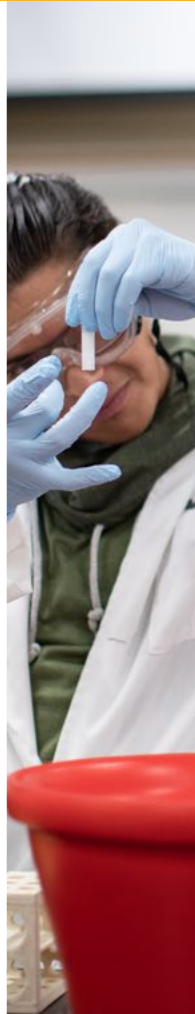


ORANGE COUNTY SECTOR ANALYSIS PROJECT 2021



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Prepared by:
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.

EXECUTIVE SUMMARY

Demand and Supply Analysis: Orange County 2021

2021 ORANGE COUNTY SECTOR ANALYSIS PROJECT DATA REFRESH

The Orange County Sector Analysis Project was originally completed in 2019. In addition to the normal annual refresh of labor market information, the COVID-19 pandemic and subsequent economic recession occurred after the first publication. Furthermore, since 2019, the Bureau of Labor Statistics (BLS) updated the Standard Occupational Classification (SOC) system, which resulted in the removal, modification, or addition of occupations and their definitions. The Integrated Postsecondary Data Education System (IPEDS) also updated the Classification of Instructional Programs (CIP) classification system, which removed, modified, or added new CIP codes. The changes in these federal data systems required the Centers of Excellence to create an updated TOP-CIP-SOC crosswalk and determine skill classifications for new SOC codes. Moreover, the living wage for a single adult in Orange County increased from \$17.39 per hour to \$20.63 per hour.

To address these changes, and to provide the most recent labor market data available, the Orange County Center of Excellence for Labor Market Research (COE) pulled and analyzed current labor market information in November 2021 and applied the same methodology that was used in 2019 to update the data included in this brief. Due to these updates, the occupations included in each sector brief differ from the 2019 versions. The occupations that were removed, changed, or added, as well as detailed explanations of these differences for each occupation, are summarized in Appendix B of each sector brief.

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 44,914 awards. Furthermore, Orange County wants to focus investments that will continue to see outcomes in the future. To this end, the 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 Calculator¹ (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 \$20.63 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 2020 and 2025. 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 2017 and 2020 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

¹ <https://insightccd.org/family-needs-calculator/>

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,
- 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 CCCCCO; 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 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 (CFNC), but have median wages above the CFNC. According to the CCCCCO LaunchBoard², 121,703 (unduplicated) students took one or more CTE courses across all programs in Program Year 2019-20. However, in that same year, only 8,527 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.

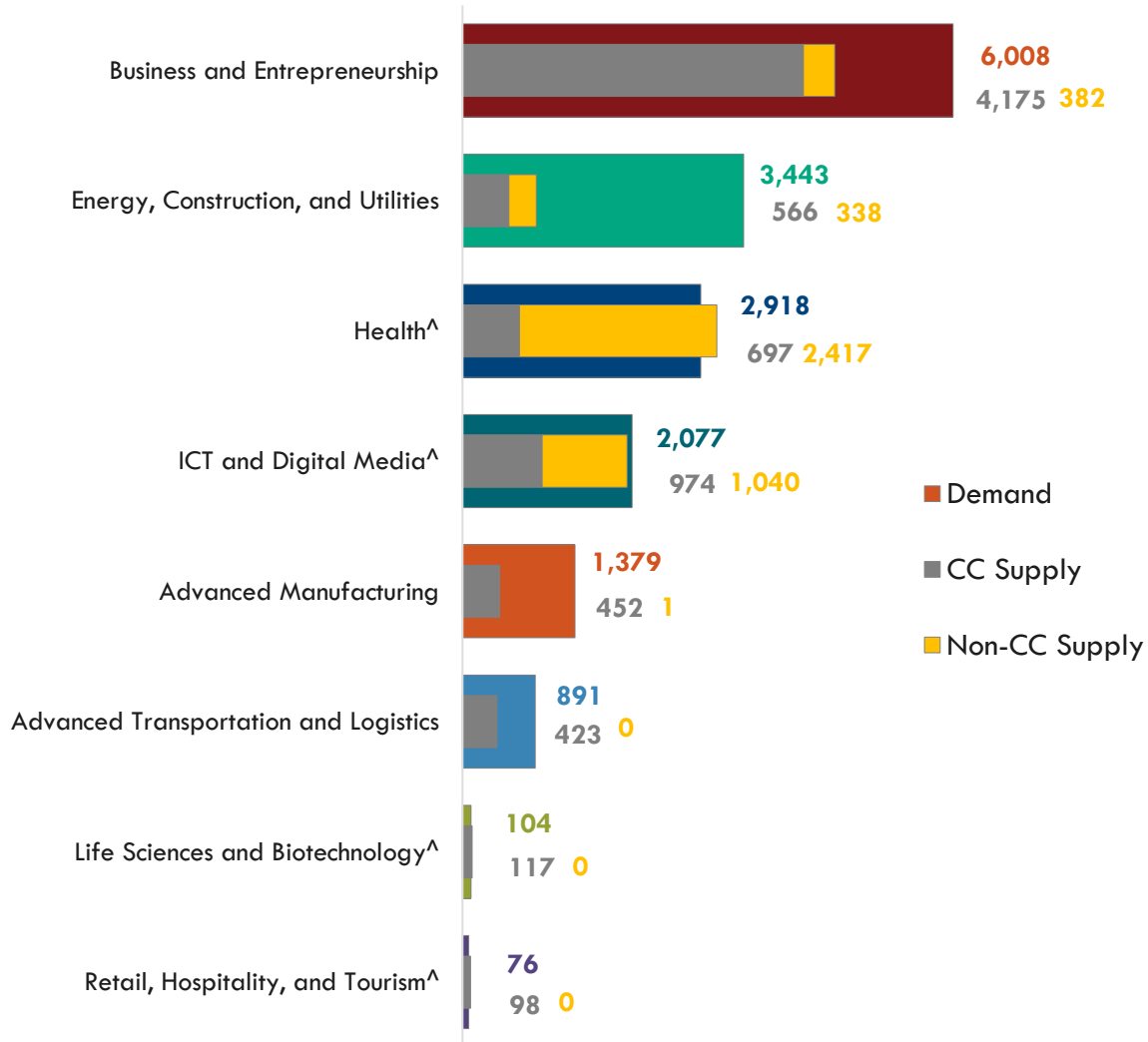
Faculty and administrators shared that although completion numbers appeared low, they know that many non-completers have positive employment outcomes from the stories shared with them by their former students. Some faculty members said that they are developing internal tracking systems to identify non-completers 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 wages³ higher than the \$20.63 per hour living wage, in all sectors with program supply from the region's community colleges and non-community college providers (Exhibit 1) results in an overarching supply gap of 5,216. Business and Entrepreneurship has both the largest demand and supply of all eight sectors; however, it accounts for 28% (1,451) 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 48% (2,539) of the top middle-skill jobs in Orange County.

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



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

Exhibit 2 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 \$20.63 per hour living wage. Of these occupations, eight are in the Business and Entrepreneurship sector, five are in the Energy, Construction, and Utilities sector, three are in the Health sector, two are in the ICT and Digital Media sector, and one each are in the Advanced Manufacturing as well as the

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.

Advanced Transportation and Logistics sectors. There are only two sectors – Retail, Hospitality, and Tourism as well as Life Sciences and Biotechnology – that are not represented in the top 20 occupations.

Exhibit 2. Top 20 Middle-Skill Jobs in Orange County Across All Sectors: Entry-Level and Median Wages

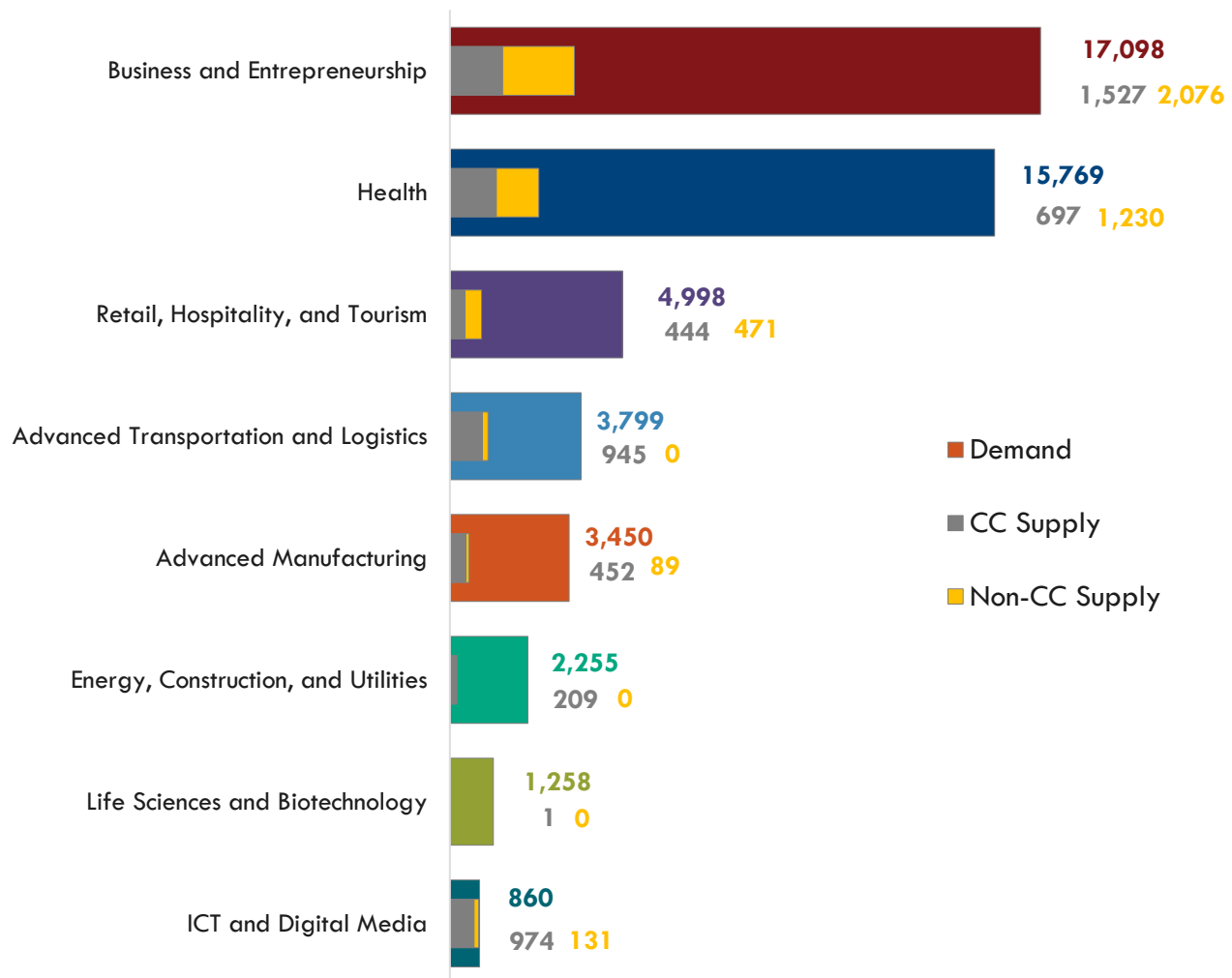
SOC Code	SOC (Occupational) Title	Sector	Demand (Annual Openings)	Entry-Level Wage (25 th Percentile)	Median Wage
13-1198	Project Management Specialists and Business Operations Specialists, All Other	Business and Entrepreneurship	2,102	\$25.66	\$36.47
43-1011	First-Line Supervisors of Office and Administrative Support Workers	Business and Entrepreneurship	1,598	\$23.01	\$29.26
29-1141	Registered Nurses	Health	1,530	\$42.91	\$52.37
47-2111	Electricians	Energy, Construction, and Utilities	1,139	\$25.09	\$35.51
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	Energy, Construction, and Utilities	685	\$30.37	\$39.96
29-2061	Licensed Practical and Licensed Vocational Nurses	Health	642	\$26.00	\$30.44
15-1232	Computer User Support Specialists	ICT and Digital Media	588	\$21.39	\$27.35
43-6011	Executive Secretaries and Executive Administrative Assistants	Business and Entrepreneurship	571	\$27.78	\$33.98
13-2072	Loan Officers	Business and Entrepreneurship	528	\$21.91	\$29.95
15-1299	Computer Occupations, All Other	ICT and Digital Media	472	\$27.19	\$38.70
51-1011	First-Line Supervisors of Production and Operating Workers	Advanced Manufacturing	454	\$23.33	\$30.69
11-9021	Construction Managers	Energy, Construction, and Utilities	446	\$32.27	\$48.40
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Energy, Construction, and Utilities	440	\$23.97	\$31.47
11-3011	Administrative Services and Facilities Managers	Business and Entrepreneurship	334	\$36.80	\$51.47
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	Advanced Transportation and Logistics	307	\$32.65	\$42.44
13-1151	Training and Development Specialists	Business and Entrepreneurship	284	\$25.00	\$34.23
29-2018	Clinical Laboratory Technologists and Technicians	Health	256	\$21.82	\$29.53
13-1031	Claims Adjusters, Examiners, and Investigators	Business and Entrepreneurship	242	\$28.28	\$37.69
47-2073	Operating Engineers and Other Construction Equipment Operators	Energy, Construction, and Utilities	233	\$30.60	\$42.46
13-1051	Cost Estimators	Business and Entrepreneurship	231	\$26.86	\$36.17

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 Exhibit 3, 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.

Exhibit 3. All Sectors Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Program Supply



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

Exhibit 4 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 \$20.63 per hour California Family Needs Calculator, occupations such as Secretaries and Administrative Assistants, Except Legal, Medical, and Executive; Bookkeeping, Accounting, and Auditing Clerks; Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products; Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel;

Maintenance and Repair Workers, General; Carpenters; Heavy and Tractor-Trailer Truck Drivers; Medical Secretaries and Administrative Assistants; Insurance Sales Agents; and Exercise Trainers and Group Fitness Instructors have median wages higher than the regional living wage, as denoted by the gray shading in Exhibit 4. Of these occupations, seven are in the Business and Entrepreneurship sector, four each are in the Health and Retail, Hospitality, and Tourism sectors, two are in the Advanced Transportation and Logistics sector, and one each are in the Advanced Manufacturing, Life Sciences and Biotechnology, and Energy, Construction, and Utilities sectors.

Exhibit 4. 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 (25 th Percentile)	Median Wage
31-1128	Home Health and Personal Care Aides	Health	8,653	\$13.12	\$13.90
43-4051	Customer Service Representatives	Business and Entrepreneurship	2,735	\$15.28	\$18.73
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Business and Entrepreneurship	2,358	\$16.91	\$21.46
43-3031	Bookkeeping, Accounting, and Auditing Clerks	Business and Entrepreneurship	2,100	\$18.61	\$23.68
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	Business and Entrepreneurship	1,543	\$20.60	\$31.17
41-3091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel	Business and Entrepreneurship	1,416	\$19.22	\$28.05
41-1011	First-Line Supervisors of Retail Sales Workers	Retail, Hospitality, and Tourism	1,244	\$14.69	\$18.38
49-9071	Maintenance and Repair Workers, General	Advanced Manufacturing	1,196	\$16.51	\$22.05
31-1131	Nursing Assistants	Health	1,180	\$15.94	\$18.33
47-2031	Carpenters	Energy, Construction, and Utilities	1,145	\$19.54	\$29.01
53-3032	Heavy and Tractor-Trailer Truck Drivers	Advanced Transportation and Logistics	1,119	\$19.14	\$23.91
43-6013	Medical Secretaries and Administrative Assistants	Health	1,090	\$17.79	\$21.78
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	Retail, Hospitality, and Tourism	1,064	\$13.91	\$16.93
31-9092	Medical Assistants	Health	1,015	\$15.32	\$18.11
53-3058	Passenger Vehicle Drivers, Except Bus Drivers, Transit and Intercity	Advanced Transportation and Logistics	925	\$11.02	\$15.42
39-5012	Hairdressers, Hairstylists, and Cosmetologists ^A	Business and Entrepreneurship	907	\$12.41	\$14.36
41-3021	Insurance Sales Agents	Business and Entrepreneurship	835	\$18.31	\$24.66
39-9031	Exercise Trainers and Group Fitness Instructors	Retail, Hospitality, and Tourism	806	\$14.68	\$23.33
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	Life Sciences and Biotechnology	796	\$15.50	\$19.70
39-9032	Recreation Workers	Retail, Hospitality, and Tourism	786	\$13.77	\$15.79

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

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply

66,383

annual job openings
(labor market demand)

21,469

average annual program awards
(labor market supply)

44,914

supply gap (number of
awards needed to close the gap)

Focus Group Key Findings and Recommendations

Key Finding	Recommendation
<p>1. Retention and success rates are high for courses in all sectors, but program completion numbers are low: Community colleges in Orange County are undersupplying for middle-skill jobs in all sectors. Nearly 7.4% of all students enrolled in CTE programs completed a degree or certificate in the 2019-2020 academic year. Students often take one or two courses to gain additional skills, then exit the community college system or they find a job before completing their program. These explanations suggest that some programs may be overdesigned, meaning that they require more courses than necessary for students to gain the needed skills to obtain employment.</p>	<p>1. To increase completion rates of students in CTE programs, colleges could re-work overdesigned programs or consider moving these programs to enhanced noncredit. Noncredit certificates are included in the Strong Workforce Program (SWP) metrics, Student Success metrics, and the Vision for Success. Enhanced noncredit programs could be a way to satisfy student needs for short-term programs and still benefit colleges. Additionally, college faculty, deans, and the Regional Employer Engagement Team for each sector should review program and course data to determine the specific barriers that prevent students from successfully completing a program (e.g., challenging introductory courses and differing pre-requisites across colleges for higher level courses). SWP funds could be invested at the college level to address students’ specific barriers to course/program retention and completion.</p>
<p>2. Tracking employment outcomes for students is difficult, time consuming, and not consistent across all colleges: Several faculty and administrators shared stories about individual students with successful employment outcomes, but reported that it is difficult to track outcomes for all students. Tracking outcomes for students that took one or two classes but did not complete a degree or certificate is particularly difficult.</p>	<p>2. To better understand employment outcomes for students, colleges should invest more resources to promote and use the California Community Colleges Chancellor’s Office-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 all students and provide valuable data on students who leave a program before completing a degree or certificate.</p>

Key Finding

3. **Orange County community colleges face similar challenges to expanding programs across all colleges:** Orange County community colleges have courses and programs that are at capacity due to a lack of physical lab space. They also do not have steady and ongoing financial resources for new equipment and maintenance for that equipment. Additionally, community colleges have trouble finding industry professionals with teaching experience and face long program development and curriculum approval timelines, making it difficult to quickly respond to employer needs and rapid changes in economic conditions, such as those posed by the coronavirus disease (COVID-19) pandemic. These challenges hinder the community colleges' ability to increase program capacity and close supply gaps.
4. **Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers:** The OC Sector Analysis Project brief examines job gaps but does not explore the specific KSAs taught at the colleges and compare them to the labor market's demand for KSAs.

Recommendation

3. While it is difficult to address these structural issues, Orange County community colleges should leverage existing regional Strong Workforce Program projects and other initiatives such as Perkins V and could focus their finite resources on items that would be most effective for students. For instance, colleges should collaborate with Orange County's Employer Engagement Team to connect with employers and find out which equipment is most important to the training of their prospective employees. Additionally, 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. To determine if the region's community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a "regional advisory group" where employers can review program KSAs, provide feedback, and validate the KSAs' current relevance and demand in the labor market

ADVANCED MANUFACTURING

Demand and Supply Analysis 2021

2021 ORANGE COUNTY SECTOR ANALYSIS PROJECT DATA REFRESH

The Orange County Sector Analysis Project was originally completed in 2019. In addition to the normal annual refresh of labor market information, the COVID-19 pandemic and subsequent economic recession occurred after the first publication. Furthermore, since 2019, the Bureau of Labor Statistics (BLS) updated the Standard Occupational Classification (SOC) system, which resulted in the removal, modification, or addition of occupations and their definitions. The Integrated Postsecondary Data Education System (IPEDS) also updated the Classification of Instructional Programs (CIP) classification system, which removed, modified, or added new CIP codes. The changes in these federal data systems required the Centers of Excellence to create an updated TOP-CIP-SOC crosswalk and determine skill classifications for new SOC codes. Moreover, the living wage for a single adult in Orange County increased from \$17.39 per hour to \$20.63 per hour.

To address these changes, and to provide the most recent labor market data available, the Orange County Center of Excellence for Labor Market Research (COE) pulled and analyzed current labor market information in November 2021 and applied the same methodology that was used in 2019 to update the data included in this brief. Due to these updates, three occupations from the 2019 report are no longer included in this updated brief and two occupations from the 2019 brief are included in this update but have new SOC codes. There are five new occupations in this brief that were not included in the 2019 version. The occupations that were removed, changed, or added, as well as detailed explanations of these differences for each occupation, are summarized in Appendix B.

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 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 Calculator⁴ (commonly known as a "living wage"). The living wage is

⁴ <https://insightcced.org/family-needs-calculator/>

the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently \$20.63 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 2020 and 2025. 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 2017 and 2020 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.

FOCUS GROUP INSIGHTS

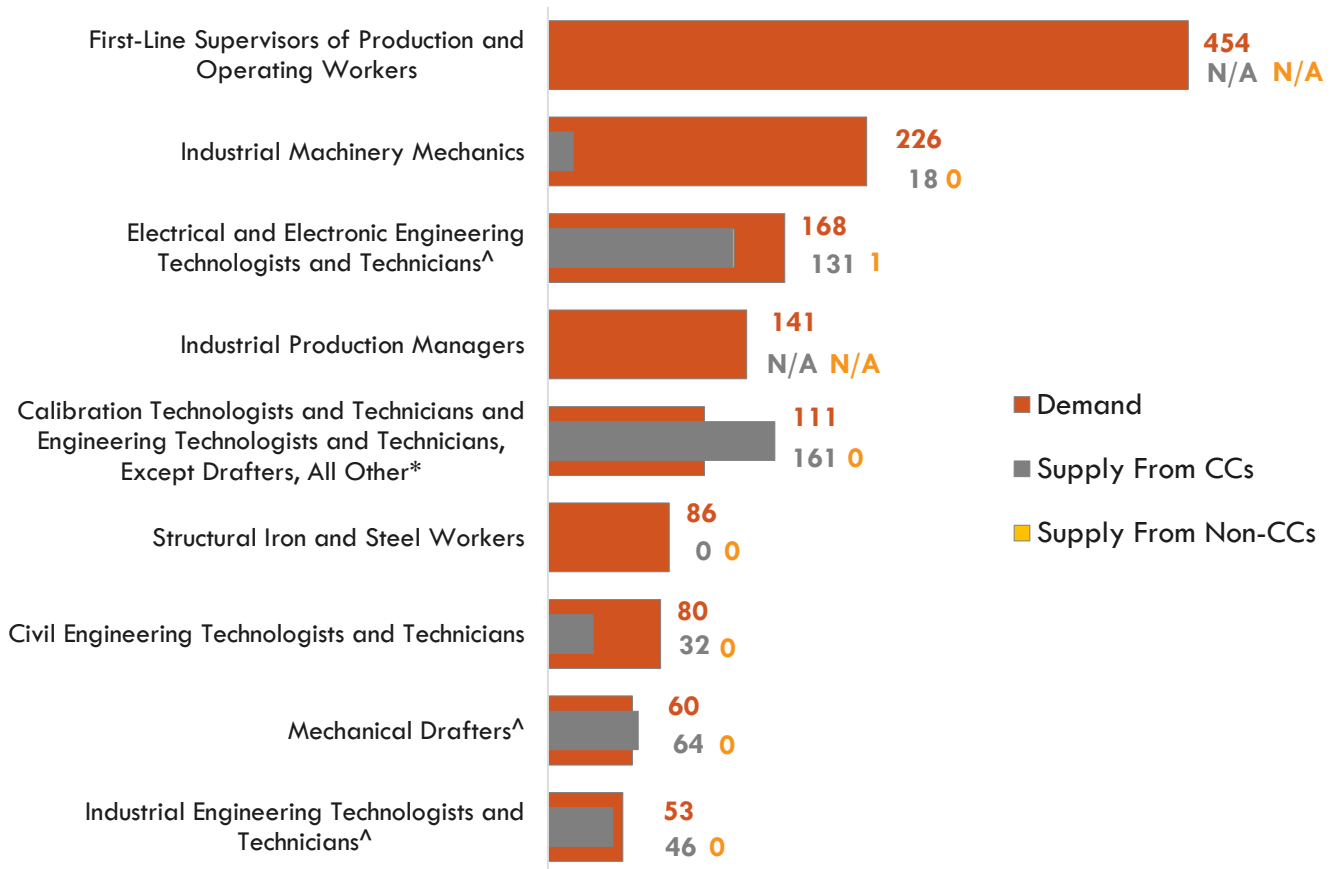
The Advanced Manufacturing sector focus group included three faculty members and four administrators from five of the seven institutions – six community colleges and one noncredit school – that offered Advanced Manufacturing programs in Orange County between 2015 and 2017. The Regional Director for Employer 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 wages⁵ for these top middle-skill jobs are higher than the \$20.63 per hour living wage. Descriptions for each occupational title can be found in Appendix C. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix D.

