



CENTER FOR A COMPETITIVE WORKFORCE

L.A. & ORANGE COUNTIES  
COMMUNITY COLLEGES:

# Powering Economic Opportunity



October 2017



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**Center for a Competitive Workforce**, housed at the Los Angeles County Economic Development Corporation (LAEDC), is a partnership of the 19 L.A. region community colleges in the L.A. | O.C. Regional Consortium, LAEDC, Los Angeles Area Chamber of Commerce, Southern California Leadership Council, and the Center of Excellence for Labor Market Research at Mt. San Antonio College. The Center’s mission is to better align supply and demand data with labor market information, support industry-driven career education and workforce development programs, and strengthen industry engagement across our region’s talent development systems with the goal to train, educate and upskill a more competitive workforce in L.A. County for the knowledge-intensive industries that will come to dominate our economic future. This work will also address the talent gaps some employers face, and help balance the supply of skilled graduates with the projected demand of local employers, a balance which helps both job-seekers and local firms.

Learn more at [www.CompetitiveWorkforce.LA](http://www.CompetitiveWorkforce.LA)

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## Founding Partners



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# 1 Introduction

**T**his report is the product of a collaboration between the Los Angeles County Economic Development Corporation (LAEDC) and the Center for a Competitive Workforce (the “Center”), which was launched with funding from L.A. County’s 19 community colleges in partnership with the LAEDC, Los Angeles Area Chamber of Commerce, Southern California Leadership Council, the LA/OC Center of Excellence for Labor Market Research, and JPMorgan Chase.

The goal of this report is to pinpoint select “target” industries and middle-skill occupations that will drive the regional economy, contributing to increased prosperity and improved standards of living for the residents in the economic region encompassed by Los Angeles and Orange counties (hereafter referred to as the “Los Angeles Basin” or “L.A. Basin”).

The report’s sections will address:

- The demand for labor in the L.A. Basin;
- The five-year detailed industry employment forecast for the L.A. Basin;
- A roadmap to target industries and occupations for the L.A. Basin; and
- An analysis of the regional community college supply of students to fill target occupations in industries of importance in the region.

This report establishes the first phase of the Center’s mission to support “systems change” across the L.A. Basin. With data from this report serving as a baseline, further primary firm-level research and input will inform the development of career education (CE), workforce and job training programs that are better aligned with and related to the region’s growing industries and occupations.

Lastly, the talent development institutions and firms from the L.A. Basin’s target industries will be formally connected for the purpose of building industry-specific education and training programs and to create ongoing, permanent relationships that result in work-based learning opportunities (employment, internships) for the region’s residents, to promote career opportunity while addressing the skills needs of our region’s employers.

## Economic and Labor Market Transition

The L.A. Basin, like much of the rest of the United States, is transitioning in many significant ways:

- from an economy which has been characterized by labor being the primary factor of production, to an information age, digital economy, where intellectual property, capital and knowledge are increasingly the primary factors;
- from traditional career paradigms to new work models such as part-time work and self-employment in the so-called “gig economy;” and
- from traditional ways of doing business to a new, technology-oriented workplace requiring vastly different skillsets and types of thinking.

Automation and robotics, along with artificial intelligence (AI) and machine learning all have the potential to displace a significant percentage of the region’s jobs while dramatically changing many others as the disintermediation of supply chains accelerates and the disaggregation of job functions continues, with the skilled tasks of a job becoming increasingly more skilled, and thus more highly rewarded, and the lower skilled, more routine activities of a job becoming automated.

E-commerce and mobile apps have already disrupted a variety of industries, from new transportation innovations, such as combining the global positioning system (GPS) and a smart phone to beget Uber and Lyft, to “brick-and-mortar” retail having to adapt to Amazon’s business model, scale and speed in order to survive. Undoubtedly, many other industries will be similarly affected in the near future.

Finally, global interconnectivity means that industries, firms, workers, students, governments, labor unions, and educational and training institutions must also quickly adapt their traditional ways of doing business to be more connected, future-forward, flexible, quickly scalable, and globally-focused in order to survive – and thrive – in the 21st century economy.

## The L.A. Basin's Talent Challenge

In this new innovation-intensive environment, economic development, education and training success will be shaped increasingly by the nature and composition of the region's industries, their associated labor markets, and the value placed on their workers.

