occupational titles are useful for classifying, collecting, and disseminating data in general, they do not always provide a complete picture of the demand and wages for specific job titles. Some occupations, such as Chefs and Head Cooks, include a variety of job titles that range from entry-level to mid-level positions. The regional director for employer engagement could work with faculty members to define common career paths and job titles within occupations to help students better understand their career options and earnings potential.
3. Faculty members at Orange Coast and Saddleback colleges reported that retention and completions have increased in programs that have a work experience component towards the end of the program. Other colleges could examine their course sequences and consider adding work-based learning or internship

components near the end of programs to help students gain work experience and complete their degree or certificate.

4. Several occupations in this sector have high demand, but low entry-level wages. Colleges could consider restructuring programs that train for these occupations by moving the programs to noncredit. With upfront counseling on career paths and earnings potential, students could move through a noncredit-to-credit pipeline that will help them gain skills and advance their careers.

APPENDIX A: METHODOLOGY AND RETAIL, HOSPITALITY, AND TOURISM DATA DEFINITIONS

The Centers of Excellence for Labor Market Research (COE) prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Emsi, a software program 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).

The California Community Colleges (CCC) define "sectors" by TOP codes. To determine what occupations should be analyzed in this brief, the COE first reviewed the TOP codes associated with the sector and then matched them with the SOC codes. According to the CCC, the following six-digit TOP codes define the Retail, Hospitality, and Tourism sector:

TOP6 Program Name	TOP6 Code
Aquatics and Lifesaving	0835.70
Consumer Services	1301.10
Culinary Arts	1306.30
Display	0509.60
Diving and Underwater Safety	0959.10
Dry Cleaning	3008.00
Family and Consumer Sciences, General	1301.00
Fashion	1303.00
Fashion Design	1303.10
Fashion Merchandising	1303.20
Flight Attendant	3020.40
Hospitality	1307.00
Interior Design and Merchandising	1302.00
Labor and Industrial Relations	0516.00
Lodging Management	1307.20
Office Management	0514.40
Public Relations	0606.00
Resort and Club Management	1307.30
Restaurant and Food Services and Management	1307.10
Retail Store Operations and Management	0506.50
Travel Services and Tourism	3009.00

Using a TOP-SOC crosswalk, the COE then identified middle-skill jobs for which programs within these TOP codes train. The COE examined more than 850 occupational codes from the Standard Occupational Classification (SOC)[4] system and identified approximately 300 occupational codes as middle-skill jobs.

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

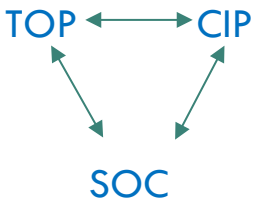
[4] SOC is a federal statistical standard used by EDD, BLS and other federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.

- 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.

For this study, the COE analyzed occupations with a labor market demand of at least 50 annual job openings. (For comparison, the average and median demand for an occupation in Orange County is 307 and 63 annual job openings, respectively.)[5] The number of annual job openings estimates employment change and turnover for an occupation each year between 2018 and 2023. Annual job openings include:

- Job Growth: An employer experiences increased demand for products and hires new employees to increase production. If job growth is zero or negative, then any and all openings are due to replacement needs.
- Replacement Needs: An employer hires replacement workers for employees who leave the workforce or change occupations. Replacement rates are derived from national 10-year, occupation-specific percentages published by the U.S. BLS's Employment Projections program.

The COE then cross-referenced the SOC codes with CIP and TOP codes to compare labor market demand with program supply. The following diagram illustrates this process:



The 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 data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP 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.

Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for an occupation. Therefore, the COE de-duplicated TOP codes that trained for more than one occupation to avoid counting the program supply more than once. Doing so provides a more accurate representation of the supply gaps in the region by occupation. This information can be seen in the demand and supply tables in Appendix C of this study.

Qualitative Methodology

An integral aspect of the Orange County Sector Analysis Project was the qualitative data collected during the project's focus groups. In May 2019, the COE created an advisory group comprised of the Orange County Regional Consortium Director as well as five CTE deans and directors that represented the four community college districts in Orange County. The advisory group created a process and timeline for inviting faculty and administrators to participate in focus groups to better understand where programs exist or do not exist to fill supply gaps and discuss how Orange County's community colleges could close the supply gaps for the county's eight priority and emerging sectors.