**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, ^ indicates that this occupation’s demand has been met, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

⁵ 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 CCCCCO are lower than expected. Manufacturing courses in Orange County tend to have high retention and success rates (91% and 80%, respectively, for all colleges, according to the CCCCCO's dashboard tool, LaunchBoard⁶); 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)⁷ 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

⁶ <https://www.calpassplus.org/LaunchBoard/Community-College-Pipeline.aspx>

⁷ <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

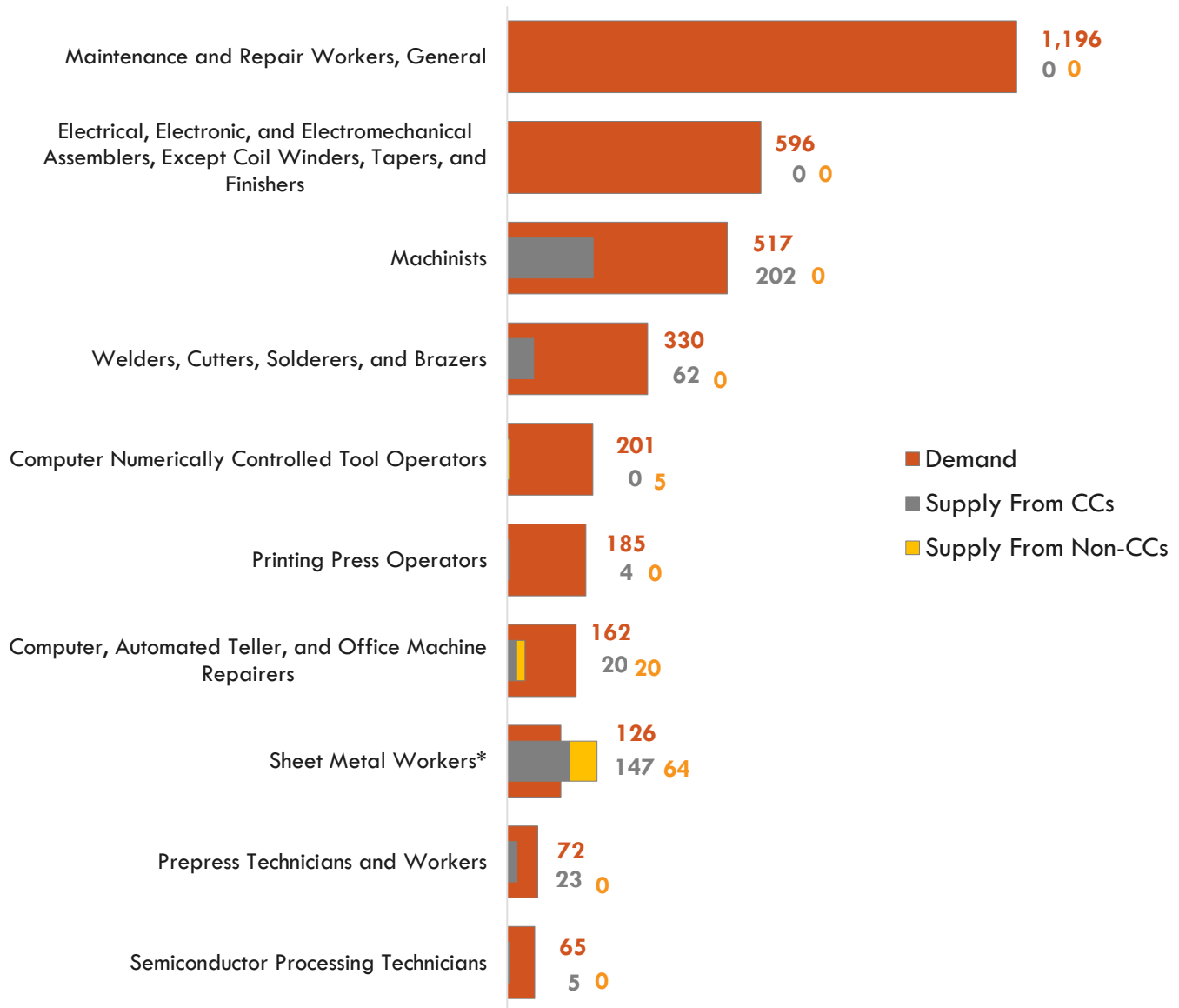
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25 th Percentile)	Median Wage
51-1011	First-Line Supervisors of Production and Operating Workers	454	\$23.33	\$30.69
49-9041	Industrial Machinery Mechanics	226	\$21.85	\$28.69
17-3023	Electrical and Electronics Engineering Technicians	168	\$25.11	\$31.84
11-3051	Industrial Production Managers	141	\$40.48	\$52.98
17-3098	Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	111	\$23.49	\$29.67
47-2221	Structural Iron and Steel Workers	86	\$21.27	\$30.81
17-3022	Civil Engineering Technologists and Technicians	80	\$27.49	\$34.12
17-3013	Mechanical Drafters	60	\$23.41	\$29.88
17-3026	Industrial Engineering Technologists and Technicians	53	\$24.19	\$32.82

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).

Exhibit 3: Advanced Manufacturing Middle-Skill Jobs in Orange County with Entry-Level Wages Below the Regional Living Wage



(Please note: * indicates that the occupation has an oversupply of labor, ^ indicates that this occupation's demand has been met, 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 \$20.63 per hour, occupations such as Maintenance and Repair Workers, General; Machinists; Computer, Automated Teller, and Office Machine Repairers; Sheet Metal Workers; and Prepress Technicians and 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 (25 th Percentile)	Median Wage
49-9071	Maintenance and Repair Workers, General	1,196	\$16.51	\$22.05
51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	596	\$15.06	\$17.83
51-4041	Machinists	517	\$16.68	\$21.55
51-4121	Welders, Cutters, Solderers, and Brazers	330	\$16.15	\$20.30
51-9161	Computer Numerically Controlled Tool Operators	201	\$15.79	\$20.14
51-5112	Printing Press Operators	185	\$15.15	\$18.60
49-2011	Computer, Automated Teller, and Office Machine Repairers	162	\$16.43	\$20.93
47-2211	Sheet Metal Workers	126	\$17.59	\$25.97
51-5111	Prepress Technicians and Workers	72	\$15.11	\$20.91
51-9141	Semiconductor Processing Technicians	65	\$17.45	\$19.55

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

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply Key Findings

4,829

annual job openings
(labor market demand)

1,007

average annual program awards
(labor market supply)

3,912

supply gap (number of
awards needed to close the gap)

Focus Group Key Findings and Recommendations

Key Finding	Recommendation
<p>1. Retention and success rates are high for Advanced Manufacturing courses, but program completion numbers are low: Community colleges in Orange County are undersupplying for middle-skill Advanced Manufacturing jobs. Nearly 9% of all students enrolled in Advanced Manufacturing programs completed a degree or certificate in the 2019-2020 academic year. Students often take one or two courses to gain additional skills, then exit the community college system or they find a job before completing their program. These explanations suggest that some programs may be overdesigned, meaning that they require more courses than necessary for students to gain the needed skills to obtain employment.</p>	<p>1. To increase completion rates of students in Advanced Manufacturing programs, colleges could re-work overdesigned programs or consider moving these programs to enhanced noncredit. Noncredit certificates are included in the Strong Workforce Program (SWP) metrics, Student Success metrics, and the Vision for Success. Enhanced noncredit programs could be a way to satisfy student needs for short-term programs and still benefit colleges. Additionally, college faculty, deans, and the Regional Employer Engagement Team should review program and course data to determine the specific barriers that prevent students from successfully completing a program (e.g., challenging introductory courses and differing pre-requisites across colleges for higher level courses). Strong Workforce Program (SWP) funds could be invested at the college level to address students' specific barriers to course/program retention and completion.</p>
<p>2. Advanced Manufacturing skills and certifications are transferable and not necessarily exclusive to a particular occupation: Orange County community colleges are developing new programs around robotics, conversational programming, and maintenance that are not solely specific to the Advanced Manufacturing Sector and provide valuable skills that can be used in other sectors such as Energy, Construction, and Utilities.</p>	<p>2. Employers tend to hire students before they complete their programs, as long as students have foundational skills needed for the job. Industry-recognized certifications are another way to demonstrate skill attainment. Colleges could explore offering courses that will allow students to obtain certifications such as Siemens Programmable Logic Controller (PLC), Level One Mechatronics, and SOLIDWORKS, all of which can be applied in both the Advanced Manufacturing and Energy, Construction, and Utilities sectors.</p>

Key Finding	Recommendation
<p>3. Advanced Manufacturing programs across Orange County community colleges are fragmented: Orange County community colleges offer several Advanced Manufacturing courses and programs—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.</p> <p>4. Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers: The OC Sector Analysis Project examines job gaps but does not explore the specific KSAs taught at the colleges and compare them to the labor market’s demand for Advanced Manufacturing KSAs.</p>	<p>3. To address the fragmentation of Advanced Manufacturing programs, the Regional Employer Engagement Team could convene administrators, faculty, and counselors to discuss articulation agreements for courses and programs that have similar goals or learning outcomes. This could create a more seamless pipeline for students thereby increasing their opportunity for completing an Advanced Manufacturing program.</p> <p>4. To determine if the region’s community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a “regional advisory group” where employers can review program KSAs, provide feedback, and validate the KSAs’ current relevance and demand in the labor market</p>

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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.

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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 Calculator⁸ (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 \$20.63 per

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FOCUS GROUP INSIGHTS

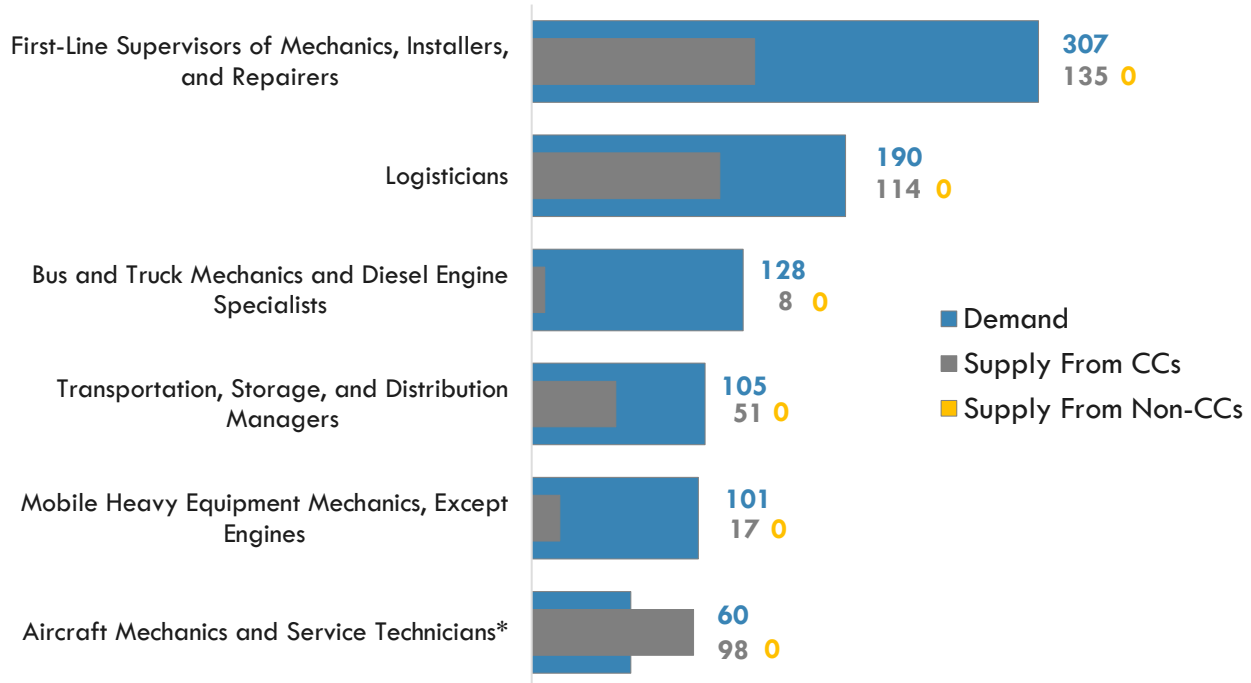
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Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone 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 wages⁹ for these top middle-skill jobs are higher than the \$20.63 per hour living wage. Descriptions for each occupational title can be found in Appendix C. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix D.

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



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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.

⁹ 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

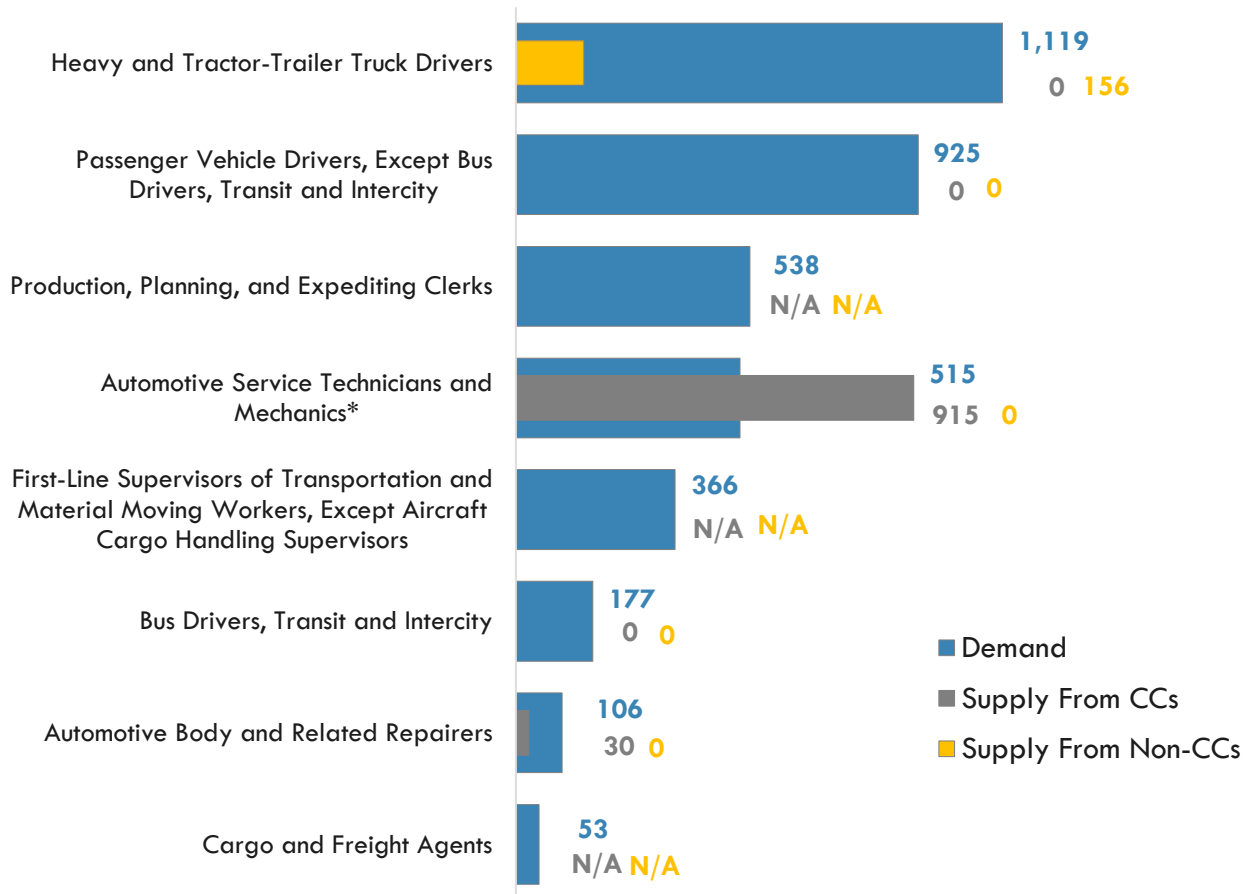
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25 th Percentile)	Median Wage
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	307	\$32.65	\$42.44
13-1081	Logisticians	190	\$32.45	\$41.01
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	128	\$25.43	\$30.83
11-3071	Transportation, Storage, and Distribution Managers	105	\$34.46	\$47.76
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	101	\$25.23	\$32.72
49-3011	Aircraft Mechanics and Service Technicians*	60	\$26.72	\$34.74

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 in Orange County with Entry-Level Wages Below the Regional Living Wage



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

Please note: Supply for Automotive Service Technicians and Mechanics is overstated due to the automatic conferral of low-unit, local certificates by Santa Ana College in 2017-18.

While these occupations have entry-level wages below the California Family Needs Calculator of \$20.63 per hour, occupations such as Heavy and Tractor-Trailer Truck Drivers; Production, Planning, and Expediting Clerks; Automotive Service Technicians and Mechanics; First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors; Bus Drivers, Transit and Intercity; Automotive Body and Related Repairers; and Cargo and Freight Agents 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 (25 th Percentile)	Median Wage
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,119	\$19.14	\$23.91
53-3058	Passenger Vehicle Drivers, Except Bus Drivers, Transit and Intercity	925	\$11.02	\$15.42
43-5061	Production, Planning, and Expediting Clerks	538	\$19.15	\$24.82
49-3023	Automotive Service Technicians and Mechanics*	515	\$17.04	\$23.94
53-1047	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	366	\$20.46	\$26.41
53-3052	Bus Drivers, Transit and Intercity	177	\$17.41	\$22.05
49-3021	Automotive Body and Related Repairers	106	\$15.93	\$23.50
43-5011	Cargo and Freight Agents	53	\$18.55	\$23.60

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 manufacturer-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 participants 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.¹⁰ 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.¹¹ Similar training or re-training programs could put workers at a lower risk of losing their job to automation.

¹⁰ <https://abc7.com/business/port-of-las-largest-tenant-gets-green-light-to-automate-terminals/5389793/>

¹¹ <https://labusinessjournal.com/news/2019/jul/18/deal-reached-over-automation-port/>

KEY FINDINGS: ADVANCED TRANSPORTATION AND LOGISTICS

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply Key Findings

4,690

annual job openings
(labor market demand)

1,524

average annual program awards
(labor market supply)

3,166

supply gap (number of
awards needed to close the gap)

Focus Group Key Findings and Recommendations

Key Finding	Recommendation
<p>1. Automation could hurt the Advanced Transportation and Logistics sectors more than others: The rapid development of autonomous vehicles and the recent decision by the Los Angeles Board of Harbor Commissioners to allow the Maersk shipping company to use automated electric cargo handlers at the Port of Los Angeles highlight some ways automation could hurt Advanced Transportation and Logistics sector. 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.</p>	<p>1. Though automation will likely impact the demand for many Advanced Transportation and Logistics occupations, 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. Orange County community colleges could offer similar training or re-training programs that could put workers at a lower risk of losing their job to automation.</p>
<p>2. Wages for Automotive Service Technicians and Mechanics could be misleading: Entry-level wages for Automotive Service Technicians and Mechanics are below the regional living wage, which is currently \$20.63. However, this occupation includes several roles and titles, including lube technicians, service technician, and automobile mechanic. 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. 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.</p>	<p>2. To help students better understand wage expectations and career progression, the Regional Employer Engagement Team could work with faculty members and administrators to define common career paths and job titles within occupations. This information can then be shared with counselors so that students can learn about their career options and how their earnings potential changes with additional education and experience.</p>

Key Finding	Recommendation
<p>3. New technology, automation, and the changing regulatory landscape make it difficult for faculty to define the specific training needed for some areas; keeping up with these trends can be expensive: Due to the bureaucratic nature of the community college system, colleges are not always able to stay current with the most recent training technology, such as flight simulators. By the time colleges can adopt new technology, newer versions have often been released. Additionally, changes in flight regulations, and the potential for future regulations, for drone pilots creates uncertainty about the skills and knowledge students will need to succeed in associated occupations.</p>	<p>3. Faculty, administrators, and the Regional Employer Engagement Team 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. This would allow colleges to focus their finite resources in areas that will be the most effective in supporting student success.</p>
<p>4. Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers: The OC Sector Analysis Project brief examines job gaps, but does not explore the specific KSAs taught at the colleges and compare them to the labor market's demand for Advanced Transportation and Logistics KSAs.</p>	<p>4. To determine if the region's community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a "regional advisory group" where employers can review program KSAs, provide feedback, and validate the KSAs' current relevance and demand in the labor market.</p>

2021 ORANGE COUNTY SECTOR ANALYSIS PROJECT DATA REFRESH

The Orange County Sector Analysis Project was originally completed in 2019. In addition to the normal annual refresh of labor market information, the COVID-19 pandemic and subsequent economic recession occurred after the first publication. Furthermore, since 2019, the Bureau of Labor Statistics (BLS) updated the Standard Occupational Classification (SOC) system, which resulted in the removal, modification, or addition of occupations and their definitions. The Integrated Postsecondary Data Education System (IPEDS) also updated the Classification of Instructional Programs (CIP) classification system, which removed, modified, or added new CIP codes. The changes in these federal data systems required the Centers of Excellence to create an updated TOP-CIP-SOC crosswalk and determine skill classifications for new SOC codes. Moreover, the living wage for a single adult in Orange County increased from \$17.39 per hour to \$20.63 per hour.

To address these changes, and to provide the most recent labor market data available, the Orange County Center of Excellence for Labor Market Research (COE) pulled and analyzed current labor market information in November 2021 and applied the same methodology that was used in 2019 to update the data included in this brief. Due to these updates, one occupation from the 2019 report is no longer included in this updated brief and one occupation from the 2019 brief is included in this update but has a new SOC code. There are five new occupations in this brief that were not included in the 2019 version. The occupations that were removed, changed, or added, as well as detailed explanations of these differences for each occupation, are summarized in Appendix B.

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 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 Calculator¹² (commonly known as a "living wage"). The living wage

¹² <https://insightccd.org/family-needs-calculator/>

is the hourly wage that a single adult needs to earn in order to meet basic needs in Orange County, and is currently \$20.63 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 2020 and 2025. 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 2017 and 2020 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.

FOCUS GROUP INSIGHTS

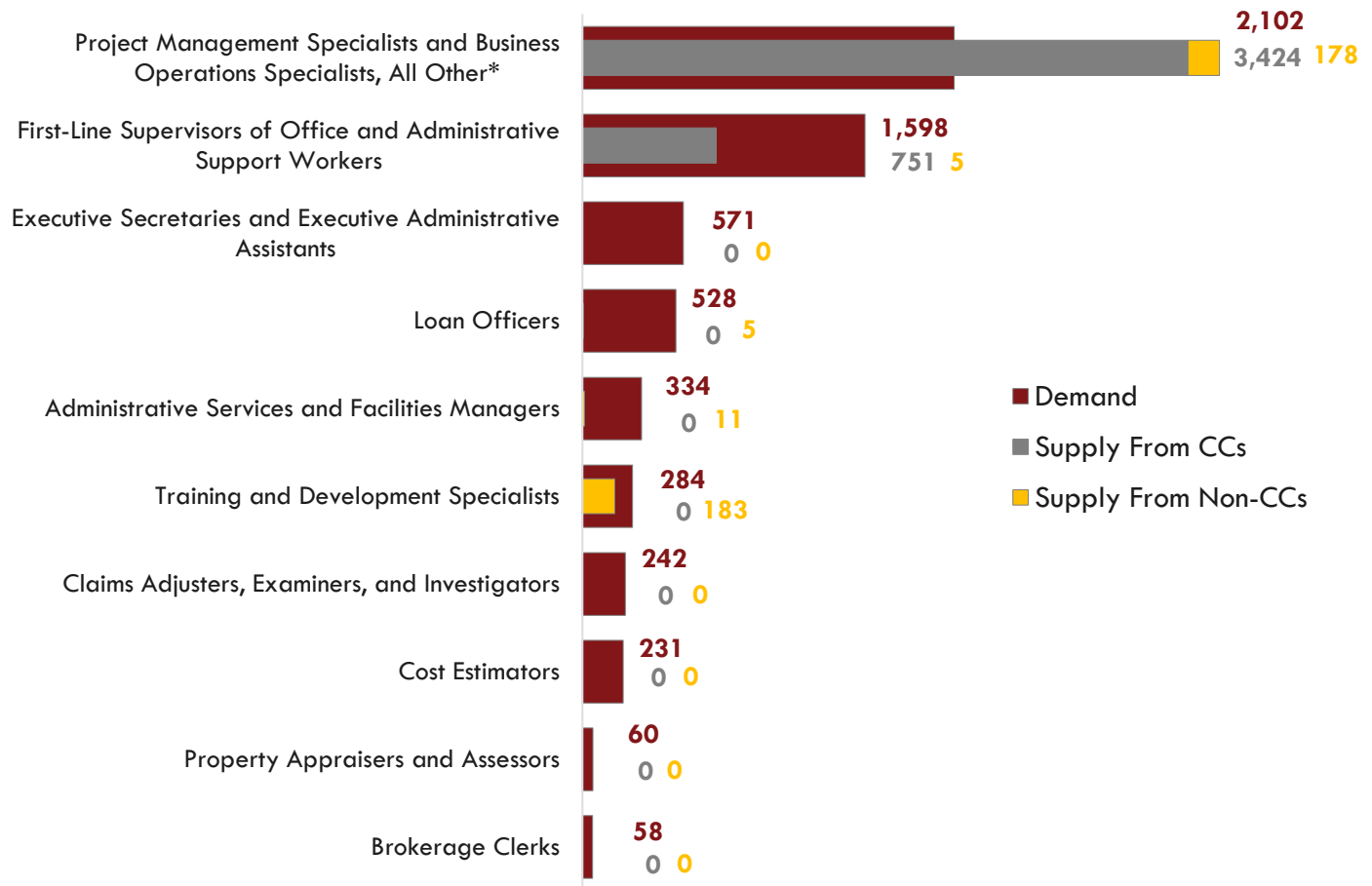
The Business and Entrepreneurship sector was split into two focus groups that were held on different days and included a total of eight faculty members – two counselors and six academic – and four administrators from seven institutions – six of the nine community colleges, and one noncredit school – 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 wages¹³ for these top middle-skill jobs are higher than the \$20.63 per hour living wage. Descriptions for each occupational title can be found in Appendix C. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix D.