Fortunately, the L.A. Basin has several unique advantages that will serve as a strong foundation for success in economic and employment growth, even in a rapidly changing economic climate. The region, for instance, is home to and has several key competitive advantages, such as supplier specializations and labor market pooling, in a diverse set of world-class, export-oriented industry clusters, including: aerospace vehicles and defense; entertainment; information technology and analytical instruments; biopharmaceuticals and medical device manufacturing; professional and technical services; and trade, transportation and logistics, which provide jobs and upward mobility for residents across the skills and education scale.

Additional emerging L.A. Basin growth industries not yet well-tracked by standard industry classification systems, but which have the potential to dramatically change the region's economy include fields such as advanced transportation, digital media and big data analytics.

These regionally-concentrated traded industry clusters and emerging fields will fuel future job growth, both in their own sectors and in the wider economy due to the spillover or multiplier effects, and are projected to create large numbers of high-skill, high-paying jobs with significant opportunities for career advancement.

The L.A. Basin's reservoir of educational institutions and deep talent pools provide another significant advantage, as success in the 21st century labor market requires higher levels of educational attainment and more specialized and in-demand skills than ever before.

A region's available supply of skilled talent is one of the foremost determinants of whether a business comes to and ultimately remains in a market. Thus, the L.A. Basin's skilled, educated workforce will help it attract and retain businesses, contributing to the growth of strong industry clusters and boosting overall economic activity.

Alongside these advantages, however, the Los Angeles Basin also has several significant vulnerabilities that could potentially hurt its labor market.

Most importantly, the current economic transformation coincides with a major, long-term demographic change in the region: aging in place. The region's median age increased from 33 in 2000 to 37 in 2016, with residents aged 55 and older now making up more than a quarter of the region's population. The region's aging will continue to accelerate for the next few decades.

While the region currently has two working-age adults for every dependent resident (aged 17 and younger or 65 and older), this ratio will fall to 1:1 by 2040. The number of residents aged 65 and older will more than double by 2060, becoming the region's single largest age group.

This trend is predicted to affect the Los Angeles Basin much more than other neighboring counties. Simply put, the region's shrinking working-age population will make it much more difficult for employers to find qualified job candidates.

In addition, the United States as a whole continues to suffer from a skills gap—a mismatch between the skills employers need and those possessed by job candidates—that could significantly constrain future workforce development. This trend could potentially affect the region in several ways, perhaps most significantly by affecting the conditions for innovation and limiting the growth of its emerging industries.

**The goal of this report is to pinpoint select “target” industries and middle-skill occupations that will drive the regional economy, contributing to increased prosperity and improved standards of living.**



Target industry clusters such as information technology (IT), biopharmaceuticals and medical devices depend on workers with highly specialized skillsets. A lack of workers with relevant skills could make the region a less attractive business environment for important growth industries.

The region's lack of affordable workforce housing is another vulnerability, as its housing market is one of the most expensive in the nation and has already pushed many recent millennial graduates to more affordable areas. If left unchecked, this trend could grow into a serious "brain drain" of young talent that could hurt a variety of innovation-intensive industries. While the region's concentrated set of industry clusters pay higher-than-average salaries that help offset a high cost-of-living, many area residents struggle to afford high housing and rental costs.

Finally, the region's recent economic rebound and strong job growth do not tell the whole story because many of the new jobs being created are low-wage, low-skill, highly-routine positions that are vulnerable to automation and without significant opportunities for career advancement. Indeed, the fastest growing occupations in the region include: waiters and waitresses; retail salespeople; home health care workers; cashiers; and food preparation and other food service sector jobs. Few of these jobs provide pathways out of poverty into the middle class. Furthermore, many of the region's low-wage, low-skill positions are part time as opposed to full time, which reflects an important shift in the labor market.

A variety of factors have encouraged employers in many industries—notably IT, education, retail and hospitality—to shift employment from full-time to part-time positions, forcing many workers to hold several part-time jobs in order to make ends meet. The "gig economy" also plays a key role in a major job market shift from full-time employment to self-employment, part-time and freelance work. Gig economy services such as Lyft, Uber, Airbnb and others have become increasingly important ways for workers to supplement their income.