To create the invite list of faculty and administrators, Regional Directors for Employer Engagement and career education deans at each college were asked to identify faculty and administrators that could represent their respective colleges in the sector-specific focus groups. Once this list was compiled, the career education deans invited faculty and administrators to express their interest in participating in a focus group via email. The email introduced the COE, provided an overview of the Orange County Sector Analysis Project, described the goals of the focus groups, and informed faculty that they would be compensated for their

[5] Emsi. Data set 2019.2. QCEW Employees + Non-QCEW + Self-Employed. 2018-2023.

participation, and that lunch would be provided for all participants. All those that stated their interest were then connected with the COE who managed the focus groups scheduling and details.

In order to be as inclusive as possible, 12 focus groups were scheduled for the eight sectors – four sectors had one focus group each and four sectors had two focus groups each, during a three-week period from July to August 2019. All focus groups participants received a confirmation email before the event that included the focus group agenda, their sector-specific draft brief, and a pre-assignment with questions based off of the information contained in the draft sector briefs. Focus group participants were instructed to complete and bring the pre-assignment to the convening so that they were prepared to discuss the data, the challenges they face in their programs, and strategies to close supply gaps. Each focus groups was recorded, with permission of the participants, by the COE solely for transcription purposes.

The COE conducted no more than two focus group sessions per day. During the focus groups the Orange County Sector Analysis Project was explained and then the information contained in the draft sector briefs was presented in detail. Participants were encouraged to ask questions and engage in dialogue throughout the entire focus group session. The COE took notes of each discussion as well as recorded the sessions, with permission of the participants and solely for transcription purposes.

Following the conclusion of the focus groups, the COE compiled the audio files, transcripts, notes, and pre-assignments to conduct a qualitative analysis of the themes for each focus group and to identify commonalities across multiple focus groups. The findings from this analysis have been highlighted throughout this report in the “Focus Group Insight” sections.

APPENDIX B: DEFINITIONS FOR RETAIL, HOSPITALITY, AND TOURISM MIDDLE-SKILL JOBS

The following definitions and sample job titles for each occupation are derived from O*NET, the nation's primary source of occupational information. The O*NET database contains hundreds of standardized and occupation-specific descriptors on nearly 1,000 occupations. O*NET is developed and sponsored by the U.S. Department of Labor[6]

Actors (SOC 27-2011): Play parts in stage, television, radio, video, motion picture productions, or other settings for entertainment, information, or instruction. Interpret serious or comic role by speech, gesture, and body movement to entertain or inform audience. May dance and sing. Sample job titles include:

- Actress
- Performer
- Comedian
- Voice-Over Artist
- Narrator
- Community Theater Actor

Chefs and Head Cooks (SOC 35-1011): Direct and may participate in the preparation, seasoning, and cooking of salads, soups, fish, meats, vegetables, desserts, or other foods. May plan and price menu items, order supplies, and keep records and accounts. Sample job titles include:

- Sous Chef
- Banquet Chef
- Kitchen Manager
- Executive Chef
- Line Cook

Dancers (SOC 27-2031): Perform dances. May perform on stage, for on-air broadcasting, or for video recording. Sample job titles include:

- Ballet Dancer
- Dance Artist
- Soloist Dancer
- Ballerina
- Belly Dancer
- Modern Dancer

Entertainers and Performers, Sports and Related Workers, All Other (SOC 27-2099): All entertainers and performers, sports and related workers not listed separately. No sample job titles reported.

Fashion Designers (SOC 27-1022): Design clothing and accessories. Create original designs or adapt fashion trends. Sample job titles include:

- Costume Designer
- Shoe Designer
- Product Developer
- Sweater Designer
- Dance Costume Designer
- Pattern Designer

First-Line Supervisors of Food Preparation and Serving Workers (SOC 35-1012): Directly supervise and coordinate activities of workers engaged in preparing and serving food. Sample job titles include:

- Kitchen Supervisor
- Cafeteria Manager
- Food Service Director
- Food Service Supervisor
- Restaurant Manager
- Food Production Supervisor

First-Line Supervisors of Retail Sales Workers (SOC 41-1011): Directly supervise and coordinate activities of retail sales workers in an establishment or department. Duties may include management functions, such as purchasing, budgeting, accounting, and personnel work, in addition to supervisory duties. Sample job titles include:

- Store Manager
- Shift Manager
- Bakery Manager
- Department Supervisor
- Department Manager
- Grocery Manager

[6] https://www.onetonline.org/

Fitness Trainers and Aerobics Instructors (SOC 39-9031): Instruct or coach groups or individuals in exercise activities. Demonstrate techniques and form, observe participants, and explain to them corrective measures necessary to improve their skills. Sample job titles include:

- Yoga Instructor
- Personal Trainer
- Group Fitness Instructor
- Group Exercise Instructor
- Fitness Consultant
- Certified Personal Trainer

Food Service Managers (SOC 11-9051): Plan, direct, or coordinate activities of an organization or department that serves food and beverages. Sample job titles include:

- Restaurant General Manager
- Restaurant Manager
- Dining Services Director
- Catering Director
- General Manager
- Food and Beverage Manager

Lodging Managers (SOC 11-9081): Plan, direct, or coordinate activities of an organization or department that provides lodging and other accommodations. Sample job titles include:

- Hotel Manager
- Resort Manager
- Front Desk Manager
- Bed and Breakfast Innkeeper
- Night Manager
- Front Office Manager

Recreation Workers (SOC 39-9032): Conduct recreation activities with groups in public, private, or volunteer agencies or recreation facilities. Organize and promote activities, such as arts and crafts, sports, games, music, dramatics, social recreation, camping, and hobbies, taking into account the needs and interests of individual members. Sample job titles include:

- Recreation Leader
- Activities Director
- Recreation Coordinator
- Recreation Assistant
- Activity Aide
- Activities Assistant

Reservation and Transportation Ticket Agents and Travel Clerks (SOC 43-4181): Make and confirm reservations for transportation or lodging, or sell transportation tickets. May check baggage and direct passengers to designated concourse, pier, or track; deliver tickets, contact individuals and groups to inform them of package tours; or provide tourists with travel or transportation information. Sample job titles include:

- Station Agent
- Reservationist
- Airline Ticket Agent
- Reservation Agent
- Tour Sales Representative
- Airport Sales Agent

Travel Agents (SOC 41-3041): Plan and sell transportation and accommodations for travel agency customers. Determine destination, modes of transportation, travel dates, costs, and accommodations required. May also describe, plan, and arrange itineraries and sell tour packages. May assist in resolving clients' travel problems. Sample job titles include:

- Travel Counselor
- Travel Consultant
- Corporate Travel Consultant
- Auto Travel Counselor
- Destination Specialist
- Beach Expert

APPENDIX C: RETAIL, HOSPITALITY, AND TOURISM DEMAND AND SUPPLY DATA

The following tables compare labor market demand and program supply by occupation. Because a TOP/CIP code may train for more than one occupation, simply aggregating all supply from all related codes may overestimate supply for that occupation. Therefore, the COE de-duplicated TOP codes that train for more than one occupation to avoid counting program supply more than once. This de-duplication process is denoted by the "Accounted for Above" statements in the tables on the following pages.

Additionally, the COE reviewed program data from the LaunchBoard[7] and the statewide COE Supply Table[8] and identified conflicting information. For certain occupations, LaunchBoard indicates that a college has a program for that occupation, but the COE Supply Table does not show program data for that college, and vice versa. These discrepancies are marked with the following:

> +The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard
>
> *LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table

The demand and supply tables in the following pages have three categories:

1. **Supply Gap** – If Average Annual Openings exceed Average Annual Awards by more than 25 percent, then the cell is shaded in light green.
2. **Supply Met** – If Average Annual Openings is within 25 percent +/- of Average Annual Awards, then the cell is shaded in light blue.
3. **Oversupply** – If Average Annual Openings exceed the Average Annual Awards by more than 25 percent, then the cell is shaded in red.