**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, ^ indicates that this occupation's demand has been met, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

¹³ 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, LaunchBoard¹, 29,765 (unduplicated) students took one or more courses in Business and Entrepreneurship programs in Program Year 2019-20. However, in that same year, only 3,297 students earned a certificate or degree.

Focus group participants provided some explanations as to why supply numbers are 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 and Facilities 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 and Facilities Managers occupation train for various managerial occupations, not just Administrative Services and Facilities Managers. For this reason, the program supply numbers for Administrative Services and Facilities 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 LaunchBoard¹⁴, in the 2019-2020 academic year, three colleges had a significant percentage of students enrolled in accounting courses who previously graduated from a four-year institution: Saddleback (25%), Irvine Valley (22%), and Coastline (20%).

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).

¹⁴ calpassplus.org/Launchboard/Community-College-Pipeline.aspx



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

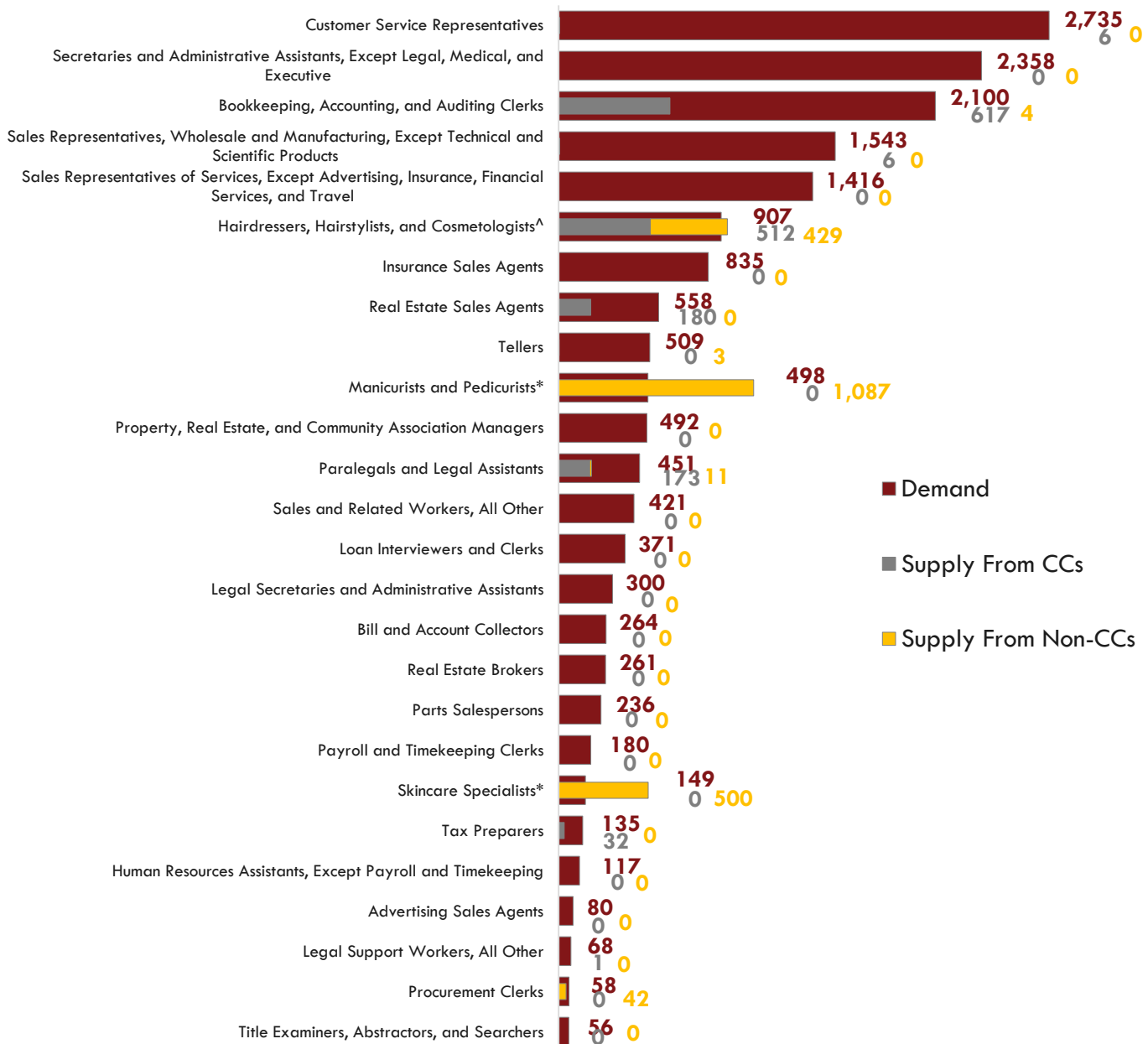
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25 th Percentile)	Median Wage
13-1198	Project Management Specialists and Business Operations Specialists, All Other	2,102	\$25.66	\$36.47
43-1011	First-Line Supervisors of Office and Administrative Support Workers	1,598	\$23.01	\$29.26
43-6011	Executive Secretaries and Executive Administrative Assistants	571	\$27.78	\$33.98
13-2072	Loan Officers	528	\$21.91	\$29.95
11-3011	Administrative Services and Facilities Managers	334	\$36.80	\$51.47
13-1151	Training and Development Specialists	284	\$25.00	\$34.23
13-1031	Claims Adjusters, Examiners, and Investigators	242	\$28.28	\$37.69
13-1051	Cost Estimators	231	\$26.86	\$36.17
13-2021	Property Appraisers and Assessors	60	\$25.24	\$38.80
43-4011	Brokerage Clerks	58	\$20.97	\$24.95

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, ^ indicates that this occupation's demand has been met, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

BUSINESS AND ENTREPRENEURSHIP

Demand and Supply Analysis: Orange County 2021

While these occupations have entry-level wages below the California Family Needs Calculator of \$20.63 per hour, occupations such as Secretaries and Administrative Assistants, Except Legal, Medical, and Executive; Bookkeeping and Accounting Clerks ; Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products; Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel; Insurance Sales Agents; Real Estate Agents; Property, Real Estate, and Community Association Managers; Paralegals and Legal Assistants; Loan Interviewers and Clerks; Legal Secretaries and Administrative Assistants; Bill and Account Collectors; Real Estate Brokers; Payroll and Timekeeping Clerks; Human Resources Assistants, Except Payroll and Timekeeping; Advertising Sales Agents; Legal Support Workers, All Other; Procurement Clerks; and Title Examiners, Abstractors, and Searchers 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 (25 th Percentile)	Median Wage
43-4051	Customer Service Representatives	2,735	\$15.28	\$18.73
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2,358	\$16.91	\$21.46
43-3031	Bookkeeping, Accounting, and Auditing Clerks	2,100	\$18.61	\$23.68
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1,543	\$20.60	\$31.17
41-3091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel	1,416	\$19.22	\$28.05
39-5012	Hairdressers, Hairstylists, and Cosmetologists	907	\$12.41	\$14.36
41-3021	Insurance Sales Agents	835	\$18.31	\$24.66
41-9022	Real Estate Sales Agents	558	\$16.72	\$28.76
43-3071	Tellers	509	\$14.86	\$16.84
39-5092	Manicurists and Pedicurists	498	\$10.82	\$12.71
11-9141	Property, Real Estate, and Community Association Managers	492	\$16.82	\$28.76
23-2011	Paralegals and Legal Assistants	451	\$19.30	\$25.70
41-9099	Sales and Related Workers, All Other	421	\$15.01	\$19.52
43-4131	Loan Interviewers and Clerks	371	\$16.57	\$21.40
43-6012	Legal Secretaries and Administrative Assistants	300	\$19.50	\$27.26
43-3011	Bill and Account Collectors	264	\$18.15	\$22.75
41-9021	Real Estate Brokers	261	\$20.00	\$33.87
41-2022	Parts Salespersons	236	\$14.88	\$16.50
43-3051	Payroll and Timekeeping Clerks	180	\$19.98	\$26.09
39-5094	Skincare Specialists	149	\$12.77	\$16.23

BUSINESS AND ENTREPRENEURSHIP
Demand and Supply Analysis: Orange County 2021

SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25 th Percentile)	Median Wage
13-2082	Tax Preparers	135	\$15.82	\$28.24
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	117	\$16.99	\$21.66
41-3011	Advertising Sales Agents	80	\$16.45	\$25.13
23-2099	Legal Support Workers, All Other	68	\$19.96	\$25.34
43-3061	Procurement Clerks	58	\$17.39	\$21.49
23-2093	Title Examiners, Abstractors, and Searchers	56	\$17.06	\$24.77

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

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply Key Findings

23,106 annual job openings (labor market demand)	8,160 average annual program awards (labor market supply)	14,946 supply gap (number of awards needed to close the gap)
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Focus Group Key Findings and Recommendations

Key Finding	Recommendation
<p>1. This sector has both the highest labor market demand and the highest number of program supply of all the sectors – but also the biggest gap of more than 15,000 awards: Community colleges in Orange County are undersupplying for middle-skill Business and Entrepreneurship jobs. Just over 11% of all students enrolled in Business and Entrepreneurship programs complete a degree or certificate. This sector tends to be the “default” major for students who are unsure of their career plans and the programs tend to attract working industry professionals who may drop out or withdraw before completing because they have learned the skills they need in their current job.</p> <p>2. Employers hire students before they complete training: 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.</p>	<p>1. To increase completion rates of students in Business and Entrepreneurship programs, colleges could focus regional and local efforts to help undecided students hone in on their interests so that they have a clear path to progression and completion. College faculty, deans and the Regional Employer Engagement Team for this sector should review program and course data to determine the specific barriers that prevent students from successfully completing a program (e.g., challenging introductory courses and differing pre-requisites across colleges for higher level courses). Strong Workforce Program (SWP) funds could be invested at the college level to address students’ specific barriers to course/program retention and completion.</p> <p>2. To increase completion numbers in Business and Entrepreneurship programs, faculty, deans, and the Regional Employer Engagement Team should review program curriculum and identify programs that may be overdesigned. These are programs that offer more courses than what may be needed in the labor market, creating long-term programs that could actually be shortened by offering fewer courses/credits, yet still prepare students for small companies’ needs.</p>

Key Finding

- 3. Dual-Enrollment could encourage more students to enroll in Business and Entrepreneurship programs:** Even though this sector has the highest number of students in the region, labor market demand is so high that there is the need for a consistent pipeline of students entering the sector's programs. There is room to increase the 19% of the students in this sector who are 19 years old or younger.
- 4. There is no Taxonomy of Program (TOP) code for Entrepreneurship:** There is no TOP code for entrepreneurship and a comprehensive list of entrepreneurship programs does not currently exist, which makes finding supply information and data on entrepreneurship skills a challenge when reviewing or creating programs. However, the skills taught in entrepreneurship classes can be applied across a variety of occupations and sectors.
- 5. Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers:** The OC Sector Analysis Project brief examines job gaps, but does not explore the specific KSAs taught at the colleges and compare them to the labor market's demand for Business and Entrepreneurship KSAs.

Recommendation

- 3.** To increase enrollments and help students focus on careers in this sector, colleges should 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.
- 4.** To better understand industry-desired entrepreneurship skills and quantify existing entrepreneurship programs, the COE should work with college administrators, faculty, and the Regional Employer Engagement Team 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.
- 5.** To determine if the region's community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a "regional advisory group" where employers can review program KSAs, provide feedback, and validate the KSAs' current relevance and demand in the labor market.

ENERGY, CONSTRUCTION, AND UTILITIES

Demand and Supply Analysis: Orange County 2021

2021 ORANGE COUNTY SECTOR ANALYSIS PROJECT DATA REFRESH

The Orange County Sector Analysis Project was originally completed in 2019. In addition to the normal annual refresh of labor market information, the COVID-19 pandemic and subsequent economic recession occurred after the first publication. Furthermore, since 2019, the Bureau of Labor Statistics (BLS) updated the Standard Occupational Classification (SOC) system, which resulted in the removal, modification, or addition of occupations and their definitions. The Integrated Postsecondary Data Education System (IPEDS) also updated the Classification of Instructional Programs (CIP) classification system, which removed, modified, or added new CIP codes. The changes in these federal data systems required the Centers of Excellence to create an updated TOP-CIP-SOC crosswalk and determine skill classifications for new SOC codes. Moreover, the living wage for a single adult in Orange County increased from \$17.39 per hour to \$20.63 per hour.

To address these changes, and to provide the most recent labor market data available, the Orange County Center of Excellence for Labor Market Research (COE) pulled and analyzed current labor market information in November 2021 and applied the same methodology that was used in 2019 to update the data included in this brief. Due to these updates, three occupations from the 2019 report are no longer included in this updated brief. There are three new occupations in this brief that were not included in the 2019 version. The occupations that were removed, changed, or added, as well as detailed explanations of these differences for each occupation, are summarized in Appendix B.

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 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 Calculator¹⁵ (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 \$20.63 per

¹⁵ <https://insightcced.org/family-needs-calculator/>

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 2020 and 2025. 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 2017 and 2020 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.

FOCUS GROUP INSIGHTS

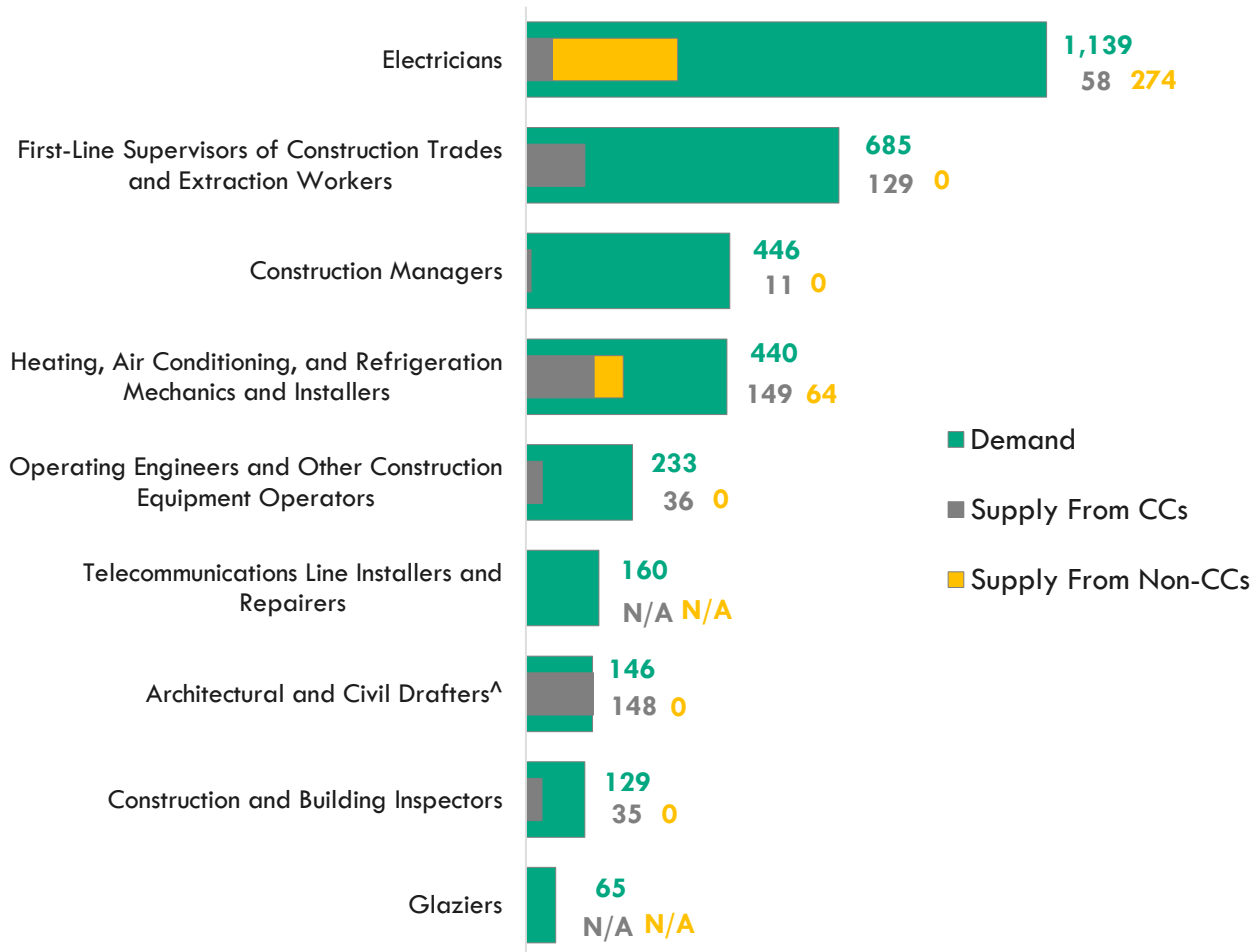
The Energy, Construction, and Utilities sector was split into two focus groups that were held on different days and included a total of two faculty members and two administrators from 10 institutions – five of the nine community colleges, and one noncredit school – that offered Energy, Construction, and Utilities programs in Orange County between 2015 and 2017. Both the Statewide and Regional Director for Employer Engagement Team 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 wages¹⁶ for these top middle-skill jobs are higher than the \$20.63 per hour living wage. Descriptions for each occupational title can be found in Appendix C. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix D.

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



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

¹⁶ 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 CCCCCO. 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

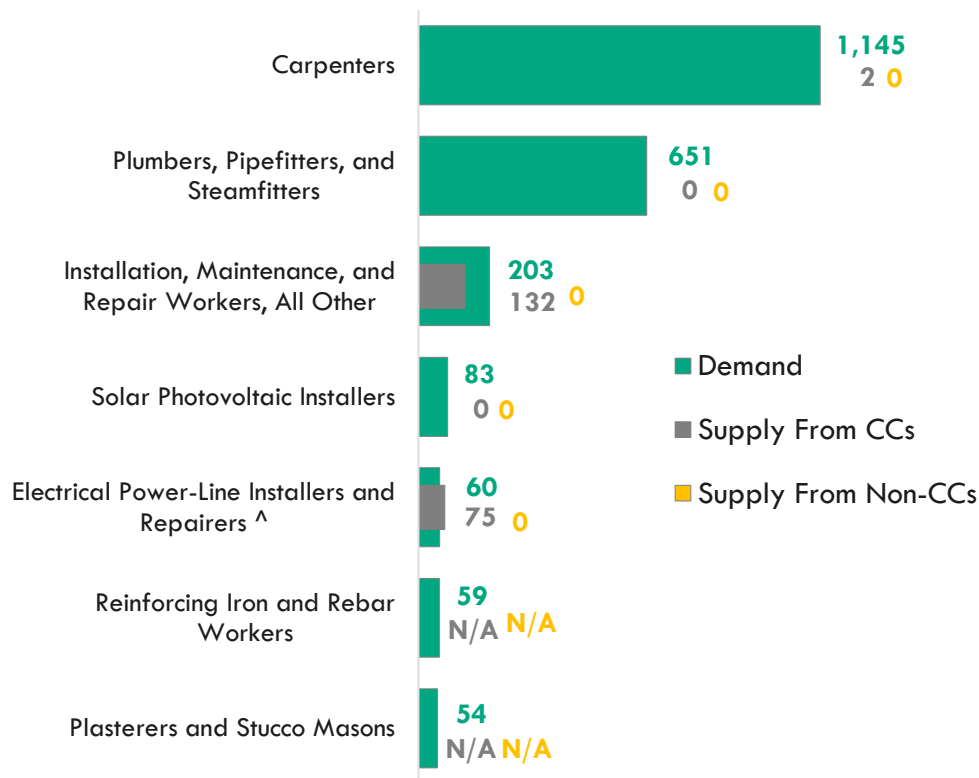
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25 th Percentile)	Median Wage
47-2111	Electricians	1,139	\$25.09	\$35.51
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	685	\$30.37	\$39.96
11-9021	Construction Managers	446	\$32.27	\$48.40
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	440	\$23.97	\$31.47
47-2073	Operating Engineers and Other Construction Equipment Operators	233	\$30.60	\$42.46
49-9052	Telecommunications Line Installers and Repairers	160	\$21.38	\$29.80
17-3011	Architectural and Civil Drafters	146	\$26.74	\$30.97
47-4011	Construction and Building Inspectors	129	\$32.06	\$43.76
47-2121	Glaziers	65	\$22.22	\$28.98

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). While these occupations have entry-level wages below the California Family Needs Calculator of \$20.63 per hour, all middle-skill occupations except for Reinforcing Iron and Rebar Workers have median wages higher than the regional living wage as denoted via the gray shading in Exhibit 4.

Exhibit 3: Energy, Construction, and Utilities Middle-Skill Jobs in Orange County with Entry-Level Wages Below the Regional Living Wage



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

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 (25 th Percentile)	Median Wage
47-2031	Carpenters	1,145	\$19.54	\$29.01
47-2152	Plumbers, Pipefitters, and Steamfitters	651	\$18.71	\$28.32
49-9099	Installation, Maintenance, and Repair Workers, All Other	203	\$16.16	\$21.19
47-2231	Solar Photovoltaic Installers	83	\$19.54	\$23.69
49-9051	Electrical Power-Line Installers and Repairers	60	\$17.18	\$37.16
47-2171	Reinforcing Iron and Rebar Workers	59	\$14.43	\$16.83
47-2161	Plasterers and Stucco Masons	54	\$20.37	\$24.47

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, LaunchBoard¹⁷, 8,327 (unduplicated) students took one or more courses in Energy, Construction, and Utilities programs in the 2019-20 program year in Orange County. However, in that same year, only 324 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.