These shifts may force many workers—especially if they are self-employed or working part-time or non-traditional jobs—to reconsider traditional expectations about jobs.

## Economic Opportunities

The L.A. Basin's regional education, workforce development and training stakeholders have the resources and ability to address these problems, but will have to work together more closely than ever before with industry on potential strategies.

Today's stakeholders have the opportunity to collaborate on innovative solutions to the most pressing issues facing the region. The skills gap, for example, can only be closed by more cooperation between educators and employers to ensure programs, curricula and stackable certificates reflect the in-demand skills and knowledge that students will need in the industries and occupations of the future.

Education increasingly involves collaboration between educators and private sector stakeholders, reflecting a growing need for internships and other hands-on, practical ways to gain relevant workplace skills.

This is especially important because educational attainment correlates with higher lifetime earnings and, looking to the future, with lower vulnerability to automation. As a result, there is a need for expanded access to education and workforce training programs that develop relevant, non-automatable skills.

Expanding access to educational and workforce training programs for underserved residents could create major benefits for the region's economy and labor force as a whole. A larger supply of job candidates with relevant, in-demand skills, for example, could go a long way towards closing the skills gap. Stakeholders can best accomplish this by focusing on the specific needs of individual groups.

Future economic prosperity will depend on stakeholders treating the rapidly changing economy not as a problem to be solved, but as an opportunity to further increase economic productivity and quality of life.

Major shifts in the job market offer education and workforce professionals, employers and other stakeholders a rare opportunity to reinvent the region's education and workforce system, and spur innovation in both emerging and traditional industries, by leveraging college and university basic and applied research, industry-driven research and development (R&D), and technology-transfer of commercially viable products and services.

## Today's stakeholders have the opportunity to collaborate on innovative solutions to the most pressing issues facing the region.

Working toward aligning programs and curricula with the skills and knowledge needed in the regional labor market could have major benefits for both sides of this education-industry partnership.

The skills gap itself, often thought of as a serious and growing problem, offers a potential way forward for the region's workers, especially those from disadvantaged backgrounds. Many of the industries hardest hit by the skills gap offer high wages and significant career advancement opportunities. Educational and training programs designed to develop these skills in students and young professionals could have significant benefits for both disadvantaged communities and employers in high-growth industries.

Recent technological advances also could lead to significant growth, in some cases by creating entirely new industries and occupations that we don't even know about today, whether through cross-industry or inter-industry convergence, such as the highly touted convergence between manufacturing, medicine and media, or by recombining older products and technologies into new and more productive uses and possibilities through their intersection, such as new biology-based processes.

The rise of "Big Data," for example, has fueled the creation of new occupations such as "Business Intelligence Analyst," one of the hottest areas of the job categories in the region. Technological development has also transformed manufacturing-based industries, which directly support approximately 500,000 jobs throughout the region, as the advanced manufacturing industry offers an important case study in how new technologies in hardware and software can revitalize an entire sector of our economy.

## Conclusion

The global economy's rapid transformation creates both challenges and opportunities for the Los Angeles Basin.

In this period of transition, only a deep talent pool with a strong set of non-automatable skills will allow the region to grow its major industry clusters and capitalize on other productive advantages vis-à-vis other economic regions and nations.

This talent pool, in turn, can only be created through a greater understanding of the regional economy and where it is heading, and by embracing industry-driven and future-forward strategies to build the region's education and workforce training systems for the economy of tomorrow.

Collaboration among stakeholders can foster an agile, nimble education and workforce training system that responds to the ever-changing labor market needs of industry in real time.

All that this requires is a willingness to work together to rethink conventional wisdom and address emerging challenges and future opportunities.

— **Written by Wallace Walrod, Ph.D., Chief Economic Advisor, Orange County Business Council (OCBC) and David Flaks, President & COO, Los Angeles County Economic Development Corporation (LAEDC)**

## 2 Resident Snapshot: Los Angeles Basin

### Population Size

The Los Angeles Basin has a massive population base of more than 13 million residents. Over the last decade, population growth dramatically slowed compared to the pace of growth over the previous 40 years as the amount of migrants entering the region dwindled.