[7] calpassplus.org/LaunchBoard/Home.aspx
[8] coeccc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

DEMAND AND SUPPLY DATA FOR TOP RETAIL, HOSPITALITY, AND TOURISM MIDDLE-SKILL JOBS IN ORANGE COUNTY

\+ The COE Supply Table indicates that this college supplies awards for this TOP code, but this college is not listed in the LaunchBoard
* LaunchBoard indicates that this college supplies awards for this TOP code, but this college is not listed in COE Supply Table

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Fitness Trainers and Aerobics Instructors	739	Supply Gap	40	Fitness Trainer	0835.20	Fullerton	4
						Irvine	5
						Orange Coast	9
						Saddleback	1
						Santa Ana	3
				Athletic Training and Sports Medicine	1228.00	Saddleback	1
						Orange Coast*	0
						Cypress*	0
					CIP 51.0913	Career Networks Institute	17
Actors	133	Supply Gap	0	N/A	N/A	No Programs	0
Fashion Designers	72	Supply Gap	39	Fashion	1303.00	Fullerton	1
						Orange Coast	1
						Saddleback	2
				Fashion Design	1303.10	Fullerton	7
						Orange Coast	13
						Saddleback	10
						Santa Ana	5

DEMAND AND SUPPLY DATA FOR RETAIL, HOSPITALITY, AND TOURISM MIDDLE-SKILL JOBS WITH ENTRY-LEVEL WAGES BELOW CALIFORNIA FAMILY NEEDS CALCULATOR IN ORANGE COUNTY

+The COE Supply Table indicates that this college/school supplies awards for this TOP code, but this college is not listed in the LaunchBoard
*LaunchBoard indicates that this college/school supplies awards for this TOP code, but this college is not listed in COE Supply Table
~Noncredit awards
^ North Orange Continuing Education is also known as North Orange Adult in the California Community Colleges Chancellor's Office Management Information System

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
First-Line Supervisors of Retail Sales Workers	1488	Supply Gap	9	Retail Store Operations and Management	0506.50	Coastline+	1
						Cypress+	1
						Golden West*	0
						Saddleback	1
						Santa Ana+	4
						Santiago Canyon+	1
				Display	0509.60	Orange Coast	1
First-Line Supervisors of Food Preparation and Serving Workers	1486	Supply Gap	51	Dietetic Services and Management	1306.20	Orange Coast	9
				Restaurant and Food Services and Management	1307.10	Cypress	32
						Orange Coast	10
Recreation Workers	698	Supply Gap	0	Parks and Outdoor Recreation	0115.10	No Programs	0
				Aquatics and Lifesaving	0835.70	Cypress*	0
				Recreation Assistant	0836.10	No Programs	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Food Service Managers	586	Supply Gap	238	Management Development and Supervision	0506.30	Coastline	207
						Irvine+	1
						Saddleback	25
						Cypress*	0
						Golden West*	0
						Orange Coast*	0
					CIP 52.0204	Allied American University	4
					CIP 52.0205	University of Phoenix-California	1
				Dietetic Services and Management	1306.20	Already Accounted For	0
				Restaurant and Food Services and Management	1307.10	Already Accounted For	0
Chefs and Head Cooks	358	Supply Met	346	Nutrition, Foods, and Culinary Arts	1306.00	Fullerton	1
						Orange Coast	8
						Saddleback	13
						Santa Ana	2
						Coastline*	0
						Santiago Canyon*	0
						Cypress*	0
						North Orange Adult*^	0
					CIP 19.0501	Brandman University	4
				Culinary Arts	1306.30	Cypress	77
						Orange Coast	86
						Saddleback	27
						Santiago Canyon~	4
					CIP 12.0501	Argosy University-The Art Institute of California-Orange County	54
					CIP 12.0503	Argosy University-The Art Institute of California-Orange County	70

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2018-23)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2015-17)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Restaurant and Food Services and Management	1307.10	Already Accounted For	0
Travel Agents	181	Supply Gap	33	Sales and Salesmanship	0509.40	Orange Coast*	0
				Travel Services and Tourism	3009.00	Cypress	17
						Orange Coast+	9
						Saddleback	7
Entertainers and Performers, Sports and Related Workers, All Other	111	Supply Gap	0	N/A	N/A	No Programs	0
Reservation and Transportation Ticket Agents and Travel Clerks	110	Supply Gap	0	Travel Services and Tourism	3009.00	Already Accounted For	0
Dancers	61	Supply Gap	7	Commercial Dance	1008.10	Cypress	2
						Irvine	2
						Orange Coast	3
Lodging Managers	52	Supply Gap	37	Management Development and Supervision	0506.30	Already Accounted For	0
				Hospitality	1307.00	Cypress	6
						Orange Coast	3
					CIP 52.0901	Bristol University	1
				Lodging Management	1307.20	Cypress	18
						Orange Coast	8
				Resort and Club Management	1307.30	Cypress+	1