¹⁷ 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 (12%) 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

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply

5,698

annual job openings
(labor market demand)

1,113

average annual program awards
(labor market supply)

4,585

supply gap (number of
awards needed to close the gap)

Focus Group Key Findings and Recommendations

Key Finding	Recommendation
<p>1. Energy, Construction, and Utilities skills are transferable and not necessarily exclusive to a particular occupation: Skills taught in Energy, Construction, and Utilities courses and programs are transferable to other sectors such as Advanced Manufacturing. Technology is blending these two sectors together and students can become employable in either sector with the right knowledge, skills, and abilities.</p>	<p>1. Faculty and the Regional Employer Engagement Team in Energy, Construction, and Utilities and Advanced Manufacturing 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.</p>
<p>2. Thousands of students take Energy, Construction, and Utilities courses, but few complete a degree or certificate. Tracking outcomes for non-completers is difficult: In the 2019-2020 academic year, 8,327 students took at least one Energy, Construction, and Utilities course, but only 567 students completed a degree or certificate. 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.</p>	<p>2. To increase completion numbers in Energy, Construction, and Utilities programs, faculty, deans, and the Regional Employer Engagement Team should review program curriculum and identify programs that may be overdesigned. These are programs that offer more courses than what may be needed in the labor market, creating long-term programs that could actually be shortened by offering fewer courses/credits yet still prepare students for companies’ needs. In order to track outcomes for students that do not complete programs, colleges should consider using the CTE Outcomes Survey (CTEOS) to better understand why students do not complete programs, their employment status, and their change in earnings after taking community college courses.</p>

Key Finding

Recommendation

- | | |
|--|--|
| <p>3. Noncredit awards for Energy, Construction, and Utilities programs are not consistently reported: One of the reasons for low completion numbers could be a result of inconsistent noncredit program reporting. If colleges are not reporting their noncredit awards, data for these programs will not be included in the supply numbers or be counted in the Strong Workforce Program (SWP) metrics. Additionally, enhanced noncredit has been increased and is now funded 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.</p> <p>4. Across all priority and emerging sectors, this sector has the lowest percentage of students that are age 19 or younger: Only 12% of students enrolled in Energy, Construction, and Utilities are recent high school graduates.</p> <p>5. Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers: The OC Sector Analysis Project brief examines job gaps but does not explore the specific KSAs taught at the colleges and compare them to the labor market's demand for Energy, Construction, and Utilities KSAs.</p> | <p>3. To better understand noncredit reporting, faculty and administrators could work with their Institutional Effectiveness/Research offices to see how noncredit information is collected locally and reported to the CCCC. More accurate reporting could increase both the sector metrics and the amount of funding colleges receive while also helping the COE more accurately measure supply for each occupation.</p> <p>4. 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. Dual enrollment agreements would allow high school students to earn college credit and help colleges create a K-12-to-community college-pipeline.</p> <p>5. To determine if the region's community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a "regional advisory group" where employers can review program KSAs, provide feedback, and validate the KSAs' current relevance and demand in the labor market.</p> |
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To address these changes, and to provide the most recent labor market data available, the Orange County Center of Excellence for Labor Market Research (COE) pulled and analyzed current labor market information in November 2021 and applied the same methodology that was used in 2019 to update the data included in this brief. Due to these updates, two occupations from the 2019 report are no longer included in this updated brief and five occupations from the 2019 brief are included in this update but have new SOC codes. There are four new occupations in this brief that were not included in the 2019 version. The occupations that were removed, changed, or added, as well as detailed explanations of these differences for each occupation, are summarized in Appendix B

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 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 Calculator¹⁸ (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 \$20.63 per

¹⁸ <https://insightcced.org/family-needs-calculator/>

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 2020 and 2025. 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 2017 and 2020 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.

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.

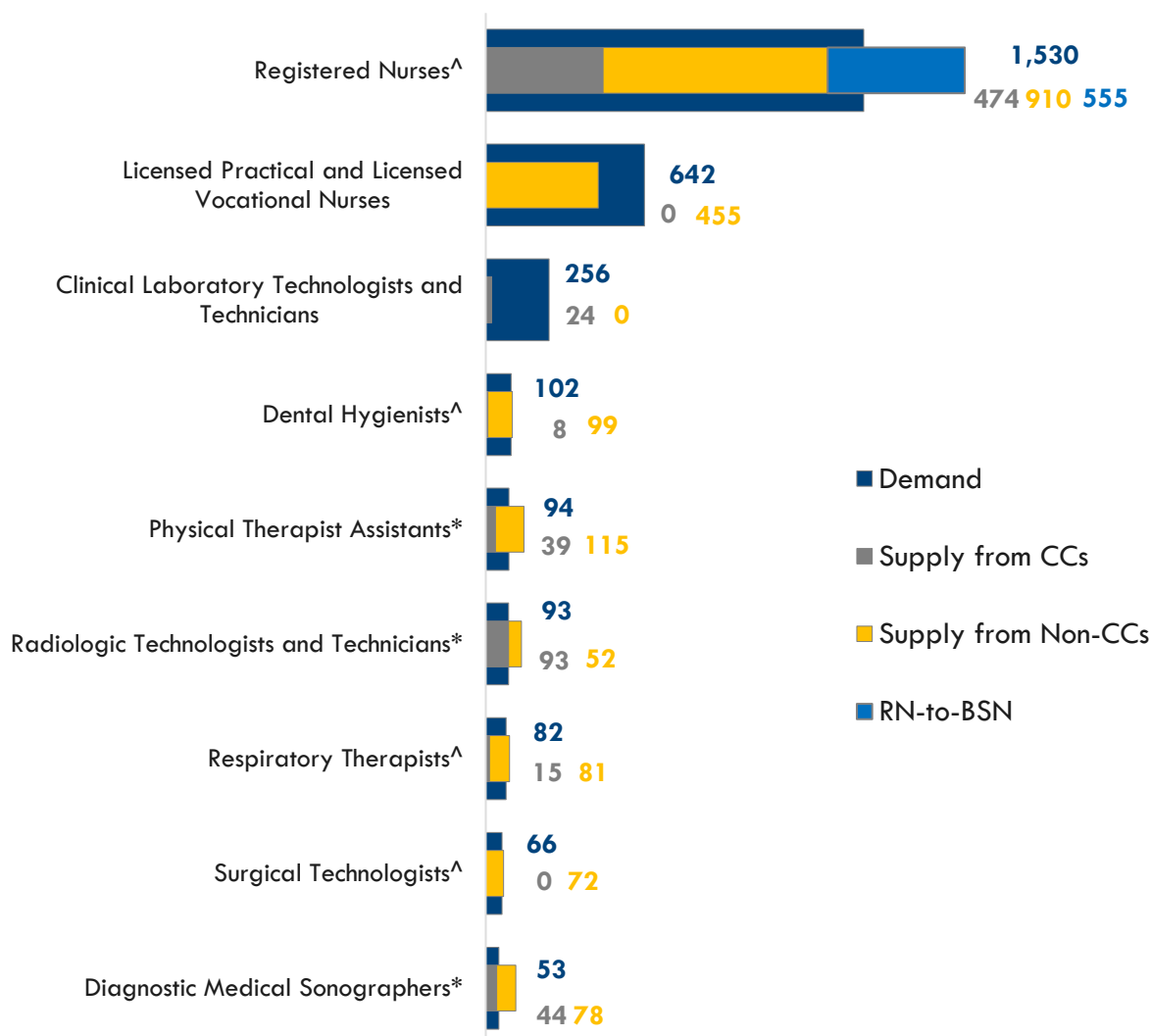
Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive 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 wages¹⁹ for these top middle-skill jobs are higher than the \$20.63 per hour living wage. Descriptions for each occupational title can be found in Appendix C. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix D

Exhibit 2: 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, ^ indicates that the occupations demand has been met, and N/A indicates that no community college program reported awards for this occupation or no community college program is available for this occupation.)

¹⁹ 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 555 awards because it is double-counting current registered nurses.

Recently created programs, such as Vanguard University's new pre-licensure program, were not included in the supply figures in 2019 because their awards were conferred after the years 2015 through 2017 which were analyzed in that report. However, Vanguard did not confer any awards between 2017 and 2020 and is not included in the supply of this updated brief.

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.²⁰ 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."²¹ 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.

The Regional Director for Employer Engagement stated 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.

*"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*

²⁰ <https://www.rn.ca.gov/education/passrates.shtml>

²¹ <https://www.wgu.edu/online-nursing-health-degrees/rn-prelicensure-nursing-bachelors-program.html>

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 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 29-2018) 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 29-2018) occupation displayed in Exhibit 1.²²

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. HIT and Nursing Informatics are emerging areas. 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 (25 th Percentile)	Median Wage
29-1141	Registered Nurses	1,530	\$42.91	\$52.37
29-2061	Licensed Practical and Licensed Vocational Nurses	642	\$26.00	\$30.44
29-2018	Clinical Laboratory Technologists and Technicians	256	\$21.82	\$29.53
29-1292	Dental Hygienists	102	\$45.83	\$54.71
31-2021	Physical Therapist Assistants	94	\$34.14	\$37.93

²² https://www.bls.gov/oes/changes_2017.htm

Demand and Supply Analysis: Orange County 2021

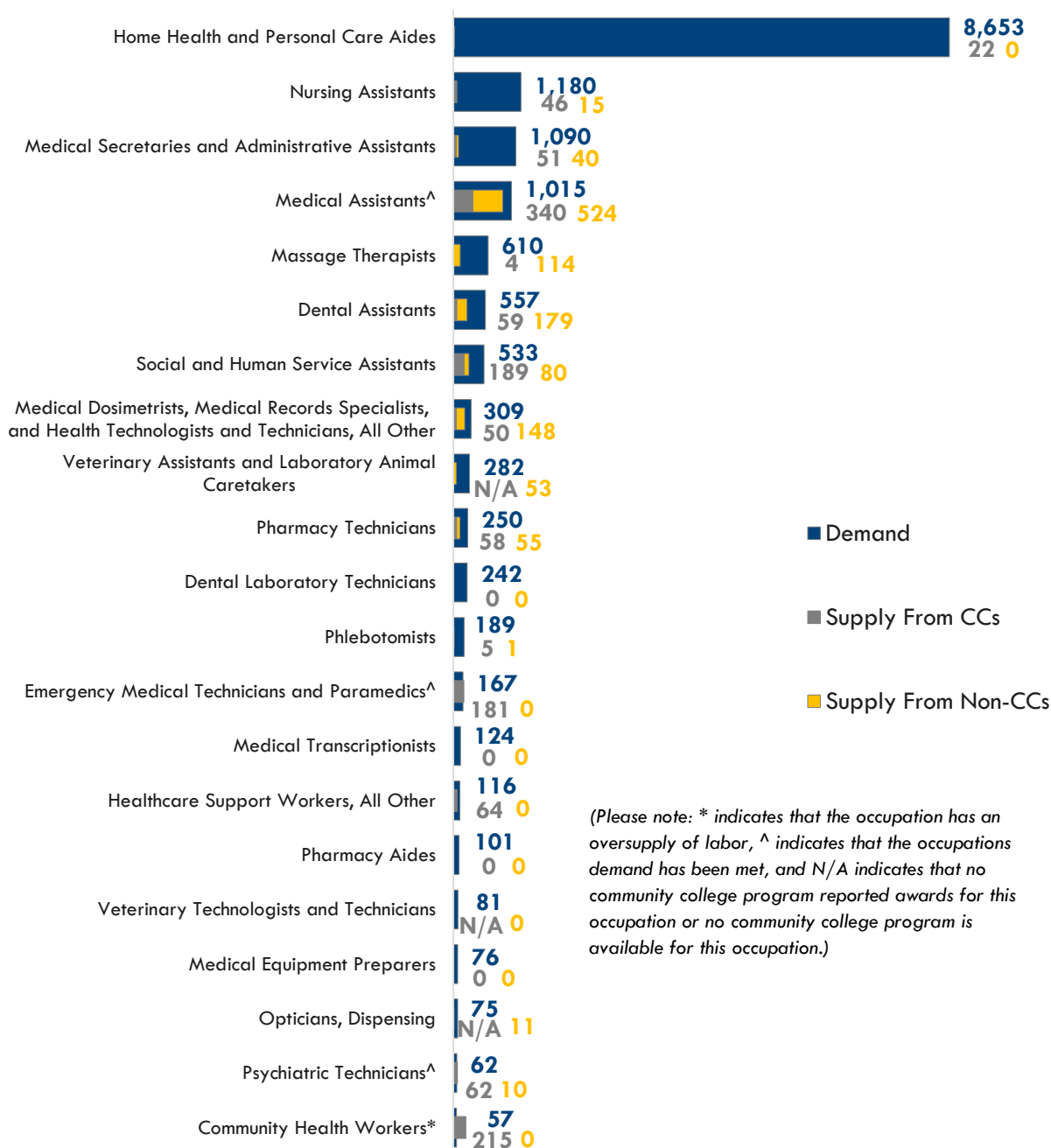
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25 th Percentile)	Median Wage
29-2034	Radiologic Technologists and Technicians	93	\$34.48	\$43.01
29-1126	Respiratory Therapists	82	\$32.31	\$37.54
29-2055	Surgical Technologists	66	\$22.28	\$27.60
29-2032	Diagnostic Medical Sonographers	53	\$42.21	\$48.41

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 in Orange County with Entry-Level Wages Below the Regional Living Wage



While these occupations have entry-level wages below the \$20.63 per hour California Family Needs Calculator, occupations such as Medical Secretaries and Administrative Assistants; Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other; Pharmacy Technicians; Health Technologists and Technicians, All Other; Phlebotomists; Medical Records and Health Information Technicians; Dental Laboratory Technicians; Phlebotomists; Emergency Medical Technicians and Paramedics; Medical Transcriptionists; Opticians, Dispensing; Medical Equipment Preparers; and Community Health Workers 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 (25 th Percentile)	Median Wage
31-1128	Home Health and Personal Care Aides	8,653	\$13.12	\$13.90
31-1131	Nursing Assistants	1,180	\$15.94	\$18.33
43-6013	Medical Secretaries and Administrative Assistants	1,090	\$17.79	\$21.78
31-9092	Medical Assistants	1,015	\$15.32	\$18.11
31-9011	Massage Therapists	610	\$13.18	\$16.26
31-9091	Dental Assistants	557	\$16.51	\$20.01
21-1093	Social and Human Service Assistants	533	\$14.33	\$18.27
29-2098	Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other	309	\$17.90	\$22.86
31-9096	Veterinary Assistants and Laboratory Animal Caretakers	282	\$13.82	\$15.68
29-2052	Pharmacy Technicians	250	\$18.04	\$21.87
51-9081	Dental Laboratory Technicians	242	\$15.53	\$20.36
31-9097	Phlebotomists	189	\$19.75	\$22.95
29-2041	Emergency Medical Technicians and Paramedics	167	\$17.97	\$22.99
31-9094	Medical Transcriptionists	124	\$18.76	\$20.87
31-9099	Healthcare Support Workers, All Other	116	\$19.84	\$22.88
31-9095	Pharmacy Aides	101	\$14.63	\$19.40
29-2056	Veterinary Technologists and Technicians	81	\$20.47	\$25.52
31-9093	Medical Equipment Preparers	76	\$18.59	\$22.79
29-2081	Opticians, Dispensing	75	\$19.40	\$23.98
29-2053	Psychiatric Technicians	62	\$16.64	\$20.37
21-1094	Community Health Workers	57	\$17.87	\$21.67

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

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply

18,687

annual job openings
(labor market demand)

5,690

average annual program awards
(labor market supply)

12,997

supply gap (number of
awards needed to close the gap)

Focus Group Key Findings and Recommendations

Key Finding	Recommendation
<p>1. Securing clinical placements is difficult because positions are limited: There are a limited number of clinical sites in the region and Orange County community colleges are competing with non-community college institutions to secure placements for their students.</p>	<p>1. To increase clinical placement for Orange County community college students, the region could hire a regional clinical placement coordinator that works with all Orange County community colleges and employers to help place students. If hiring a regional position is not feasible, regional funding could be used to support this work occurring on a local level at the colleges. Placements can help students earn valuable hands-on experience and connections that can be useful when searching for a full-time position.</p>
<p>2. Several Health occupations are in high demand but pay low wages: Even though there is a significant need for occupations such as Nursing Assistants and Home Health Aides, entry-level wages for these occupations are below the living-wage for one adult in Orange County.</p>	<p>2. To help students move into occupations with higher wages, colleges could consider creating noncredit programs for high-demand, low wage occupations and create a noncredit-to-credit pipeline so students have a pathway to obtain additional education and experience that will help them earn better wages and advance their careers. Additionally, to help students better understand wage expectations and career progression, the Regional Employer Engagement Team could work with faculty members and administrators to define common career paths and job titles within occupations. This information can then be shared with counselors so that students can learn about their career options and how their earnings potential changes with additional education and experience.</p>

Key Finding

Recommendation

- | | |
|---|--|
| <p>3. Supply data for Health occupations is incomplete: The number of awards conferred by some non-community college institutions, such as Western Governors University and Regional Occupational Programs (ROP) are not included in the supply figures. Additionally, the supply numbers do not account for the differences between pre-licensure nursing programs and Registered Nurse to Bachelor's of Science in Nursing (RN-to-BSN) programs. Without a complete picture of training providers and programs, the supply numbers may be understated for certain occupations.</p> <p>4. Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers: The OC Sector Analysis Project brief examines job gaps, but does not explore the specific KSAs taught at the colleges and compare them to the labor market's demand for Advanced Transportation and Logistics KSAs.</p> | <p>3. To better understand and quantify the supply of qualified students from programs at all educational institutions in Orange County, the COE should work with the Regional Employer Engagement Team to identify existing Health programs in order to generate a complete list of training providers for Health occupations.</p> <p>4. To determine if the region's community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a "regional advisory group" where employers can review program KSAs, provide feedback, and validate the KSAs' current relevance and demand in the labor market.</p> |
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INFORMATION & COMMUNICATION TECHNOLOGIES (ICT) AND DIGITAL MEDIA

Demand and Supply Analysis: Orange County 2021

2021 ORANGE COUNTY SECTOR ANALYSIS PROJECT DATA REFRESH

The Orange County Sector Analysis Project was originally completed in 2019. In addition to the normal annual refresh of labor market information, the COVID-19 pandemic and subsequent economic recession occurred after the first publication. Furthermore, since 2019, the Bureau of Labor Statistics (BLS) updated the Standard Occupational Classification (SOC) system, which resulted in the removal, modification, or addition of occupations and their definitions. The Integrated Postsecondary Data Education System (IPEDS) also updated the Classification of Instructional Programs (CIP) classification system, which removed, modified, or added new CIP codes. The changes in these federal data systems required the Centers of Excellence to create an updated TOP-CIP-SOC crosswalk and determine skill classifications for new SOC codes. Moreover, the living wage for a single adult in Orange County increased from \$17.39 per hour to \$20.63 per hour.

To address these changes, and to provide the most recent labor market data available, the Orange County Center of Excellence for Labor Market Research (COE) pulled and analyzed current labor market information in November 2021 and applied the same methodology that was used in 2019 to update the data included in this brief. Due to these updates, one occupation from the 2019 report is no longer included in this updated brief and six occupations from the 2019 brief are included in this update but have new SOC codes. There is one new occupation in this brief that was not included in the 2019 version. The occupations that were removed, changed, or added, as well as detailed explanations of these differences for each occupation, are summarized in Appendix B.

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 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 Calculator²³ (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 \$20.63 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.

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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.

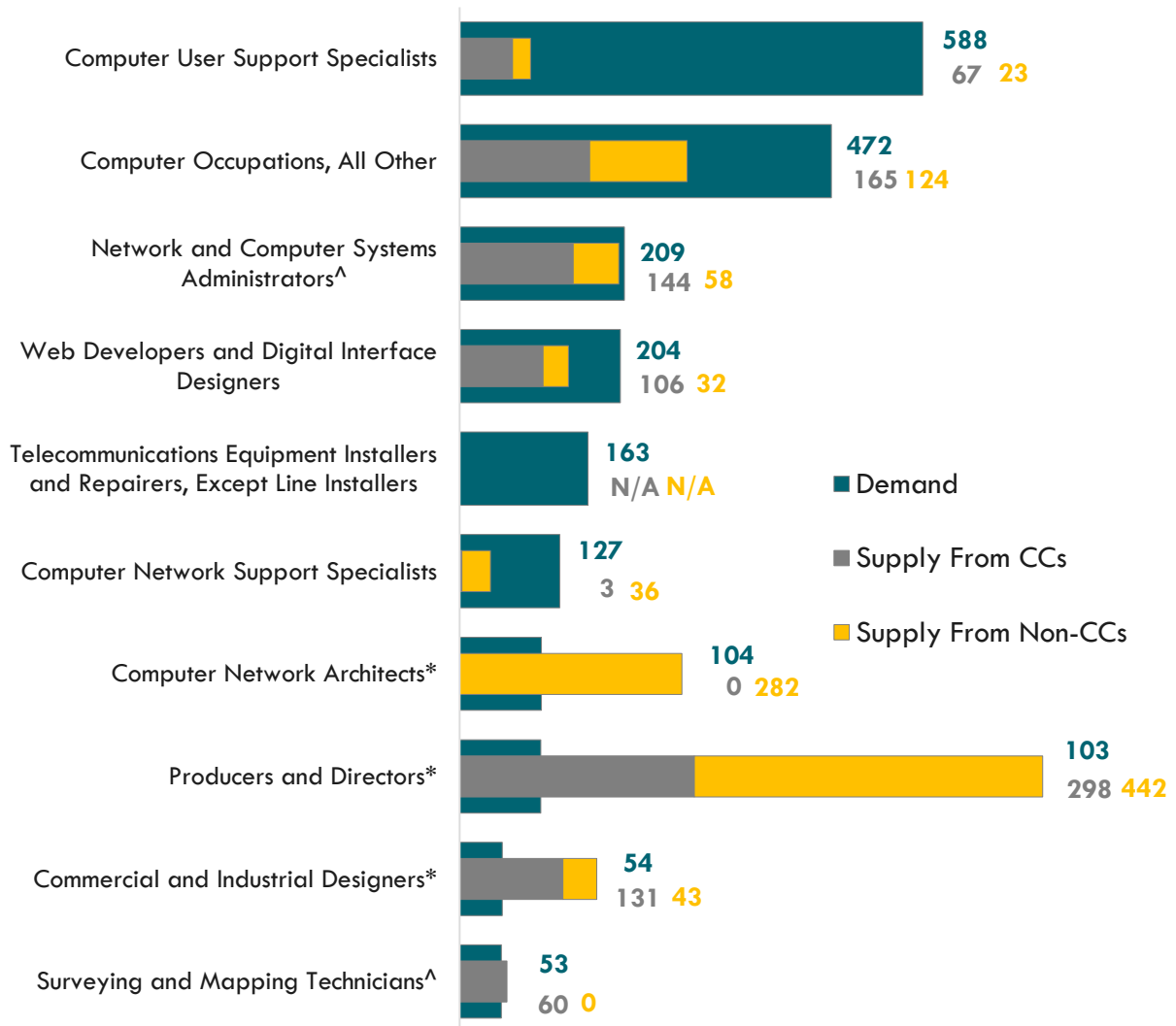
Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive 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.

²³ <https://insightccd.org/family-needs-calculator/>

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 wages²⁴ for these top middle-skill jobs are higher than the \$20.63 per hour living wage. Descriptions for each occupational title can be found in Appendix C. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix D.