For various reasons, including the region's high cost of living, population growth forecasts call for continued slow growth over the next decade and beyond. The California Department of Finance projects the population will grow by 0.5 percent annually in the region over the next decade, and will slow even further through 2060.

### Race and Ethnicity

A defining feature of the region is the ethnic and cultural diversity of its population. Latinos and Hispanics, who account for nearly half of the region's total population, are the largest ethnic group in the region.

White, not Hispanic or Latino, residents account for the majority of residents within Orange County and comprise 30 percent of the Los Angeles Basin's population.

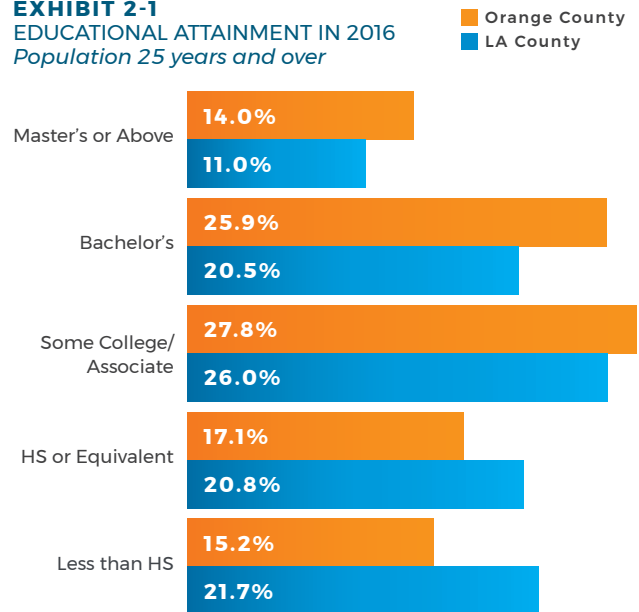
However, the region's diversity is best exemplified by the presence of numerous small racial and ethnic groups that are far less represented in the rest of the nation, including Japanese, Filipino, Vietnamese, Korean and Indian residents of the Los Angeles Basin.

### Language

Along with its cultural diversity, many residents in the Los Angeles Basin primarily speak a language other than English at home.

The inability to speak English less than "very well" (as defined by the U.S. Census Bureau), which is classified as "Limited English Proficient" (LEP), is a language barrier that affects employability and wage-earning potential, as workers who are LEP may face obstacles finding employment at or succeeding in establishments where English is preferred.

**EXHIBIT 2-1**  
EDUCATIONAL ATTAINMENT IN 2016  
Population 25 years and over



Source: 2016 ACS 1-year estimates

### Educational Attainment

Educational attainment levels are varied across the Los Angeles Basin (Exhibit 2-1). Orange County has an especially well-educated population with almost 40 percent of its residents aged 25 and older holding at least a bachelor's degree. On the other side of the educational attainment spectrum, more than 41 percent and 32 percent of Los Angeles and Orange County residents, respectively, have only a high school education or less. These are the residents who need the most attention in this transitioning economy, which, as stated earlier, rewards higher levels of education and skills attainment.



# 3 Economic Environment: Los Angeles Basin

## Economic Snapshot

The Los Angeles Basin is the largest metropolitan area on the West Coast. Although primarily known for its motion picture, aerospace and fashion industries, the region comprises a much more diverse economy. The high-tech, trade, biomedical and hospitality industries have strong presences, as do professional and technical services.

The lingering effects of the 2009 economic recession are still impacting many residents, however economic and job growth conditions have greatly improved in recent years with the region at or approaching so-called “full employment.”

Los Angeles County’s unemployment rate declined to 4.5 percent in July 2017, on par with the nation. Orange County’s unemployment rate fell to 4 percent in the same period. While the probability of an economic recession remains low over the next two years with the fundamentals underlying the region’s thriving economy remaining intact, growth is, however, projected to decelerate.

As described earlier, not all of the current job news is good, as many of the new jobs being created are part-time and lower-skill occupations, such as food preparation and home health care services, that provide relatively few pathways into the middle class.