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



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

²⁴ 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

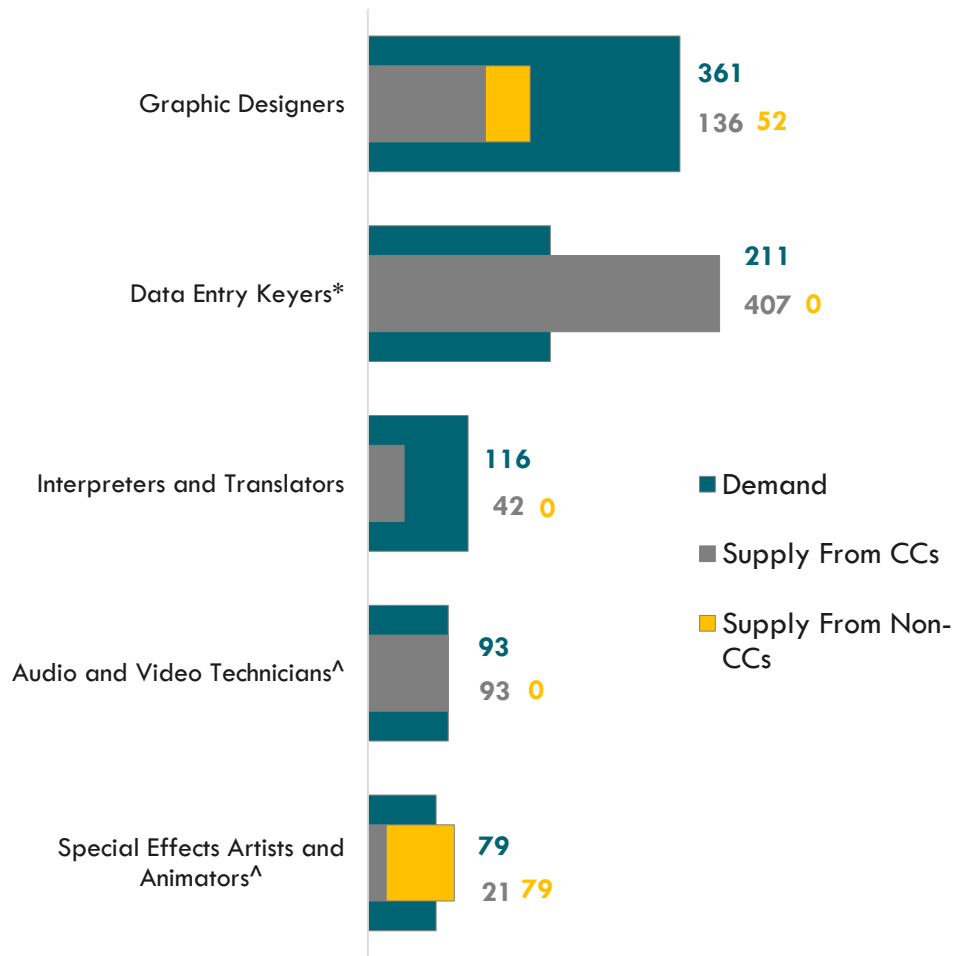
SOC Code	SOC (Occupational) Title	Demand (Annual Openings)	Entry-Level Wage (25 th Percentile)	Median Wage
15-1232	Computer User Support Specialists	588	\$21.39	\$27.35
15-1299	Computer Occupations, All Other	472	\$27.19	\$38.70
15-1244	Network and Computer Systems Administrators	209	\$34.80	\$45.01
15-1257	Web Developers and Digital Interface Designers	204	\$22.01	\$33.48
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	163	\$31.60	\$38.71
15-1231	Computer Network Support Specialists	127	\$26.58	\$32.07
15-1241	Computer Network Architects	104	\$40.98	\$56.88
27-2012	Producers and Directors	103	\$25.74	\$41.99
27-1021	Commercial and Industrial Designers	54	\$28.41	\$37.41
17-3031	Surveying and Mapping Technicians	53	\$29.98	\$41.24

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 in Orange County with Entry-Level Wages Below the Regional Living Wage: Labor Market Demand vs Program Supply



(Please note: * indicates that the occupation has an oversupply of labor, ^ indicates that this occupation's demand has been met, 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 \$20.63 per hour, occupations such as Graphic Designers; Interpreters and Translators; Audio and Video Equipment Technicians; and Special Effects 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 (25 th Percentile)	Median Wage
27-1024	Graphic Designers	361	\$19.13	\$27.84
43-9021	Data Entry Keyers	211	\$14.68	\$17.07
27-3091	Interpreters and Translators	116	\$19.60	\$26.50
27-4011	Audio and Video Technicians	93	\$19.30	\$28.73
27-4014	Special Effects Artists and Animators	79	\$15.49	\$30.51

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, including 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

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply

2,937 annual job openings (labor market demand)	2,844 average annual program awards (labor market supply)	93 supply gap (number of awards needed to close the gap)
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Focus Group Key Findings and Recommendations

Key Finding	Recommendation
<p>1. A four-year degree for information technology does not exist, so employers focus on skills and certifications when hiring workers: Community colleges in Orange County train for a variety of certification, such as those offered by CompTIA and Cisco, but it is unclear which certifications employers value the most when making hiring decisions.</p>	<p>1. To identify the most in-demand certifications, the Regional Employer Engagement Team and faculty members could work with employers to determine which certifications they value the most. Once these certifications are identified, colleges could consider providing students with vouchers to take certification exams after they complete a degree or certificate.</p>
<p>2. Finding data for emerging areas in the ICT and Digital Media sector makes it difficult to define the skills that should be taught in new programs: Traditional labor market information does not always capture new and emerging areas, so information related to skills, certifications, and education requirements are not always readily available.</p>	<p>2. To better understand local employer needs, colleges and the Regional Employer Engagement Team could work with employers to identify emerging areas for which they need workers and identify the skills, certifications, and education employers require. Colleges could then work with the COE to verify this information in order to re-tool or develop new programs.</p>
<p>3. Emerging areas in this sector require skills from a variety of disciplines: New and emerging areas such as Augmented Reality (AR) and Virtual Reality (VR), cloud technology, cybersecurity, data analytics, and game design require a diverse skill set that is not often found in a single discipline. For example, game design may involve character design, concept art, story development, and programming skills, while data analytics skills can be used in a variety of business occupations.</p>	<p>3. To diversify the skill set of students in ICT and Digital Media programs, 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.</p>

Key Finding

4. **Similar programs at different colleges could help train qualified workers for emerging areas, but some colleges may already have areas of specialization that can be expanded:** Common challenges to expanding programs included the lack of dedicated lab space and high costs for equipment. If every college is using their resources to buy equipment for their individual campus, they may not be able to provide training in all areas of need.
5. **Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers:** The OC Sector Analysis Project brief examines job gaps but does not explore the specific KSAs taught at the colleges and compare them to the labor market's demand for ICT and Digital Media KSAs.

Recommendation

4. Colleges could explore the idea of working with each other to establish college-specific specializations that build upon already existing infrastructure, personnel, and resources. Faculty at each college could work with each other to establish articulation agreements and clear pathways for students. For example, students could earn a foundational IT skills certificate at one college, then continue taking courses at another college that specializes in cybersecurity.
5. To determine if the region's community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a "regional advisory group" where employers can review program KSAs, provide feedback, and validate the KSAs' current relevance and demand in the labor market.

2021 ORANGE COUNTY SECTOR ANALYSIS PROJECT DATA REFRESH

The Orange County Sector Analysis Project was originally completed in 2019. In addition to the normal annual refresh of labor market information, the COVID-19 pandemic and subsequent economic recession occurred after the first publication. Furthermore, since 2019, the Bureau of Labor Statistics (BLS) updated the Standard Occupational Classification (SOC) system, which resulted in the removal, modification, or addition of occupations and their definitions. The Integrated Postsecondary Data Education System (IPEDS) also updated the Classification of Instructional Programs (CIP) classification system, which removed, modified, or added new CIP codes. The changes in these federal data systems required the Centers of Excellence to create an updated TOP-CIP-SOC crosswalk and determine skill classifications for new SOC codes. Moreover, the living wage for a single adult in Orange County increased from \$17.39 per hour to \$20.63 per hour.

To address these changes, and to provide the most recent labor market data available, the Orange County Center of Excellence for Labor Market Research (COE) pulled and analyzed current labor market information in November 2021 and applied the same methodology that was used in 2019 to update the data included in this brief. Due to these updates, one occupation from the 2019 report is no longer included in this updated brief. There are three new occupations in this brief that were not included in the 2019 version. The occupations that were removed, changed, or added, as well as detailed explanations of these differences for each occupation, are summarized in Appendix B.

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 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 Calculator²⁵ (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 \$20.63 per

²⁵ <https://insightcced.org/family-needs-calculator/>

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 2020 and 2025. 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 2017 and 2020 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.

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.²⁶ 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.

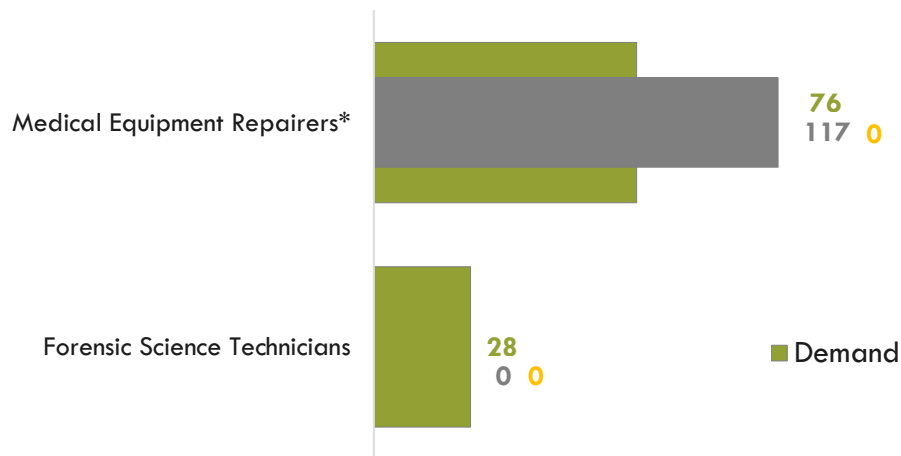
Focus group participants identified several data limitations, challenges in expanding programs, and other issues that were common across multiple sectors. The cross-sector, common themes are expanded on and explained in further detail in the standalone Orange County Sector Analysis Project Executive 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.

²⁶ 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 wages²⁷ for these top middle-skill jobs are higher than the \$20.63 per hour living wage. Descriptions for each occupational title can be found in Appendix C. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix D.

Exhibit 1. Life Sciences and Biotechnology Top Middle-Skill Jobs in Orange County: Labor Market Demand vs. Program Supply



(Please note: * indicates that the occupation has an oversupply of labor, ^ indicates that the occupations demand has been met, and 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 C. 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

²⁷ 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 CCCC's dashboard tool, LaunchBoard²⁸, 392 (unduplicated) students took one or more courses in Life Sciences and Biotechnology programs in the 2019-20 program year in Orange County. However, in that same year, only 29 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 (25 th Percentile)	Median Wage
49-9062	Medical Equipment Repairers	76	\$23.21	\$31.40
19-4092	Forensic Science Technicians	28	\$31.07	\$41.27

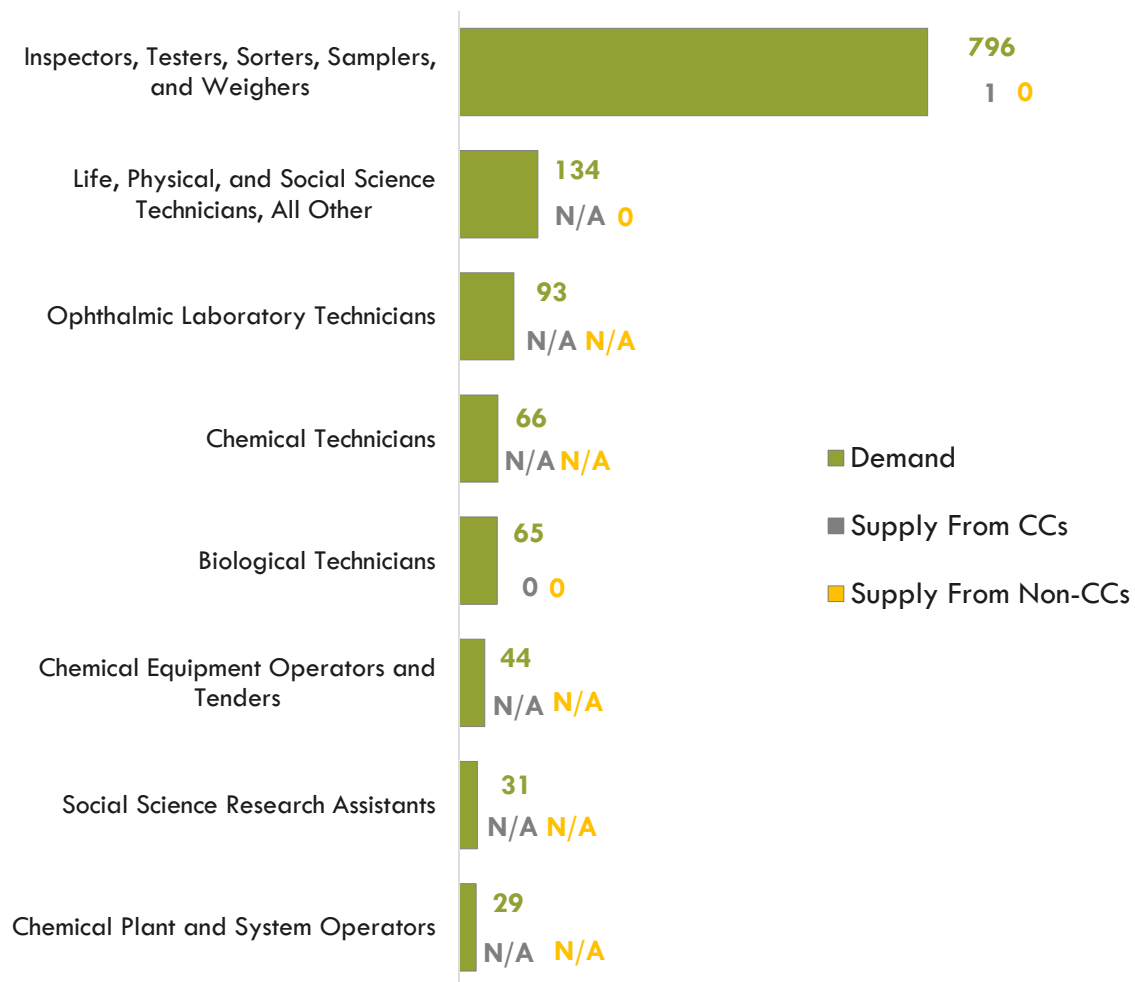
²⁸ calpassplus.org/Launchboard/Community-College-Pipeline.aspx

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 in Orange County with Entry-Level Wages Below the Regional Living Wage



(Please note: * indicates that the occupation has an oversupply of labor, ^ indicates that the occupations demand has been met, 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 \$20.63 per hour California Family Needs Calculator, occupations such as Life, Physical, and Social Science Technicians, All Other; Chemical Technicians; Biological Technicians; Chemical Equipment Operators and Tenders; Social Science Research Assistants; and Chemical Plant and System Operators 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 (25 th Percentile)	Median Wage
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	796	\$15.50	\$19.70
19-4099	Life, Physical, and Social Science Technicians, All Other	134	\$19.18	\$25.93
51-9083	Ophthalmic Laboratory Technicians	93	\$14.64	\$17.81
19-4031	Chemical Technicians	66	\$16.98	\$21.91
19-4021	Biological Technicians	65	\$18.16	\$23.02
51-9011	Chemical Equipment Operators and Tenders	44	\$20.21	\$27.07
19-4061	Social Science Research Assistants	31	\$19.38	\$23.11
51-8091	Chemical Plant and System Operators	29	\$18.30	\$21.31

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

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply

1,362 annual job openings (labor market demand)	118 average annual program awards (labor market supply)	1,244 supply gap (number of awards needed to close the gap)
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Focus Group Key Findings and Recommendations

Key Finding	Recommendation
<p>1. Employers in this sector heavily recruit from four-year colleges, even if a position does not require a bachelor's degree: Even though employers tend to have a preference to hire students from four-year colleges, there is anecdotal evidence that students taking community college course have stronger lab skills than their four-year college counterparts. Additionally, some technical lab skills are not typically taught at four-year colleges, where training tends to be more theoretical.</p>	<p>1. To break down the bachelor's degree requirement with employers, the Regional Employer Engagement Team and internship coordinators at each college could work with employers to show how Orange County community colleges are preparing students to meet employers' demand for qualified workers.</p>
<p>2. Life Sciences and Biotechnology is a relatively new sector and attracting young students is difficult: Programs in this sector have historically attracted working professionals that are adding additional skills to advance in their current job. Because of the emerging nature of this sector, high school students are not always aware of Life Sciences and Biotechnology jobs and opportunities. Finding dual enrollment partners and integrating the K-12 system into a pathway has been difficult.</p>	<p>2. To raise awareness, attract younger students to community college programs, and increase enrollments in this sector, colleges could intentionally promote programs to targeted audiences such as K-12 students, career counselors, and K-12 partners. These efforts could help make high school students aware of Life Sciences and Biotechnology programs at the community colleges and create a potential pipeline of students to increase enrollment.</p>
<p>3. Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers: The OC Sector Analysis Project brief examines job gaps but does not explore the specific KSAs taught at the colleges and compare them to the labor market's demand for Life Sciences and Biotechnology KSAs.</p>	<p>3. To determine if the region's community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a regional advisory group" where employers can review program KSAs, provide feedback, and validate the KSAs' current relevance and demand in the labor market.</p>

RETAIL, HOSPITALITY, AND TOURISM

Demand and Supply Analysis: Orange County 2021

2021 ORANGE COUNTY SECTOR ANALYSIS PROJECT DATA REFRESH

The Orange County Sector Analysis Project was originally completed in 2019. In addition to the normal annual refresh of labor market information, the COVID-19 pandemic and subsequent economic recession occurred after the first publication. Furthermore, since 2019, the Bureau of Labor Statistics (BLS) updated the Standard Occupational Classification (SOC) system, which resulted in the removal, modification, or addition of occupations and their definitions. The Integrated Postsecondary Data Education System (IPEDS) also updated the Classification of Instructional Programs (CIP) classification system, which removed, modified, or added new CIP codes. The changes in these federal data systems required the Centers of Excellence to create an updated TOP-CIP-SOC crosswalk and determine skill classifications for new SOC codes. Moreover, the living wage for a single adult in Orange County increased from \$17.39 per hour to \$20.63 per hour.

To address these changes, and to provide the most recent labor market data available, the Orange County Center of Excellence for Labor Market Research (COE) pulled and analyzed current labor market information in November 2021 and applied the same methodology that was used in 2019 to update the data included in this brief. Due to these updates, three occupations from the 2019 report are no longer included in this updated brief. There are two new occupations in this brief that were not included in the 2019 version. The occupations that were removed, changed, or added, as well as detailed explanations of these differences for each occupation, are summarized in Appendix B.

While the data for all sectors included in the Orange County Sector Analysis Project was refreshed to provide the most recent labor market data available, it is particularly important to have updated data for the Retail, Hospitality, and Tourism sector due to the outsized impact that the COVID-19 pandemic had on employment in this sector in Orange County. The COE examined the effects of the pandemic and subsequent economic recession on employment in this sector in a recently released report entitled “Impacts of the COVID-19 Pandemic on the Retail, Hospitality, and Tourism Sector in Orange County.”²⁹

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 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

²⁹ <https://coecc.net/orange-county/2022/02/impacts-of-the-covid-19-pandemic-on-the-retail-hospitality-and-tourism-sector-in-orange-county/>

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 Calculator³⁰ (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 \$20.63 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 2020 and 2025. 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 2017 and 2020 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.

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.

³⁰ <https://insightccd.org/family-needs-calculator/>

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 wages³¹ for this top middle-skill job are higher than the \$20.63 per hour living wage. Descriptions for each occupational title can be found in Appendix C. Detailed supply and demand data analyzed for each occupation, including supply numbers by institutions is included in Appendix D.

**Exhibit 1. Retail, Hospitality, and Tourism Top Middle-Skill Jobs in Orange County:
Labor Market Demand vs. Program Supply**



(Please note: * indicates that the occupation has an oversupply of labor, ^ indicates that the occupation's demand has been met, and 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 hire 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 County, colleges should keep in mind that students live and work in surrounding counties where there may be greater demand for certain occupations.

³¹ 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 CCCC's dashboard tool, LaunchBoard³², 6,127 (unduplicated) students took one or more courses in Retail, Hospitality, and Tourism programs in the 2019-20 program year in Orange County. However, in that same year, only 336 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 (25 th Percentile)	Median Wage
27-1022	Fashion Designers	76	\$26.79	\$41.66

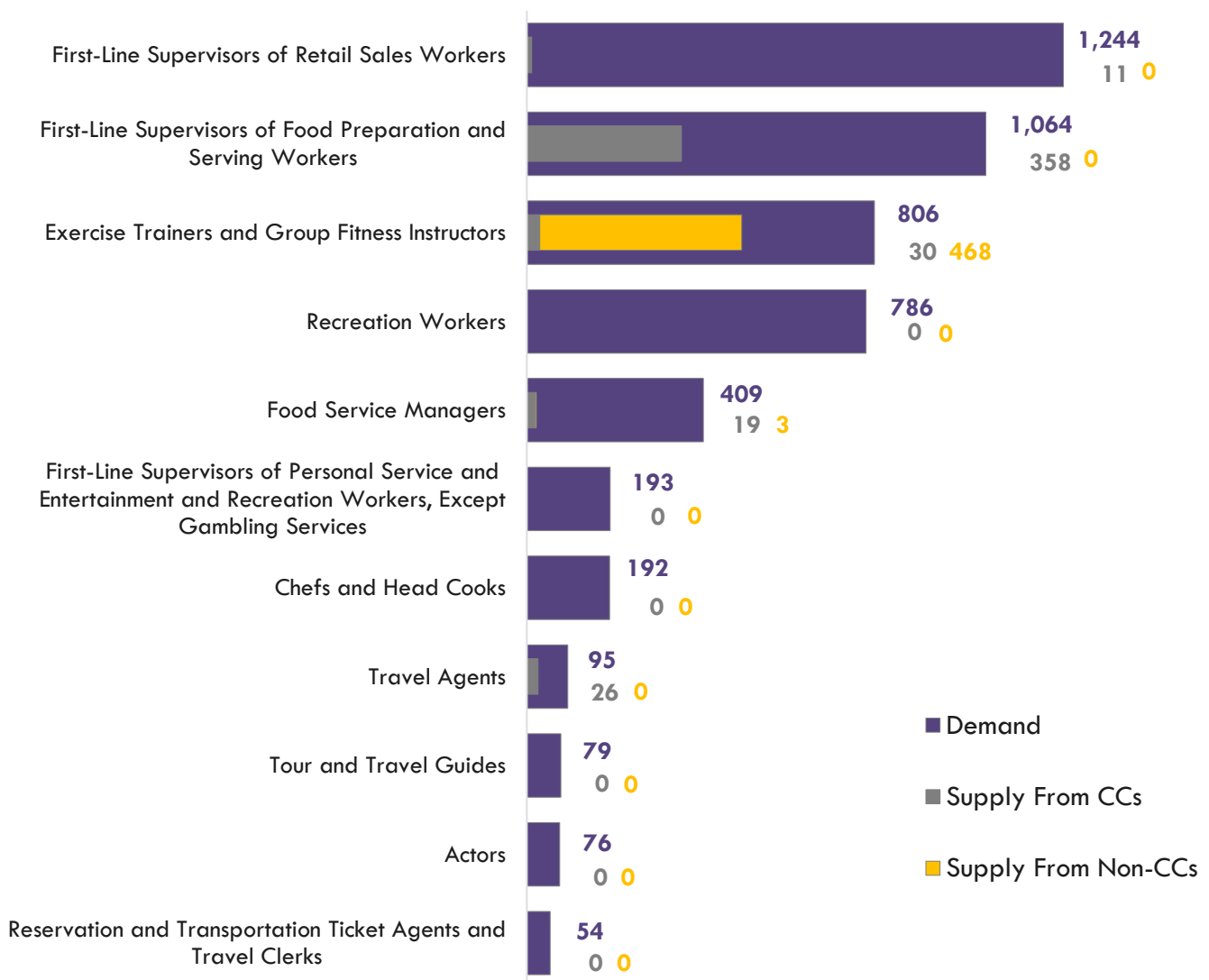
³² <https://www.calpassplus.org/LaunchBoard/Home.aspx>

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 in Orange County with Entry-Level Wages Below the Regional Living Wage: Labor Market Demand vs Program Supply



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

RETAIL, HOSPITALITY, AND TOURISM

Demand and Supply Analysis: Orange County 2021

While these occupations have entry-level wages below the California Family Needs Calculator of \$20.63 per hour, occupations such as Exercise Trainers and Group Fitness Instructors; Food Service Managers; First-Line Supervisors of Personal Service and Entertainment and Recreation Workers, Except Gambling Services; Chefs and Head Cooks; Travel Agents; and Actors 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 (25 th Percentile)	Median Wage
41-1011	First-Line Supervisors of Retail Sales Workers	1,244	\$14.69	\$18.38
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	1,064	\$13.91	\$16.93
39-9031	Exercise Trainers and Group Fitness Instructors	806	\$14.68	\$23.33
39-9032	Recreation Workers	786	\$13.77	\$15.79
11-9051	Food Service Managers	409	\$16.38	\$24.18
39-1098	First-Line Supervisors of Personal Service and Entertainment and Recreation Workers, Except Gambling Services	193	\$15.12	\$21.34
35-1011	Chefs and Head Cooks	192	\$14.86	\$23.74
41-3041	Travel Agents	95	\$15.23	\$21.02
39-7018	Tour and Travel Guides	79	\$13.66	\$16.48
27-2011	Actors	76	\$16.19	\$22.58
43-4181	Reservation and Transportation Ticket Agents and Travel Clerks	54	\$13.32	\$16.49

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 the 2019 version of this report focused on awards conferred between 2015 and 2017, Argosy was still included at that time. However, when the data included in this brief was updated in 2021, Argosy University was no longer included due to its closure. Because of this change, there is now a supply gap for Chefs and Head Cooks.

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

Based on the demand and supply data, as well as the focus group insights analyzed in this brief, the COE identified the following key research findings and recommendations:

Demand and Supply

5,074	1,013	4,061
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 Key Findings and Recommendations

Key Finding	Recommendation
<p>1. Completion numbers are low, but some colleges have found solutions to increase completion: In the 2019-2020 academic year, 6,127 students took at least one Retail, Hospitality, and Tourism course in Orange County, but only 336 students earned a degree or certificate. There tends to be high turnover of workers in this sector, so it is relatively easy for students to find a job before completing. However, upfront counseling to help students understand the importance and value of completing has helped increase persistence rates at some colleges.</p> <p>2. Several Retail, Hospitality, and Tourism occupations are in high demand, but pay low wages: Even though there is a significant need for occupations such as First-Line Supervisors of Retail Workers and First-Line Supervisors of Food Preparation and Serving Workers, entry-level wages for these occupations are below the living-wage for one adult in Orange County.</p>	<p>1. To increase completion rates of students in Retail, Hospitality, and Tourism programs colleges could focus on counseling efforts early in a student’s course progression to help them understand the value of a degree or certificate. Colleges could also add a work experience component, such as an internship of work-based learning opportunity, towards the end of their programs to incentivize students to complete their degree or certificate.</p> <p>2. To help students move into occupations with higher wages, colleges could consider creating noncredit programs for high-demand, low wage occupations and create a noncredit-to-credit pipeline so students have a pathway to obtain additional education and experience that will help them earn better wages and advance their careers.</p>

Key Finding

Recommendation

- 3. Wages for Chefs and Head Cooks could be misleading:** Entry-level wages for Chefs and Head Cooks are below the regional living wage, which is currently \$20.63. However, this occupation includes several roles and titles, ranging from line cook to executive chef. 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. Prolific positions that are typically considered entry-level and require less experience, like line cooks, have low wages and bring the entry-level and median wages down for this occupation.
 - 4. Knowledge, Skills, and Abilities (KSAs) for the sector have not been validated by employers:** The OC Sector Analysis Project brief examines job gaps but does not explore the specific KSAs taught at the colleges and compare them to the labor market's demand for Retail, Hospitality, and Tourism KSAs. Orange County community colleges offer several courses that are designed to provide students with additional skills, rather than train them for a specific occupation.
- 3.** To help students better understand wage expectations and career progression, the Regional Employer Engagement Team could work with faculty members and administrators to define common career paths and job titles within occupations. This information can then be shared with counselors so that students can learn about their career options and how their earnings potential changes with additional education and experience.
 - 4.** To determine if the region's community colleges are training for the right KSAs, the Regional Employer Engagement Team should convene employers in a "regional advisory group" where employers can review program KSAs, provide feedback, and validate the KSAs' current relevance and demand in the labor market.

APPENDIX A: METHODOLOGY AND 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 the table below.

Sector	TOP6 Program Name	TOP6 Code
Advanced Manufacturing	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	
Advanced Transportation and Logistics	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

Sector	TOP6 Program Name	TOP6 Code	
	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	
	Business and Entrepreneurship	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		
Energy, Construction, and Utilities	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	

Sector	TOP6 Program Name	TOP6 Code	
	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	
	Health	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		

Sector	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
	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
ICT and Digital Media	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

Sector	TOP6 Program Name	TOP6 Code
	Telecommunications Technology	0934.30
	Television (including combined TV-film-video)	0604.20
	Website Design and Development	0614.30
	World Wide Web Administration	0709.00
Life Sciences and Biotechnology	Biomedical Instrumentation	0934.60
	Biotechnology and Biomedical Technology	0430.00
	Chemical Technology	0954.00
	Electron Microscopy	0934.70
	Laboratory Science Technology	0955.00
Retail, Hospitality, and Tourism	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)³³ system and identified approximately 300 occupational codes as middle-skill jobs.

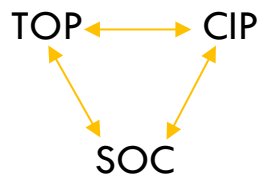
Middle-skill jobs include:

- 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.)³⁴ The number of annual job openings estimates employment change and turnover for an occupation each year between 2020 and 2025. 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 D of each study.

³³ 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.

³⁴ Emsi. Data set 2021.3. QCEW Employees + Non-QCEW + Self-Employed. 2020-2025

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 group 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: OCCUPATIONAL DIFFERENCES BETWEEN 2019 AND 2021 VERSIONS

Removed Occupations

The following occupations were included in the 2019 version of this brief but were not included in the 2021 version because they were not projected to have at least 50 annual job openings between 2020 and 2025, were assigned to a different sector in 2019, or were classified as below or above middle-skill in 2021:

Advanced Manufacturing

- Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic (51-4012)
- Electrical and Electronics Repairers, Commercial and Industrial Equipment (49-2094)
- Molders, Shapers, and Casters, Except Metal and Plastic (51-9195)

Advanced Transportation and Logistics

There were not any occupations from the 2019 version of this brief that were not included in the 2021 version.

Business and Entrepreneurship

- Credit Counselors (13-2071)
- Compensation, Benefits, and Job Analysis Specialists (13-1141)
- Barbers (39-5011)

Energy, Construction, and Utilities

- Stonemasons (47-2022)
- Insulation Workers, Mechanical (47-2132)
- Brickmasons and Blockmasons (47-2021)

Health

- Occupational Therapy Assistants (31-2011)
- First-Line Supervisors of Protective Service Workers, All Other (31-9099)

ICT and Digital Media

- Photographers (27-4021)

Life Sciences and Biotechnology

- Medical Appliance Technicians (51-9082)

Retail, Hospitality, and Tourism

- Lodging Managers (11-9081)
- Dancers (27-2031)
- Entertainers and Performers, Sports and Related Workers, All Other (27-2099)

SOC Code Changes

The following occupations were included in the 2019 version of this brief but are listed under a new SOC code in this brief due to BLS's update of the SOC system:

Advanced Manufacturing

- Engineering Technicians, Except Drafters, All Other (17-3029)
 - This occupation was updated by BLS to Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other (17-3098)
- Computer-Controlled Machine Tool Operators, Metal and Plastic (51-4011)
 - This occupation was updated by BLS to Computer Numerically Controlled Tool Operators (51-9161)

Advanced Transportation and Logistics

- Bus Drivers, Transit and Intercity (53-3021)
 - This occupation was updated by BLS to Bus Drivers, Transit and Intercity (53-3052)
- Bus Drivers, School or Special Client (53-3022)
 - This occupation was updated by BLS to Bus Drivers, Transit and Intercity (53-3052)

Business and Entrepreneurship

- Sales Representatives, Services, All Other (41-3099)
 - This occupation was updated by BLS to Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel (41-3091)

Energy, Construction, and Utilities

There were not any occupations from the 2019 version of this brief for which BLS assigned a new or modified SOC code.

Health

- Dental Hygienists (29-2021)
 - This occupation was updated by BLS to Dental Hygienists (29-1292)
- Medical Records and Health Information Technicians (29-2071)
 - This occupation was updated by BLS to Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other (29-2098)
- Health Technologists and Technicians, All Other (29-2099)
 - This occupation was updated by BLS to Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other (29-2098)
- Home Health Aides (31-1011)
 - This occupation was updated by BLS to Home Health and Personal Care Aides (31-1128)
- Nursing Assistants (31-1014)
 - This occupation was updated by BLS to Nursing Assistants (31-1131)

ICT and Digital Media

- Computer Network Architects (15-1143)
 - This occupation was updated by BLS to Computer Network Architects (15-1241)
- Computer Network Support Specialists (15-1152)
 - This occupation was updated by BLS to Computer Network Support Specialists (15-1231)
- Web Developers (15-1134)
 - This occupation was updated by BLS to Web Developers and Digital Interface Designers (15-1257)
- Network and Computer Systems Administrators (15-1142)
 - This occupation was updated by BLS to Network and Computer Systems Administrators (15-1244)
- Computer Occupations, All Other (15-1199)
 - This occupation was updated by BLS to Computer Occupations, All Other (15-1299)
- Computer User Support Specialists (15-1151)
 - This occupation was updated by BLS to Computer User Support Specialists (15-1232)

Life Sciences and Biotechnology

There were not any occupations from the 2019 version of this brief for which BLS assigned a new or modified SOC code.

Retail, Hospitality, and Tourism

There were not any occupations from the 2019 version of this brief for which BLS assigned a new or modified SOC code.

New Occupations

The following occupations were not included in the 2019 brief because they either did not meet the annual job openings criteria in 2019, were classified as below or above middle-skill in 2019, or a new SOC code was created by BLS:

Advanced Manufacturing

- Industrial Engineering Technologists and Technicians (17-3026)
- Computer, Automated Teller, and Office Machine Repairers (49-2011)
- Semiconductor Processing Technicians (51-9141)
- Prepress Technicians and Workers (51-5111)
- Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers (51-2028)

Advanced Transportation and Logistics

- First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors (53-1047)
- Passenger Vehicle Drivers, Except Bus Drivers, Transit and Intercity (53-3058)

Business and Entrepreneurship

- Cost Estimators (11-3051)
- Project Management Specialists and Business Operations Specialists, All Other (13-1198)
- Title Examiners, Abstractors, and Searchers (23-2093)
- Legal Support Workers, All Other (23-2099)
- Paralegals and Legal Assistants (23-2011)

Energy, Construction, and Utilities

- Plasterers and Stucco Masons (47-2161)
- Electrical Power-Line Installers and Repairers (49-9051)
- Installation, Maintenance, and Repair Workers, All Other (49-9099)

Health

- Diagnostic Medical Sonographers (29-2032)
- Psychiatric Technicians (29-2053)
- Pharmacy Aides (31-9095)
- Veterinary Assistants and Laboratory Animal Caretakers (31-9096)

ICT and Digital Media

- Interpreters and Translators (27-3091)

Life Sciences and Biotechnology

- Forensic Science Technicians (19-4092)
- Social Science Research Assistants (19-4061)
- Chemical Plant and System Operators (51-8091)

Retail, Hospitality, and Tourism

- Tour and Travel Guides (39-7018)
- First-Line Supervisors of Personal Service and Entertainment and Recreation Workers, Except Gambling Services (39-1098)

APPENDIX C: DEFINITIONS FOR MIDDLE-SKILL JOBS IN ALL SECTORS

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.³⁵

Advanced Manufacturing

Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other (SOC 17-3098): Execute or adapt procedures and techniques for calibrating measurement devices, by applying knowledge of measurement science, mathematics, physics, chemistry, and electronics, sometimes under the direction of engineering staff. Determine measurement standard suitability for calibrating measurement devices. May perform preventive maintenance on equipment. May perform corrective actions to address identified calibration problems. Because this is a new SOC code created by the BLS, sample job titles are not currently available.

Civil Engineering Technicians and Technicians (SOC 17-3022): Operate computer-controlled tools, machines, or robots to machine or process parts, tools, or other work pieces made of metal, plastic, wood, stone, or other materials. May also set up and maintain equipment. Sample job titles include:

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

Computer Numerically Controlled Tool Operators (SOC 51-9161): Operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces. Sample job titles include:

- Brake Press Operator
- Computer Numerical Control Lathe Operator
- Computer Numerical Control Machine Operator
- Computer Numerical Control Machinist
- Computer Numerical Control Mill Operator
- Computer Numerical Control Set-Up and Operator

Computer, Automated Teller, and Office Machine Repairers (SOC 49-2011): Repair, maintain, or install computers, word processing systems, automated teller machines, and electronic office machines, such as duplicating and fax machines.

- ATM Technician
- Computer Repair Technician
- Computer Technician
- Copier Technician
- Field Service Technician
- Service Technician

Electrical and Electronics Engineering Technologists and 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 Electromechanical Assemblers (SOC 51-2028): Assemble or modify electrical or electronic equipment, such as computers, test equipment telemetering systems, electric motors, and batteries. Assemble or modify electromechanical equipment or devices, such as servomechanisms, gyros, dynamometers, magnetic drums, tape drives, brakes, control linkage, actuators, and appliances. Sample job titles include:

- Assembler
- Electromechanical Assembler
- Electrical Assembler
- Electronic Technician
- Manufacturing Assembler
- Wiring Technician

³⁵ <https://www.onetonline.org/>

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

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 Engineering Technologists and Technicians (17-3026): Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May perform time and motion studies on worker operations in a variety of industries for purposes such as establishing standard production rates or improving efficiency. Sample job titles include:

- Engineering Technician
- Industrial Engineering Technician
- Manufacturing Coordinator
- Industrial Engineering Analyst
- Quality Technician
- Service Technician

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

Prepress Technicians and Workers (SOC 51-5111): Format and proof text and images submitted by designers and clients into finished pages that can be printed. Includes digital and photo typesetting. May produce printing plates. Sample job titles include:

- Desktop Operator
- Electronic Prepress Operator
- Electronic Prepress Technician
- Plate Maker
- Plate Mounter
- Pre-Press Proofer

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

Semiconductor Processing Technicians (SOC 51-9141): Perform any or all of the following functions in the manufacture of electronic semiconductors: load semiconductor material into furnace; saw formed ingots into segments; load individual segment into crystal growing chamber and monitor controls; locate crystal axis in ingot using x-ray equipment and saw ingots into wafers; and clean, polish, and load wafers into series of special purpose furnaces, chemical baths, and equipment used to form circuitry and change conductive properties.

- Device Processing Engineer
- Diffusion Operator
- Engineering Technician
- Manufacturing Specialist
- Probe Operator
- Wafer Fabrication Technician

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 (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:

- Fitter
- Iron Workers
- Ironworker
- Steel Fabricator
- Steel Worker
- Structural Steel Erector

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

Advanced Transportation and Logistics

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

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

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

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

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

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

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

Bus Drivers, Transit and Intercity (SOC 53-3052): 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
- Transit Operator
- Tram Driver
- Bus Operator
- Charter Coach Driver
- Tour Bus Driver

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

First-Line Supervisors of Mechanics, Installers, and Repairers (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 Supervisor
- Maintenance Foreman
- Maintenance Superintendent
- Maintenance Planner
- Electrical Supervisor

First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors (SOC 53-1047): Directly supervise and coordinate activities of material-moving machine and vehicle operators and helpers. Ample job titles include:

- Dock supervisor
- Driver Manager
- Fleet Manager
- On Car Supervisor
- Transportation Supervisor
- Warehouse 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

Passenger Vehicle Drivers, Except Bus Drivers, Transit and Intercity (SOC 53-3058): Drive a motor vehicle to transport passengers on an unplanned basis and charge a fare, usually based on a meter. Drive a motor vehicle to transport passengers on a planned or scheduled basis. May collect a fare. Includes nonemergency medical transporters and hearse drivers. Because this is a new SOC code created by the BLS, sample job titles are not currently available

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, Storage, and Distribution Managers (SOC 11-3071): Plan, direct, or coordinate transportation, storage, or distribution activities in accordance with organizational policies and applicable government laws or regulations. Includes logistics managers

- Distribution Center Manager
- Distribution Manager
- Global Transportation Director
- Logistics Director
- Supply Chain Logistics Manager

Business and Entrepreneurship

Administrative Services and Facilities 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

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

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

Cost Estimators (SOC 13-1051): Prepare cost estimates for product manufacturing, construction projects, or services to aid management in bidding on or determining price of product or service. May specialize according to particular service performed or type of product manufactured. Sample job titles include:

- Acquisition Cost Estimator
- Construction Estimator
- Cost Analyst
- Cost Consultant
- Cost Estimator
- Estimator

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

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 and Administrative Assistants (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

Legal Support Workers, All Other (SOC 23-2099): All legal support workers not listed separately. "All Other" titles represent occupations with a wide range of characteristics which do not fit into one of the detailed O*NET-SOC occupations. O*NET data is not available for this type of title.

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
- Nail Technician
- Manicurist
- Fingernail Technician
- Nail Artist

Paralegals and Legal Assistants (SOC 23-2011): Assist lawyers by investigating facts, preparing legal documents, or researching legal precedent. Conduct research to support a legal proceeding, to formulate a defense, or to initiate legal action. Sample job titles include:

- Certified Paralegal
- Corporate Law Assistant
- Law Associate
- Legal Assistant
- Paralegal
- Paralegal Assistant

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

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

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
- Payroll Technician
- Personnel Assistant
- Payroll Specialist

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
- Purchasing Specialist
- Procurement Assistant
- Warehouse Technician

Property Appraisers and Assessors (SOC 13-2021): Appraise real estate, exclusively, and estimate its fair value. May assess taxes in accordance with prescribed schedules. Appraise and estimate the fair value of tangible personal or business property, such as jewelry, art, antiques, collectibles, and equipment. May also appraise land. Sample job titles include:

- Appraiser
- Field Appraiser
- Assessor
- Valuation Consultant
- Commercial Appraiser

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

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

Sales and Related Workers, All Other (SOC 41-9099): All sales and related workers not listed separately. "All Other" titles represent occupations with a wide range of characteristics which do not fit into one of the detailed O*NET-SOC occupations. O*NET data is not available for this type of title.

Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel (SOC 41-3091): Sell services to individuals or businesses. May describe options or resolve client problems. Because this is a new SOC code created by the BLS, sample job titles are not currently available.

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:

- Account Representative
- Member Services Representative
- Bank Teller
- Teller
- Customer Service Associate

Title Examiners, Abstractors, and Searchers (SOC 23-2093): Search real estate records, examine titles, or summarize pertinent legal or insurance documents or details for a variety of purposes. May compile lists of mortgages, contracts, and other instruments pertaining to titles by searching public and private records for law firms, real estate agencies, or title insurance companies. Sample job titles include:

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

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

Energy, Construction, and Utilities

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

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
- Construction Worker
- Form Carpenter
- Production Worker
- Bridge 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
- Elevator Inspector
- Building Inspector
- Home Inspector
- Construction 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
- Construction Area Manager
- Project Superintendent
- General Contractor
- Senior Site Manager
- Construction Foreman

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

Electrical Power-Line Installers and Repairers (SOC 49-5051): Install or repair cables or wires used in electrical power or distribution systems. May erect poles and light or heavy duty transmission towers. Sample job titles include:

- Class Gloving Electrical Lineman
- Electrical Lineman
- Power Lineman
- Class Rubber Gloving Lineman
- Electrical Lineworker
- Third Step Lineman

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

Installation, Maintenance, and Repair Workers, All Other (SOC 49-9099): All installation, maintenance, and repair workers not listed separately. No sample job titles are available for this occupation. "All Other" titles represent occupations with a wide range of characteristics which do not fit into one of the detailed O*NET-SOC occupations. O*NET data is not available for this type of title.

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

Plasterers and Stucco Masons (SOC 47-2161) Apply interior or exterior plaster, cement, stucco, or similar materials. May also set ornamental plaster. Sample job titles include:

- Applicator
- Artisan Plasterer
- Plaster and Stucco Worker
- Plaster Mechanic
- Plasterer
- Plastering Contractor

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

Telecommunications Line Installers and Repairers (SOC 49-9052): Install and repair telecommunications cable, including fiber optics. Sample job titles include:

- Cable Splicer
- Cable Technician
- Field Service Technician
- Installation and Repair Technician
- Lineman
- Service Technician

Health

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

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

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

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

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

Dental Hygienists (SOC 29-1292): 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
- Oral Hygienist
- Pediatric Dental 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
- Crown and Bridge Dental
- Orthodontic Laboratory Technician
- Dental Technician
- Porcelain Technician/Finisher

Diagnostic Medical Sonographers (SOC 29-2032): Produce ultrasonic recordings of internal organs for use by physicians. Includes vascular technologists. Sample job titles include:

- Cardiac Sonographer
- Medical Sonographer
- Ultrasonographer
- Diagnostic Medical Sonographer
- Registered Diagnostic Medical Sonographer (RDMS)
- Ultrasound 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
- Multi Care Technician
- Emergency Medical Technician/Driver
- Flight Paramedic
- Emergency Medical Technician/Dispatcher
- First Responder

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 and Personal Care Aides (SOC 31-1128): Produce ultrasonic recordings of internal organs for use by physicians. Includes vascular technologists. Sample job titles include:

- Caregiver
- Certified Home Health Aide (CHHA)
- Certified Nurse Aide (CAN) Home Attendant
- Home Health Aide (HHA)
- 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 Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other (SOC 20-2098): All Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians not listed separately. "All Other" titles represent occupations with a wide range of characteristics which do not fit into one of the detailed O*NET-SOC occupations. O*NET data is not available for this type of title.

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 Secretaries and Administrative Assistants (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 31-1131): 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)

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 Assistant
- Optometric Technician

Pharmacy Aides (SOC 31-9095): Record drugs delivered to the pharmacy, store incoming merchandise, and inform the supervisor of stock needs. May operate cash register and accept prescriptions for filling. Sample job titles include:

- Certified Pharmacy Assistant
- Drug Purchaser
- Pharmacy Aide
- Pharmacy Assistant
- Pharmacy Assistant
- Pharmacy Clerk

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
- Accredited Pharmacy Technician
- Lead 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

Psychiatric Technicians (SOC 29-2053): Care for individuals with mental or emotional conditions or disabilities, following the instructions of physicians or other health practitioners. Monitor patients' physical and emotional well-being and report to medical staff. May participate in rehabilitation and treatment programs, help with personal hygiene, and administer oral or injectable medications. Sample job titles include:

- Behavioral Health Technician
- Health Care Technician
- Mental Health Assistant
- Mental Health Specialist
- Psychiatric Technician
- Residential Aide

Radiologic Technologists and Technicians (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 Technologist (CST)
- Operating Room Surgical Technician
- Certified Surgical Tech/First Assistant
- Surgical Scrub Technician/Technologist
- Certified Surgical Technician

Veterinary Assistants and Laboratory Animal Caretakers (SOC 31-9096): Feed, water, and examine pets and other nonfarm animals for signs of illness, disease, or injury in laboratories and animal hospitals and clinics. Clean and disinfect cages and work areas, and sterilize laboratory and surgical equipment. May provide routine postoperative care, administer medication orally or topically, or prepare samples for laboratory examination under the supervision of veterinary or laboratory animal technologists or technicians, veterinarians, or scientists. Sample jobs titles include:

- Animal Care Provider
- Certified Veterinary Assistant
- Kennel Veterinary Assistant
- Animal Caregiver
- Emergency Veterinary Assistant
- Research Animal Attendant

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

ICT and Digital Media

Audio and Video 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 15-1241): 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 15-1231): 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 15-1299): 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 15-1232): 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

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 jobs include:

- Data Capture Specialist
- Data Entry Clerk
- Data Entry Operator
- Data Transcriber
- Records Clerk
- Underwriting 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

Interpreters and Translators (SOC 27-3091): Interpret oral or sign language, or translate written text from one language into another. Sample job titles include:

- ASL Interpreter
- Medical Interpreter
- Court Interpreter
- Educational Interpreter

Network and Computer Systems Administrators (SOC 15-1244): 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

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

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

- 3D Animator
- 3D Artist
- Animator
- Artist
- Graphic Artist
- Illustrator

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

Web Developers and Digital Interface Designers (SOC 15-1257): Design digital user interfaces or websites. Develop and test layouts, interfaces, functionality, and navigation menus to ensure compatibility and usability across browsers or devices. May use web framework applications as well as client-side code and processes. May evaluate web design following web and accessibility standards, and may analyze web use metrics and optimize websites for marketability and search engine ranking. May design and test interfaces that facilitate the human-computer interaction and maximize the usability of digital devices, websites, and software with a focus on aesthetics and design. May create graphics used in websites and manage website content and links. Sample job titles include:

- Technology Applications Engineer
- Web Architect
- Web Design Specialist
- Web Designer
- Web Developer
- Webmaster

Life Sciences and Biotechnology

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 Plant and System Operators (SOC 51-8091): Control or operate entire chemical processes or system of machines. Sample job titles include:

- Chemical Operator
- Loader Technician
- Process Control Operator
- Process Development Specialist
- Process 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

Forensic Science Technicians (SOC 19-4092): Collect, identify, classify, and analyze physical evidence related to criminal investigations. Perform tests on weapons or substances, such as fiber, hair, and tissue to determine significance to investigation. May testify as expert witnesses on evidence or crime laboratory techniques. May serve as specialists in area of expertise, such as ballistics, fingerprinting, handwriting, or biochemistry.

- Crime Lab Analyst
- Crime Scene Technician
- Forensic Specialist

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

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

Social Science Research Assistants (19-4061): Assist social scientists in laboratory, survey, and other social science research. May help prepare findings for publication and assist in laboratory analysis, quality control, or data management. Sample job titles include:

- Clinical Research Assistant
- Graduate Assistant
- Research Aide
- Research Assistant
- Research Technician
- Social Research Assistant

Retail, Hospitality, and Tourism

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
- Voice-Over Artist
- Performer
- Narrator
- Comedian
- 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:

- Aerobics Instructor
- Fitness Instructor
- Fitness Technician
- Fitness Trainer
- Group Fitness Instructor
- Yoga Instructor

Exercise Trainers and Group Fitness Instructors (SOC 39-9031): Instruct or coach groups or individuals in exercise activities for the primary purpose of personal fitness. Demonstrate techniques and form, observe participants, and explain to them corrective measures necessary to improve their skills. Develop and implement individualized approaches to exercise. Sample job titles include:

- Yoga Instructor
- Personal Trainer
- Group Fitness Instructor
- Group Exercise Instructor
- Fitness Consultant
- Certified Personal Trainer

Fashion Designers (SOC 27-1022): Design clothing and accessories. Create original designs or adapt fashion trends. Sample job titles include:

- Costume Designer
- Sweater Designer
- Shoe Designer
- Dance Costume Designer
- Product Developer
- 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
- Food Service Supervisor
- Cafeteria Manager
- Restaurant Manager
- Food Service Director
- Food Production Supervisor

First-Line Supervisors of Personal Service and Entertainment and Recreation Workers, Except Gambling Services (SOC 39-1098): Directly supervise and coordinate activities of entertainment and recreation related workers.

- Community Life Director
- Recreation Coordinator
- Hair Salon Manager
- Hotel Services Supervisor
- Hotel Services Manager
- Salon Manager

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
- Department Supervisor
- Shift Manager
- Department Manager
- Bakery Manager
- Grocery Manager

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

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

Tour and Travel Guides (SOC 39-7018): Escort individuals or groups on sightseeing tours or through places of interest, such as industrial establishments, public buildings, and art galleries. Plan, organize, and conduct long-distance travel, tours, and expeditions for individuals and groups.

- Museum Docent
- River Guide
- Tour Guide
- Tour Coordinator
- Cruise Counselor
- Tour Director

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 D: DEMAND AND SUPPLY DATA FOR ALL SECTORS

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 LaunchBoard³⁶ and the statewide COE Supply Table³⁷ 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.

³⁶ calpassplus.org/LaunchBoard/Home.aspx

³⁷ coecc.net/COE/media/SupplyandDemandPageDocuments/Supply-2014-17_Feb-2018.xlsm

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
First-Line Supervisors of Production and Operating Workers	454	Supply Gap	0	No Programs	No Programs	No Programs	0
Industrial Machinery Mechanics	226	Supply Gap	18	Industrial Systems Technology and Maintenance	0945.00	Fullerton	1
						Santiago Canyon	15
				Energy Systems Technology	0946.10	Golden West	2
Electrical and Electronic Engineering Technologists and Technicians	168	Supply Met	132	Engineering Technology, General (requires Trigonometry)	0924.00	Santa Ana	1
				Electronics and Electric Technology	0934.00	Coastline	80
						Irvine	25
						Orange Coast	9
						Saddleback	11
						Santa Ana	5
				Electrical and Electronic Engineering Technologies/Technicians, Other	CIP 15.0399	Southern California Institute of Technology	1
Computer Electronics	0934.10	Already accounted for	0				
Computer Installation and Repair Technology/Technician	CIP 47.0104	Already accounted for	0				
Industrial Production Managers	141	Supply Gap	0	No Programs	No Programs	No Programs	0
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	111	Oversupply	161	Architecture and Architectural Technology	0201.00	Fullerton	8
						Orange Coast	61
						Saddleback	11
				Engineering Technology, General (requires Trigonometry)	0924.00	Already accounted for	0
				Electronics and Electric Technology	0934.00	Already accounted for	0
				Computer Electronics	0934.10	Already accounted for	0
				Computer Installation and Repair Technology/Technician	CIP 47.0104	Already accounted for	0
				Laser and Optical Technology	0934.80	Irvine	15
	0956.00	Fullerton	19				

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Manufacturing and Industrial Technology		Irvine	1
						Saddleback	9
						Santa Ana	1
						Santiago Canyon	26
				Marine Technology	0959.00	Orange Coast	8
				Marine Technology	0959.00	Saddleback	2
Structural Iron and Steel Workers	86	Supply Gap	0	Sheet Metal and Structural Metal	0956.40	No Programs	0
				Sheet Metal Technology/Sheetworking	CIP 48.0506	No Programs	0
Civil Engineering Technologists and Technicians	80	Supply Gap	32	Architecture and Architectural Technology	0201.00	Already accounted for	0
				Engineering Technology, General (requires Trigonometry)	0924.00	Already accounted for	0
				Civil and Construction Management Technology	0957.00	Fullerton	11
				Public Works	2102.10	Santiago Canyon	21
Mechanical Drafters	60	Supply Met	64	Engineering Technology, General (requires Trigonometry)	0924.00	Already accounted for	0
				Drafting Technology	0953.00	Fullerton	7
						Golden West	28
						Irvine	4
						Saddleback	1
						Santa Ana	21
				Irvine	3		
Manufacturing and Industrial Technology	0956.00	Already accounted for	0				
Industrial Engineering Technologists and Technicians	53	Supply Met	46	Engineering Technology, General (requires Trigonometry)	0924.00	Already accounted for	0
				Manufacturing and Industrial Technology	0956.00	Already accounted for	0
				Other Engineering and Related Industrial Technologies	0999.00	Coastline	46

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Computer Numerically Controlled Tool Operators	201	Supply Gap	5	Manufacturing and Industrial Technology	0956.00	Already accounted for	0
				Machining and Machine Tools	0956.30	Already accounted for	0
				Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist	CIP 48.0510	California Career School	5
Computer, Automated Teller, and Office Machine Repairers	162	Supply Gap	42	Computer Electronics	0934.10	Orange Coast	5
						Saddleback	17
				Computer Installation and Repair Technology/Technician	CIP 47.0104	United Education Institute-Anaheim	20
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	596	Supply Gap	0	Industrial Electronics	0934.20	No Programs	0
				Engineering Technology, General (requires Trigonometry)	0924.00	Already accounted for	0
Machinists	517	Supply Gap	202	Machining and Machine Tools	0956.30	Fullerton	3
						Orange Coast	94
						Santa Ana	105
Maintenance and Repair Workers, General	1196	Supply Gap	0	Industrial Systems Technology and Maintenance	0945.00	Already accounted for	0
				Building/Property Maintenance	CIP 46.0401	No Programs	0
Prepress Technicians and Workers	72	Supply Gap	23	Digital Media	0614.00	Coastline	1
						Golden West	9
						Irvine	8
						Santa Ana	0
				Desktop Publishing	0614.50	Fullerton	1
						Santa Ana	4
Printing Press Operators	185	Supply Gap	4	Printing and Lithography	0936.00	Fullerton	2
				Printing and Lithography	0936.00	Saddleback	2
Semiconductor Processing Technicians	65	Supply Gap	5		0935.00	Orange Coast	2

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Electro-Mechanical Technology		Santa Ana	3
Sheet Metal Workers	126	Oversupply	211	Sheet Metal and Structural Metal	0956.40	No Programs	0
				Environmental Control Technology	0946.00	Cypress	105
				Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology	CIP 47.0201	Orange Coast	42
						Brownson Technical School	11
						InterCoast Colleges-Santa Ana	16
						United Education Institute-Anaheim	37
Welders, Cutters, Solderers, and Brazers	330	Supply Gap	62	Welding Technology	0956.50	Fullerton	9
						Orange Coast	16
						Santa Ana	37

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
First-Line Supervisors of Mechanics, Installers, and Repairers	307	Supply Gap	135	Electrical Systems and Power Transmission	0934.40	Santiago Canyon	75
				Energy Systems Technology	0946.10	Golden West	2
				Automotive Technology	0948.00	Already Accounted For	0
				Electrical	0952.20	Irvine	10
						North Orange Adult	18
						Orange Coast	3
Santiago Canyon	27						
Logisticians	190	Supply Gap	114	Logistics and Materials Transportation	0510.00	Coastline	114
Bus and Truck Mechanics and Diesel Engine Specialists	128	Supply Gap	17	Diesel Technology	0947.00	Santa Ana	8
Transportation, Storage, and Distribution Managers	105	Supply Gap	37	Aviation and Airport Management and Services	3020.00	Orange Coast	13
				Aviation and Airport Management	3020.10	Cypress	38
Mobile Heavy Equipment Mechanics, Except Engines	101	Supply Gap	17	Diesel Technology	0947.00	Already Accounted For	0
				Heavy Equipment Maintenance	0947.20	Santa Ana	17
						Santiago Canyon	0
Aircraft Mechanics and Service Technicians	60	Oversupply	98	Aeronautical and Aviation Technology	0950.00	Orange Coast	37
				Aviation Airframe Mechanics	0950.10	Orange Coast	31
				Aviation Powerplant Mechanics	0950.20	Orange Coast	30

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Automotive Body and Related Repairers	106	Supply Gap	0	Automotive Collision Repair	0949.00	Cypress	30
Automotive Service Technicians and Mechanics	515	Oversupply	915	Diesel Technology	0947.00	Already Accounted For	0
				Automotive Technology	0948.00	Cypress	266
						Fullerton	33
						Golden West	47
						Saddleback	33
Alternative Fuels Technology	0948.40	Saddleback	6				
Bus Drivers, Transit and Intercity	177	Supply Gap	13	Truck and Bus Driving	CIP 49.0505	Already Accounted For	0
Cargo and Freight Agents	53	Supply Gap	0	No Programs	No Programs	No Programs	0
First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	366	Supply Gap	0	No Programs	No Programs	No Programs	0
Heavy and Tractor-Trailer Truck Drivers	1119	Supply Gap	156	Truck and Truck Driving	CIP 49.0505	California Career School	156
Passenger Vehicle Drivers, Except Bus Drivers, Transit and Intercity	925	Supply Gap	0	Truck and Bus Driving	0947.50	Already Accounted For	0
Production, Planning, and Expediting Clerks	538	Supply Gap	0	No Programs	No Programs	No Programs	0

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Project Management Specialists and Business Operations Specialists, All Other	2,102	Oversupply	3,602	Business and Commerce, General	0501.00	Coastline	5
						Saddleback	13
				Business Administration and Management, General	CIP 52.0201	California Intercontinental University	0
						Hope International University	0
						InterCoast Colleges-Santa Ana	0
						Platt College-Anaheim	3
						University of Phoenix-California	175
						Westcliff University	0
				Business Administration	0505.00	Coastline	679
						Cypress	228
						Fullerton	368
						Golden West	160
						Irvine	296
						Orange Coast	406
						Saddleback	320
						Santa Ana	218
						Santiago Canyon	156
				Business Management	0506.00	Coastline	76
						Cypress	4
						Fullerton	11
						Golden West	12
						Irvine	8
						North Orange Adult	29
						Orange Coast	36
						Santa Ana	71
						Santiago Canyon	27
				International Business and Trade	0508.00	Fullerton	1
						Orange Coast	5
Saddleback	5						
Santa Ana	290						

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
First-Line Supervisors of Office and Administrative Support Workers	1,598	Supply Gap	756	Management Development and Supervision	0506.30	Coastline	305
						Saddleback	28
						Santa Ana	9
						Santiago Canyon	1
				Office Technology/Office Computer Applications	0514.00	Coastline	13
						Cypress	14
						Golden West	3
						Irvine	16
						North Orange Adult	66
						Saddleback	9
Santa Ana	172						
Santiago Canyon	114						
Administrative Assistant and Secretarial Science, General	52.0401	InterCoast Colleges-Santa Ana	5				
Office Management	0514.40	Cypress	1				
Executive Secretaries and Executive Administrative Assistants	571	Supply Gap	0	Office Technology/Office Computer Applications	0514.00	Already accounted for	0
				Administrative Assistant and Secretarial Science, General	52.0401	Already accounted for	0
Loan Officers	528	Supply Gap	5	Finance, General	52.0801	University of Phoenix-California	5
				Banking and Finance	0504.00	No Programs	0
Administrative Services and Facilities Managers	334	Supply Gap	11	Business and Commerce, General	0501.00	Already accounted for	0
				Business Administration and Management, General	52.0201	Already accounted for	0
				Business Administration	0505.00	Already accounted for	0
				Management Development and Supervision	0506.30	Already accounted for	0
				Operations Management and Supervision	52.0205	University of Phoenix-California	11
				Office Management	0514.40	Already accounted for	0
Training and Development Specialists	284	Supply Gap	183	Educational/Instructional Technology	CIP 13.0501	Brandman University	20
						California State University-Fullerton	70
						Concordia University-Irvine	93
				Educational Technology	0860.00	No Programs	0
	242	Supply Gap	0	Insurance	0512.00	No Programs	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Claims Adjusters, Examiners, and Investigators				Insurance	CIP 52.1701	No Programs	0
Cost Estimators	231	Supply Gap	0	Business and Commerce, General	0501.00	Already accounted for	0
				Business Administration and Management, General	CIP 52.0201	Already accounted for	0
				Business Administration	0505.00	Already accounted for	0
Property Appraisers and Assessors	60	Supply Gap	0	Banking and Finance	0504.00	No Programs	0
				Business and Commerce, General	0501.00	Already accounted for	0
				Business Administration and Management, General	CIP 52.0201	Already accounted for	0
				Accounting	0502.00	Already accounted for	0
				Tax Studies	0502.10	Already accounted for	0
				Finance, General	52.0801	Already accounted for	0
				Real Estate	0511.00	Already accounted for	0
				Escrow	0511.10	Already accounted for	0
Brokerage Clerks	58	Supply Gap	0	Accounting	0502.00	Already accounted for	0
				Accounting Technology/Technician and Bookkeeping	CIP 52.0302	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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Customer Service Representatives	2,735	Supply Gap	6	Customer Service	0518.00	Santiago Canyon	6
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2,358	Supply Gap	0	Office Technology/Office Computer Applications	0514.00	Already accounted for	0
				Administrative Assistant and Secretarial Science, General	CIP 52.0401	Already accounted for	0
Bookkeeping, Accounting, and Auditing Clerks	2,100	Supply Gap	621	Accounting	0502.00	Coastline	45
						Cypress	6
						Fullerton	14
						Golden West	24
						Irvine	219
						Orange Coast	114
						Saddleback	35
						Santa Ana	137
				Santiago Canyon	23		
				Accounting Technology/Technician and Bookkeeping	CIP 52.0302	InterCoast Colleges-Santa Ana	2
Southern California Institute of Technology	0						
Trident University International	2						
University of Phoenix-California	0						
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1,543	Supply Gap	6	Sales and Salesmanship	0509.40	Orange Coast	6
						Santa Ana	0
Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel	1,416	Supply Gap	0	Sales and Salesmanship	0509.40	Already accounted for	0
				Sales and Salesmanship	0509.40	Already accounted for	0
Hairdressers, Hairstylists, and Cosmetologists	907	Supply Met	941	Cosmetology and Barbering	3007.00	Fullerton	95
						Golden West	118
						Saddleback	254
						Santiago Canyon	45
				Cosmetology/Cosmetologist, General	CIP 12.0401	Advance Beauty College	37
						Asian-American International Beauty College	56
Career Academy of Beauty	45						

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
						Coastline Beauty College	27
						Coba Academy	19
						Colleen O'Haras Beauty Academy (CLOSED)	25
						CRU Institute of Cosmetology and Barbering	3
						Paul Mitchell the School-Costa Mesa	92
						Santa Ana Beauty Academy	10
						Santa Ana Beauty College	83
						Thanh Le College School of Cosmetology	15
				Make-Up Artist/Specialist	CIP 12.0406	Colleen O'Haras Beauty Academy (CLOSED)*	7
				Hair Styling/Stylist and Hair Design	CIP 12.0407	Santa Ana Beauty Academy	1
						Advance Beauty College	2
						Asian-American International Beauty College	5
						Career Academy of Beauty	1
Colleen O'Haras Beauty Academy (CLOSED)*	0						
Thanh Le College School of Cosmetology	1						
Insurance Sales Agents	835	Supply Gap	0	Insurance	0512.00	No Programs	0
					CIP 52.1701	No Programs	0
Real Estate Sales Agents	558	Supply Gap	180	Real Estate	0511.00	Coastline	6
						Fullerton	3
						Irvine	47
						Orange Coast	24
						Saddleback	79
				Santiago Canyon	17		
Escrow	0511.10	Saddleback	4				
Tellers	509	Supply Gap	3	Banking and Finance	0504.00	No Programs	0
				Banking and Financial Support Services	52.0803	California Intercontinental University	3
Manicurists and Pedicurists	498	Oversupply	1087	Cosmetology and Barbering	3007.00	Already accounted for	0
				Cosmetology/Cosmetologist, General	CIP 12.0401	Already accounted for	0
					CIP 12.0410	Advance Beauty College	379

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Nail Technician/Specialist and Manicurist		Asian-American International Beauty College	522
						Career Academy of Beauty	1
						Coastline Beauty College	109
						Santa Ana Beauty Academy	0
						Santa Ana Beauty College	76
						Thanh Le College School of Cosmetology	0
Property, Real Estate, and Community Association Managers	492	Supply Gap	0	Real Estate	0511.00	Already accounted for	0
				Escrow	0511.10	Already accounted for	0
Paralegals and Legal Assistants	451	Supply Gap	184	Paralegal	1402.00	Coastline	65
						Fullerton	30
						Irvine	21
						Santa Ana	57
				Legal Assistant/Paralegal	CIP 22.0302	Brandman University	1
						InterCoast Colleges-Santa Ana	0
						Platt College-Anaheim	0
						South Coast College	10
Sales and Related Workers, All Other	421	Supply Gap	0	Sales and Salesmanship	0509.40	Already accounted for	0
Loan Interviewers and Clerks	371	Supply Gap	0	Banking and Finance	0504.00	No Programs	0
				Banking and Financial Support Services	CIP 52.0803	Already accounted for	0
Legal Secretaries and Administrative Assistants	300	Supply Gap	0	Legal Office Technology	0514.10	Santa Ana	0
				Legal Administrative Assistant/Secretary	CIP 22.0301	South Coast College	0
Bill and Account Collectors	264	Supply Gap	0	Banking and Finance	0504.00	No Programs	0
				Banking and Financial Support Services	CIP 52.0803	Already accounted for	0
Real Estate Brokers	261	Supply Gap	0	Real Estate	0511.00	Already accounted for	0
				Escrow	0511.10	Already accounted for	0
Parts Salespersons	236	Supply Gap	0	Sales and Salesmanship	0509.40	Already accounted for	0
Payroll and Timekeeping Clerks	180	Supply Gap	0	Accounting	0502.00	Already accounted for	0
				Accounting Technology/Technician and Bookkeeping	52.0302	Already accounted for	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Accounting Technology/Technician and Bookkeeping	52.0302	Already accounted for	0
				Accounting Technology/Technician and Bookkeeping	52.0302	Already accounted for	0
				Accounting Technology/Technician and Bookkeeping	52.0302	Already accounted for	0
Skincare Specialists	149	Oversupply	500	Cosmetology and Barbering	3007.00	Already accounted for	0
				Cosmetology/Cosmetologist, General	CIP 12.0401	Already accounted for	0
				Facial Treatment Specialist/Facialist	CIP 12.0408	Coastline Beauty College	26
				Aesthetician/Esthetician and Skin Care Specialist	CIP 12.0409	Advance Beauty College	98
						Asian-American International Beauty College	111
						Career Academy of Beauty	93
						Coastline Beauty College	10
						Coba Academy	27
						Colleen O'Haras Beauty Academy (CLOSED)*	13
						CRU Institute of Cosmetology and Barbering	0
						Paul Mitchell the School-Costa Mesa	72
						Santa Ana Beauty Academy	5
						Santa Ana Beauty College	36
Thanh Le College School of Cosmetology	9						
Master Aesthetician/Esthetician	CIP 12.0414	Colleen O'Haras Beauty Academy (CLOSED)*	0				
Tax Preparers	135	Supply Gap	32	Accounting	0502.00	Already accounted for	0
				Accounting Technology/Technician and Bookkeeping	CIP 52.0302	Already accounted for	0
				Tax Studies	0502.10	Irvine	23
						Orange Coast	3
				Saddleback	6		
Human Resources Assistants, Except Payroll and Timekeeping	117	Supply Gap	0	Office Technology/Office Computer Applications	0514.00	Already accounted for	0
				Administrative Assistant and Secretarial Science, General	CIP 52.0401	Already accounted for	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Advertising Sales Agents	80	Supply Gap	0	Sales and Salesmanship	0509.40	Already accounted for	0
Legal Support Workers, All Other	68	Supply Gap	1	Paralegal	1402.00	Already accounted for	0
				Legal Assistant/Paralegal	CIP 22.0302	Already accounted for	0
				Legal and Community Interpretation	2140.00	Santa Ana	1
Procurement Clerks	58	Supply Gap	42	Office Technology/Office Computer Applications	0514.00	Already accounted for	0
				General Office Occupations and Clerical Services	52.0408	United Education Institute-Anaheim	42
Title Examiners, Abstractors, and Searchers	56	Supply Gap	0	Paralegal	1402.00	Already accounted for	0
				Legal Assistant/Paralegal	22.0302	Already accounted for	0

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Electricians	1,139	Supply Gap	332	Electrical	0952.20	Irvine	10
						North Orange Adult	18
						Orange Coast	3
						Santiago Canyon	27
					CIP 46.0302	InterCoast Colleges-Santa Ana	35
Southern California Institute of Technology	239						
First-Line Supervisors of Construction Trades and Extraction Workers	685	Supply Gap	129	Construction Crafts Technology	0952.00	Fullerton	11
						Orange Coast	62
						Santa Ana	56
Construction Managers	446	Supply Gap	11	Construction Crafts Technology	0952.00	Already Accounted For	0
						Civil and Construction Management Technology	0957.00
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	440	Supply Gap	213	Environmental Control Technology	0946.00	Cypress	106
						Orange Coast	43
					CIP 47.0201	Brownson Technical School	11
						InterCoast Colleges-Santa Ana	16
Operating Engineers and Other Construction Equipment Operators	233	Supply Gap	36	Diesel Technology	0947.00	Santa Ana	8
						Heavy Equipment Operation	0947.30
Telecommunications Line Installers and Repairers	160	Supply Gap	0	No Programs	No Programs	No Programs	0
Architectural and Civil Drafters	146	Supply Met	148	Architecture and Architectural Technology	0201.00	Fullerton	8
						Orange Coast	61
						Saddleback	11
				Drafting Technology	0953.00	Fullerton	7
						Golden West	28
						Irvine	4
Saddleback	1						

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
						Santa Ana	21
				Architectural Drafting	0953.10	Fullerton	3
						Santa Ana	2
				Civil Drafting	0953.20	Irvine	2
Construction and Building Inspectors	129	Supply Gap	35	Construction Inspection	0957.20	Coastline	13
						Fullerton	8
						Saddleback	9
						Santiago Canyon	5
Glaziers	65	Supply Gap	0	No Programs	No Programs	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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Carpenters	1,145	Supply Gap	2	Carpentry	0952.10	Fullerton	1
						Santiago Canyon	1
Plumbers, Pipefitters, and Steamfitters	651	Supply Gap	0	Plumbing, Pipefitting and Steamfitting	0952.30	Orange Coast	0
Plasterers and Stucco Masons	54	Supply Gap	0	No Programs	No Programs	No Programs	0
Reinforcing Iron and Rebar Workers	59	Supply Gap	0	No Programs	No Programs	No Programs	0
Installation, Maintenance, and Repair Workers, All Other	203	Supply Gap	132	Electronics and Electric Technology	0934.00	Coastline	80
						Irvine	25
						Orange Coast	9
						Saddleback	11
						Santa Ana	5
Solar Photovoltaic Installers	83	Supply Gap	0	Energy Systems Technology	0946.10	Golden West	2
						Electronics and Electric Technology	0934.00
Electrical Power-Line Installers and Repairers	60	Supply Met	75	Electrical Systems and Power Transmission	0934.40	Santiago Canyon	75
						Electrical	0922.20

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

* RN-to-BSN program

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Registered Nurses	1,530	Supply Met	1,939	Registered Nursing	1230.10	Cypress	93
						Golden West	83
						Saddleback	204
						Santa Ana	94
				Registered Nursing/Registered Nurse	CIP 51.3801	Brandman University*	6
						California State University-Fullerton*	335
						Career Networks Institute	112
						Concordia University-Irvine	104
						Pacific College	34
						Stanbridge University	54
University of Phoenix-California*	214						
West Coast University-Orange County	606						
Licensed Practical and Licensed Vocational Nurses	642	Supply Gap	455	Licensed Practical/Vocational Nurse Training	51.3901	American Career College-Anaheim	119
						California Career Institute	90
						Career Networks Institute	11
						Pacific College	92
						Platt College-Anaheim	0
				Stanbridge University	143		
Licensed Vocational Nursing	1230.20	No Programs	0				
Clinical Laboratory Technologists and Technicians	256	Supply Gap	24	Medical Laboratory Technology	1205.00	Saddleback	24
Dental Hygienists	102	Supply Met	107	Dental Hygienist	1240.20	Cypress	8
				Dental Hygiene/Hygienist	CIP 51.0602	Concorde Career College-Garden Grove	31
						West Coast University-Orange County	68
Physical Therapist Assistants	94	Oversupply	154	Physical Therapist Assistant	1222.00	North Orange Adult	39
				Physical Therapy Technician/Assistant	CIP 51.0806	American Career College-Anaheim	36
						Concorde Career College-Garden Grove	27
						Stanbridge University	52

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Radiologic Technologists and Technicians	93	Oversupply	145	Radiologic Technology	1225.00	Cypress	71
						Orange Coast	22
				Radiologic Technology/Science - Radiographer	51.0911	Modern Technology School	52
Respiratory Therapists	82	Supply Met	96	Respiratory Care/Therapy	1210.00	Orange Coast	15
				Respiratory Care Therapy/Therapist	CIP 51.0908	American Career College-Anaheim	40
						Concorde Career College-Garden Grove	41
						Platt College-Anaheim	0
				Surgical Technician	1217.00	No Programs	0
				Surgical Technology/Technologist	CIP 51.0909	American Career College-Anaheim	37
						Career Networks Institute	26
North-West College-Anaheim	9						
Diagnostic Medical Sonographers	53	Oversupply	122	Diagnostic Medical Sonography	1227.00	Cypress	26
						Orange Coast	18
				Diagnostic Medical Sonography/Sonographer and Ultrasound Technician	51.0910	Modern Technology School	23
						North-West College-Anaheim	20
						Platt College-Anaheim	35

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)			
Home Health and Personal Care Aides	8,653	Supply Gap	22	Gerontology	1309.00	Coastline	11			
						Cypress	6			
						Saddleback	5			
				Home Health Aide	1230.80	No Programs	0			
				Home Health Aide/Home Attendant	51.2602	No Programs	0			
Nursing Assistants	1,180	Supply Gap	61	Certified Nurse Assistant	1230.30	Santiago Canyon	46			
				Nursing Assistant/Aide and Patient Care Assistant/Aide	51.3902	California Career Institute	12			
						Platt College-Anaheim	3			
Medical Secretaries and Administrative Assistants	1,090	Supply Gap	40	Medical Office Assistant/Specialist	CIP 51.0710	Concorde Career College-Garden Grove	13			
						Platt College-Anaheim	5			
				Medical Insurance Specialist/Medical Biller	CIP 51.0713	North-West College-Anaheim	22			
				Medical Administrative/Executive Assistant and Medical Secretary	CIP 51.0716	North-West College-Anaheim	0			
				Medical Assisting	1208.00				North Orange Adult	Already accounted for
									Orange Coast	Already accounted for
									Saddleback	Already accounted for
									Santa Ana	Already accounted for
				Administrative Medical Assisting	1208.20	Saddleback	15			
		Santiago Canyon	35							
Health Information Coding	1223.10	Saddleback	1							
Medical Office Technology	0514.20	No Programs	0							
Medical Assistants	1,015	Supply Met	864	Medical Assisting	1208.00	North Orange Adult	118			
						Orange Coast	23			

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
						Saddleback	30
						Santa Ana	149
				Clinical Medical Assisting	1208.10	Saddleback	20
				Medical/Clinical Assistant	CIP 51.0801	American Career College-Anaheim	181
						California Career Institute	23
						Career Networks Institute	16
						Concorde Career College-Garden Grove	89
						InterCoast Colleges-Santa Ana	3
						Modern Technology School	6
						North-West College-Anaheim	66
						Platt College-Anaheim	7
						South Coast College	13
United Education Institute-Anaheim	120						
Massage Therapists	610	Supply Gap	118	Massage Therapy	1262.00	Fullerton	4
				Massage Therapy/Therapeutic Massage	CIP 51.3501	Advance Beauty College	3
						American Institute of Massage Therapy	47
						Career Networks Institute	1
						Coastline Beauty College	1
						North-West College-Anaheim	1
Santa Ana Beauty College	61						
Dental Assistants	557	Supply Gap	238	Dental Assistant	1240.10	Cypress	25
				Dental Assisting/Assistant	CIP 51.0601	Orange Coast	34
						American Career College-Anaheim	45
						Concorde Career College-Garden Grove	77
						InterCoast Colleges-Santa Ana	0
United Education Institute-Anaheim	57						
Social and Human Service Assistants	533	Supply Gap	263	Family Studies	1308.00	Saddleback	1
				Human Services	2104.00	Coastline	20
						Cypress	26
						Orange Coast	1

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
						Saddleback	22
						Santa Ana	58
				Alcohol and Controlled Substances	2104.40	Cypress	20
						Saddleback	35
				Substance Abuse/Addiction Counseling	CIP 51.1501	InterCoast Colleges-Santa Ana	80
				Disability Services	2104.50	North Orange Adult	6
				Community Health Care Worker	1261.00	No Programs	0
				Family and Consumer Sciences, General	1301.00	No Programs	0
				Parenting and Family Education	1305.60	No Programs	0
Foster and Kinship Care	1305.70	No Programs	0				
Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other	309	Supply Gap	198	Respiratory Care/Therapy	1210.00	Already accounted for	0
				Respiratory Care Therapy/Therapist	CIP 51.0908	Already accounted for	0
						Already accounted for	0
						Already accounted for	0
				Polysomnography	1211.00	Orange Coast	2
				Electro-Neurodiagnostic Technology	1212.00	Orange Coast	14
				Health Information Technology	1223.00	Cypress	19
						Saddleback	14
				Health Information/Medical Records Technology/Technician	CIP 51.0707	American Career College-Anaheim	7
				Health Information Coding	1223.10	Saddleback	1
				Radiologic Technology	1225.00	Already accounted for	0
				Radiologic Technology/Science - Radiographer	CIP 51.0911	Already accounted for	0
Medical Insurance Coding Specialist/Coder	51.0713	American Career College-Anaheim	89				
		InterCoast Colleges-Santa Ana	2				
		Trident University International	1				
		United Education Institute-Anaheim	49				
Veterinary Assistants and Laboratory Animal Caretakers	282	Supply Gap	53	Veterinary/Animal Health Technology/Technician and Veterinary Assistant	CIP 51.0808	Platt College-Anaheim	15
						Stanbridge University	38

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Veterinary Technician (Licensed)	0102.10	No Programs	0
Pharmacy Technicians	250	Supply Gap	113	Pharmacy Technology	1221.00	North Orange Adult	4
						Santa Ana	54
				Pharmacy Technician/Assistant	CIP 51.0805	American Career College-Anaheim	43
						Career Networks Institute	2
						InterCoast Colleges-Santa Ana	0
						North-West College-Anaheim	10
Platt College-Anaheim	0						
Dental Laboratory Technicians	242	Supply Gap	0	Dental Laboratory Technician	1240.30	No Programs	0
				Dental Laboratory Technology/Technician	CIP 51.0603	No Programs	0
Phlebotomists	189	Supply Gap	6	Phlebotomy	1205.10	Saddleback	5
				Phlebotomy Technician/Phlebotomist	CIP 51.1009	Modern Technology School	1
Emergency Medical Technicians and Paramedics	167	Supply Met	181	Emergency Medical Services	1250.00	Orange Coast	36
						Saddleback	97
				Paramedic	1250.10	Saddleback	48
Medical Transcriptionists	124	Supply Gap	0	No Programs	1250.10	No Programs	0
Healthcare Support Workers, All Other	116	Supply Gap	64	Medical Assisting	1208.00	Already accounted for	0
				Medical Insurance Specialist/Medical Biller	CIP 51.0713	Already accounted for	0
				Administrative Medical Assisting	1208.20	Already accounted for	0
				Speech/Language Pathology and Audiology	1220.00	Orange Coast	17
						Santa Ana	23
				Health Information Coding	1223.10	Already accounted for	0
				Radiologic Technology	1225.00	Already accounted for	0
Other Health Occupations	1299.00	Orange Coast	16				
		Santiago Canyon	8				
Pharmacy Aides	101	Supply Gap	0	No Programs	1299.00	No Programs	0
Veterinary Technologists and Technicians	81	Supply Gap	0	Veterinary Technician (Licensed)	0102.10	No Programs	0
				Veterinary/Animal Health Technology/Technician and Veterinary Assistant	CIP 51.0808	Already accounted for	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Medical Equipment Preparers	76	Supply Gap	0	No Programs	CIP 51.0808	No Programs	0
				Sterile Processing Technology/Technician	CIP 51.1012	No Programs	0
Opticians, Dispensing	75	Supply Gap	11	No Programs	CIP 51.1012	No Programs	0
				Opticianry/Ophthalmic Dispensing Optician	CIP 51.1801	American Career College-Anaheim	11
Psychiatric Technicians	62	Supply Met	72	Psychiatric Technician	1239.00	Cypress	62
				Psychiatric/Mental Health Services Technician	CIP 51.1502	InterCoast Colleges-Santa Ana	10
Community Health Workers	57	Oversupply	215	Health and Wellness, General	CIP 51.1001	University of Phoenix-California	0
				Health Occupations, General*	1201.00	Cypress	3
						Orange Coast	4
						Saddleback	208
				Community Health Care Worker	1261.00	Already accounted for	0
				Human Services	2104.00	Already accounted for	0
				Alcohol and Controlled Substances	2104.40	Already accounted for	0
				Substance Abuse/Addiction Counseling	CIP 51.1501	Already accounted for	0
Disability Services	2104.50	Already accounted for	0				

DEMAND AND SUPPLY DATA FOR TOP ICT AND DIGITAL MEDIA MIDDLE-SKILL JOBS IN ORANGE COUNTY

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)	
Computer User Support Specialists	588	Supply Gap	90	Computer Infrastructure and Support	0708.00	Coastline	54	
						Cypress	2	
						Orange Coast	2	
				Computer Support	CIP 11.1006	Southern California Institute of Technology	22	
						University of Phoenix-California	1	
						0708.20	Cypress	3
							Santa Ana	6
CIP 11.1006	Already Accounted For	0						
Computer Occupations, All Other	472	Supply Gap	289	Information Technology, General	CIP 11.0101	Brandman University	22	
						California University of Management and Sciences	78	
						Chapman University	10	
						University of California-Irvine	14	
						Vanguard University of Southern California	0	
				Computer Information Systems	0702.00	Cypress	6	
						Fullerton	15	
						Irvine	1	
						Orange Coast	3	
						Santa Ana	4	
						Santiago Canyon	3	
				CIP 11.0101	Already Accounted For	0		
				Computer Programming	0707.10	Cypress	20	
						Fullerton	15	
						Irvine	7	
Orange Coast	72							
Santa Ana	5							
Santiago Canyon	14							
Network and Computer Systems Administrators	209	Supply Met	202	Information Technology, General	CIP 11.0101	Already Accounted For	0	
				Computer Information Systems	0702.00	Already Accounted For	0	
					CIP 11.0101	Already Accounted For	0	

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Computer Infrastructure and Support	0708.00	Already Accounted For	0
					CIP 11.1006	Already Accounted For	0
				Computer Networking	0708.10	Coastline	36
						Cypress	67
						Irvine	15
						Saddleback	15
						Santa Ana	11
				CIP 11.1001	California Intercontinental University	1	
				CIP 11.1001	University of Phoenix-California	8	
				CIP 11.1003	University of Phoenix-California	49	
Computer Support	0708.20	Already Accounted For	0				
World Wide Web Administration	0709.00	Saddleback	0				
	11.1003	Already Accounted For	0				
Web Developers and Digital Interface Designers	204	Supply Gap	138	Digital Media	0614.00	Coastline	1
						Golden West	9
						Irvine	8
						Santa Ana	0
					CIP 09.0702	University of Phoenix-California	1
				Website Design and Development	0614.30	Coastline	1
						Fullerton	1
						Irvine	1
						Orange Coast	3
						Saddleback	4
						Santa Ana	1
				CIP 11.0801	University of Phoenix-California	1	
				Information Technology, General	CIP 11.0101	Already Accounted For	0
Computer Information Systems	0702.00	Already Accounted For	0				
	CIP 11.0101	Already Accounted For	0				
Software Applications	0702.10	Coastline	7				

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)	
					CIP 11.0801	Irvine	36	
						Saddleback	5	
						Already Accounted For	0	
				Computer Software Development	0707.00	Cypress	1	
						Golden West	3	
						Orange Coast	5	
						Saddleback	6	
				Computer Programming	CIP 11.0201	Platt College-Anaheim	3	
						University of Phoenix-California	25	
				World Wide Web Administration	CIP 11.1004	0707.10	Already Accounted For	0
						CIP 11.0201	Already Accounted For	0
				E-Commerce (Technology emphasis)	CIP 11.0801	0709.00	Already Accounted For	0
						CIP 11.1004	University of Phoenix-California	2
				Applied Design	CIP 50.0409	0709.10	Saddleback	2
						CIP 11.0801	Already Accounted For	0
Graphic Art and Design	CIP 50.0409	1009.00	Already Accounted For	0				
		1030.00	Already Accounted For	0				
Telecommunications Equipment Installers and Repairers, Except Line Installers	163	Supply Gap	0	Telecommunications Technology	0934.30	No Programs	0	
Computer Network Support Specialists	127	Supply Gap	39	Information Technology, General	CIP 11.0201	Already Accounted For	0	
				Computer Information Systems	0702.00	Already Accounted For	0	
					CIP 11.0501	University of Phoenix-California	2	
				Computer Software Development	0707.00	Already Accounted For	0	
					CIP 11.0201	Already Accounted For	0	
				Computer Programming	0707.10	Already Accounted For	0	
					CIP 11.0201	Already Accounted For	0	
				Computer System Analysis	CIP 11.0501	Already Accounted For	0	
0707.30	Cypress	3						
				0708.00	Already Accounted For	0		

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)				
				Computer Infrastructure and Support	CIP 11.0901	University of California-Irvine	18				
						University of Phoenix-California	16				
					CIP 11.1001	Already Accounted For	0				
					CIP 11.1003	Already Accounted For	0				
								Computer Support	0708.20	Already Accounted For	0
							CIP 11.1003		Already Accounted For	0	
							CIP 11.1006		Already Accounted For	0	
								World Wide Web Administration	0709.00	Already Accounted For	0
							CIP 11.1003		Already Accounted For	0	
				Computer Network Architects	104		282	Information Technology, General	11.0101	Already Accounted For	0
Computer Information Systems	0702.00	Already Accounted For	0								
	CIP 11.0101	Already Accounted For	0								
	CIP 11.0103	Bethesda University	0								
		California Intercontinental University	0								
		California State University-Fullerton	63								
		Platt College-Anaheim	4								
		Stanbridge University	8								
		Trident University International	163								
	University of Phoenix-California	44									
	CIP 11.0501	Already Accounted For	0								
Computer Programming	0707.10	Already Accounted For	0								
	CIP 11.0501	Already Accounted For	0								
Computer System Analysis	0707.30	Already Accounted For	0								
	CIP 11.0501	Already Accounted For	0								
Computer Infrastructure and Support	0708.00	Already Accounted For	0								
	CIP 11.0901	Already Accounted For	0								
	CIP 11.1001	Already Accounted For	0								
	CIP 11.1003	Already Accounted For	0								
Computer Networking	0708.10	Already Accounted For	0								

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
					CIP 11.0901	Already Accounted For	0
					CIP 11.1001	Already Accounted For	0
					CIP 11.1003	Already Accounted For	0
				Computer Support	0708.20	Already Accounted For	0
					CIP 11.1003	Already Accounted For	0
				World Wide Web Administration	0709.00	Already Accounted For	0
CIP 11.1003	Already Accounted For	0					
Producers and Directors	103	Oversupply	740	Radio and Television	0604.00	Fullerton	2
						Saddleback	127
						Santa Ana	2
						Santiago Canyon	1
				CIP 09.0701	California State University-Fullerton	190	
					The Academy of Radio and TV Broadcasting	23	
				Radio	0604.10	Fullerton	6
						Saddleback	0
				CIP 09.0701	Already Accounted For		0
					Television	0604.20	Cypress
				Fullerton			44
				Orange Coast			21
				Saddleback			3
				Santa Ana			14
				CIP 09.0701	Already Accounted For		0
				Film Production	0612.20	Orange Coast	48
Saddleback	7						
CIP 50.0602	Chapman University		229				
Technical Theater	1006.00	Cypress	3				
		Fullerton	8				
		Golden West	0				
		Irvine	3				
		Orange Coast	0				
Saddleback	1						

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)	
						Santa Ana	2	
Commercial and Industrial Designers	54	Oversupply	174	Drafting Technology	0953.00	Fullerton	7	
					0953.00	Golden West	28	
					0953.00	Irvine	4	
					0953.00	Saddleback	1	
					0953.00	Santa Ana	21	
					50.0404	California State University-Fullerton	42	
				Manufacturing and Industrial Technology	0956.00	CIP 50.0404	Fullerton	19
							Irvine	1
							Saddleback	9
							Santa Ana	1
							Santiago Canyon	26
				Applied Design	CIP 50.0401	Bethesda University	1	
				Commercial Art	1013.00	CIP 50.0401	Cypress	1
							Fullerton	5
Orange Coast	5							
Santa Ana	3							
Surveying and Mapping Technicians	53	Supply Met	60	Surveying	0957.30	Santiago Canyon	52	
				Geographic Information Systems	2206.10	Cypress	8	

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Graphic Designers	361	Supply Gap	188	Digital Media	0614.00	Already Accounted For	0
				Website Design and Development	0614.30	Already Accounted For	0
						CIP 11.0801	Already Accounted For
				Computer Graphics and Digital Imagery	0614.60	Coastline	3
						Cypress	4
						Fullerton	1
						North Orange Adult	5
						Orange Coast	32
						Saddleback	5
						Santa Ana	5
					CIP 11.0803	University of California-Irvine	0
				Software Applications	0702.10	Already Accounted For	0
					CIP 11.0801	Already Accounted For	0
				E-Commerce (Technology emphasis)	0709.10	Already Accounted For	0
					CIP 11.0801	Already Accounted For	0
				Drafting Technology	0953.00	Already Accounted For	0
					CIP 50.0404	Already Accounted For	0
				Manufacturing and Industrial Technology	0956.00	Already Accounted For	0
					CIP 50.0404	Already Accounted For	0
				Applied Design	CIP 50.0401	Already Accounted For	0
Commercial Art	CIP 1013.00	Already Accounted For	0				
Graphic Art and Design	1030.00	Fullerton	13				
		Golden West	37				
		Irvine	6				
		Saddleback	17				
		Santa Ana	3				
		Santiago Canyon	5				
		Chapman University	20				
		CIP 50.0409	Concordia University-Irvine	9			

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)				
						Laguna College of Art and Design	23				
Data Entry Keyers	211	Oversupply	407	Office Technology/Office Computer Applications	0514.00	Coastline	13				
						Cypress	14				
						Golden West	3				
						Irvine	16				
						North Orange Adult	66				
						Saddleback	9				
						Santa Ana	172				
				Santiago Canyon	114						
				Software Applications	0702.10	Already Accounted For	0				
Interpreters and Translators	116	Supply Gap	42	Sign Language Interpreting	0850.10	Golden West	32				
						Saddleback	9				
				Santiago Canyon	0						
				Legal and Community Interpretation	2140.00	Santa Ana	1				
Audio and Video Technicians	93	Supply Met	93	Commercial Music	1005.00	Cypress	14				
						Fullerton	6				
						Irvine	1				
						Orange Coast	6				
						Saddleback	10				
				Santa Ana	6						
				Applied Photography	1012.00	Cypress	6				
Applied Photography	1012.00	Fullerton	17								
Applied Photography	1012.00	Orange Coast	27								
Special Effects Artists and Animators	79	Supply Met	100	Digital Media	0614.00	Already Accounted For	0				
				Multimedia	0614.10	Cypress	0				
						Orange Coast	1				
						Santiago Canyon	7				
									CIP 10.0304	Chapman University	0
										Laguna College of Art and Design	23
								Electronic Game Design	0614.20	Golden West	2
					CIP 50.0411	Chapman University	1				

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
						Laguna College of Art and Design	31
						University of California-Irvine	1
				Website Design and Development	0614.30	Already Accounted For	0
					CIP 11.0801	Already Accounted For	0
				Animation	0614.40	Cypress	3
						Fullerton	1
						Irvine	1
						Orange Coast	0
						Santa Ana	6
					CIP 10.0304	Chapman University	0
				Software Applications	0702.10	Already Accounted For	0
					CIP 11.0801	Already Accounted For	0
				E-Commerce (Technology emphasis)	0709.10	Already Accounted For	0
					CIP 11.0801	Already Accounted For	0
				Graphic Art and Design	1030.00	Already Accounted For	0
					CIP 50.0409	Already Accounted For	0

DEMAND AND SUPPLY DATA FOR TOP LIFE SCIENCES AND BIOTECHNOLOGY MIDDLE-SKILL JOBS IN ORANGE COUNTY

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Medical Equipment Repairers	76	Oversupply	117	Biotechnology and Biomedical Technology	0430.00	Fullerton	13
					0430.00	Irvine	23
					0430.00	Santa Ana	11
					0430.00	Santiago Canyon	6
				Biotechnology and Biomedical Technology	CIP 15.0401	Southern California Institute of Technology	64
				Biomedical Instrumentation	CIP 15.0401	Already Accounted For	0
Forensic Science Technicians	28	Supply Gap	0	No Programs	No Programs	No Programs	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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Inspectors, Testers, Sorters, Samplers, and Weighers	796	Supply Gap	1	Industrial Quality Control	0956.80	Santiago Canyon	1
					CIP 15.0702	California Intercontinental University	0
Life, Physical, and Social Science Technicians, All Other	134	Supply Gap	0	No Programs	No Programs	No Programs	0
Ophthalmic Laboratory Technicians	93	Supply Gap	0	No Programs	No Programs	No Programs	0
Chemical Technicians	66	Supply Gap	0	No Programs	No Programs	No Programs	0
Biological Technicians	65	Supply Gap	0	Biotechnology and Biomedical Technology	0430.00	Already Accounted For	0
Chemical Equipment Operators and Tenders	44	Supply Gap	0	No Programs	No Programs	No Programs	0
Social Science Research Assistants	31	Supply Gap	0	No Programs	No Programs	No Programs	0
Chemical Plant and System Operators	29	Supply Gap	0	No Programs	No Programs	No Programs	0

DEMAND AND SUPPLY DATA FOR TOP RETAIL, HOSPITALITY, AND TOURISM MIDDLE-SKILL JOBS IN ORANGE COUNTY

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
Fashion Designers	76	Supply Met	98	Fashion	1303.00	Fullerton	1
						Saddleback	1
						Santa Ana	9
				Fashion Design	1303.10	Fullerton	5
						Orange Coast	9
						Saddleback	14
				Fashion Merchandising	1303.20	Santa Ana	10
						Fullerton	8
						Orange Coast	18
				Fashion Production	1303.30	Saddleback	9
						Santa Ana	2
						Fullerton	1
						Orange Coast	9
						Santa Ana	2

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

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
First-Line Supervisors of Retail Sales Workers	1,244	Supply Gap	11	Retail Store Operations and Management	0506.50	Coastline	2
						Golden West	1
						Orange Coast	1
				Retail Store Operations and Management	0506.50	Santa Ana	1
						Orange Coast	6
				Sales and Salesmanship	0509.40	Santa Ana	0
				Display	0509.60	Orange Coast	0
E-Commerce/Electronic Commerce	CIP 52.0208	University of Phoenix-California	0				
First-Line Supervisors of Food Preparation and Serving Workers	1,064	Supply Gap	303	Nutrition, Foods, and Culinary Arts	1306.00	Cypress	1
						Fullerton	8
						Orange Coast	16
						Saddleback	23
						Santa Ana	3
				Dietetic Services and Management	1306.20	Orange Coast	6
				Culinary Arts	1306.30	Cypress	86
						Orange Coast	84
						Saddleback	27
Santiago Canyon	49						
Restaurant and Food Services and Management	1307.10	Cypress	55				
Exercise Trainers and Group Fitness Instructors	806	Supply Gap	498	Fitness Trainer	0835.20	Cypress	0
						Fullerton	3
						Irvine	7
						Orange Coast	16
						Santa Ana	1
				Coaching	0835.60	Cypress	2
						Fullerton	1
						Irvine	0
						Saddleback	0

OCCUPATIONAL TITLE	AVERAGE ANNUAL OPENINGS (2020-2025)	SUPPLY GAP/ SUPPLY MET/ OVERSUPPLY	AVERAGE ANNUAL AWARDS (2017-2020)	TOP6 TITLE	TOP6 OR CIP	COLLEGE	COLLEGE SUPPLY (3-YR AVG)
				Sport and Fitness Administration/Management	CIP 31.0504	Concordia University-Irvine	468
Recreation Workers	786	Supply Gap	0	No Programs	CIP 31.0504	No Programs	0
				Outdoor Education	CIP 31.0601	No Programs	0
Food Service Managers	409	Supply Gap	22	Dietetic Services and Management	1306.20	Already accounted for	0
				Hospitality	1307.00	Cypress	13
						Orange Coast	6
				Hospitality Administration/Management, General	CIP 52.0901	University of Phoenix-California	3
				Restaurant and Food Services and Management	1307.10	Already accounted for	0
First-Line Supervisors of Personal Service and Entertainment and Recreation Workers, Except Gambling Services	193	Supply Gap	0	Restaurant and Food Services and Management	1307.10	No Programs	0
				Restaurant and Food Services and Management	1307.10	No Programs	0
Chefs and Head Cooks	192	Supply Gap	0	Nutrition, Foods, and Culinary Arts	1306.00	Already accounted for	0
				Culinary Arts	1306.30	Already accounted for	0
Travel Agents	95	Supply Gap	26	Sales and Salesmanship	0509.40	Already accounted for	0
				Travel Services and Tourism	3009.00	Cypress	14
						Orange Coast	4
						Saddleback	8
Tour and Travel Guides	79	Supply Gap	0	Travel Services and Tourism	3009.00	Already accounted for	0
Actors	76	Supply Gap	0	Travel Services and Tourism	3009.00	No Programs	0
Reservation and Transportation Ticket Agents and Travel Clerks	54	Supply Gap	0	Travel Services and Tourism	3009.00	No Programs	0