Another potential challenge is a shortage of workers in the region. Regionally, the difficulty employers are experiencing in hiring workers is beginning to impact wages. While average annual wages in the Los Angeles Basin grew by less than 2 percent per year from 2010 to 2014, wage increases have accelerated in more recent years. From 2014 to 2016, average annual wages have grown by nearly 3 percent, and national figures suggest 2017 will be another strong year for wage growth<sup>1</sup>.

Nevertheless, many in the region’s workforce face more obstacles finding employment than their counterparts elsewhere in the nation. As of July 2017, an estimated 100,000 residents had not held a job in over 26 weeks, representing 33 percent of unemployed residents in the region compared to the national rate of 26 percent.

Taking these two economic trends together: a shortage of workers and a large number of long-term unemployed workers in the region, suggests a skills gap between the talent that local employers need and the talent that is available in the region.

## Industry Forecasting

The LAEDC used an economic forecast model to determine the five-year demand by occupation for workers in the Los Angeles Basin (Exhibit 3-1).

The model first projects employment by industry, which is then used to calculate the type of workers by occupation needed by the businesses in those industries throughout the regional economy.

The five-year forecast takes into account the business cycle and forthcoming structural changes, such as public policy, legal decisions, and technological innovation, since fundamentals in the short run and long run will affect employment in coming years. A qualitative analysis by industry is provided to illuminate the concepts that influence the economic forecast model.

### 3.1 Prominent Growth Industries

Using the economic forecast model, four industries were identified that have grown at healthy rates over the last 10 years and that are projected to significantly expand over the next three to five years.

**EXHIBIT 3-1**  
LOS ANGELES BASIN EMPLOYMENT 2016 TO 2021F

	2016 (000s)	2006 to 2016 Change	2016 to 2021 Forecast
<b>Health Care (Public and Private)</b>	887.4	36.8%	6.2%
<b>Accommodations and Food Services</b>	585.0	29.1%	6.6%
<b>Professional, Scientific and Technical Services</b>	411.1	9.8%	5.7%
<b>Other Services</b>	193.9	8.8%	5.8%
<b>Total L.A. Basin</b>	<b>5,910.1</b>	<b>4.1%</b>	<b>3.8%</b>

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

<sup>1</sup>Various surveys suggest that wages throughout the nation are continuing to grow in 2017, such as the Bureau of Labor Statistics, Employment Cost Index, June 2017.

#### Health Care and Social Assistance

Health care and social assistance is the region's largest industry by employment with 887,400 jobs in 2016, across both private and public establishments.

Job growth in health care and social assistance over the last ten years increased at a vigorous pace: 37 percent, even while overall economic growth receded. This indicates that the demand for health care and social assistance workers is more closely tied to an aging population than to the economic cycle.

It is possible that policy changes, such as the potential removal or modification of the Affordable Care Act, could impact the structure of the industry. However, these policy changes will have less impact on the demand and supply of workers than the region's aging population.

Based on projections developed by the California Department of Finance, the number of residents aged 65 and older in the region will grow at an annual rate of about 4 percent through 2025. This is much faster than the annual rate of 0.5 percent for the overall population.

As increasing numbers of "baby boomers" retire (with "Generation X" not far behind), the health care and social assistance industry will need to keep pace with the needs of the region's aging population.

**The number of health care and social assistance jobs in the L.A. Basin is expected to expand by 6 percent over the next five years.**

#### Accommodation and Food Services

Local establishments in the accommodation and food services industry cater to tourists and the 22 million residents living across the six-county Southern California region.

The demand for accommodation and food services has been growing throughout the economic recovery and expansion. The region has experienced particularly robust growth in tourism over the last five years.

Some local regulations have impacted the accommodation and food services industry. In Los Angeles, the citywide minimum wage was raised recently and will remain above the state-imposed minimum wage, affecting businesses in food services which employ a large share of workers earning minimum or near minimum wages. Additionally, some hotels in the City of Los Angeles must now adhere to a minimum wage that is nearly 30 percent above the citywide minimum wage.

Disruptive forces are also greatly impacting the industry, as new forms of accommodations are increasing consumer demand in the form of short-term rentals. While short-term rentals have existed for many years, many new households are renting their homes through companies like Airbnb and HomeAway. While these services may encourage new tourists to visit the region, there are some tourists visiting the region who would have otherwise patronized traditional hotel accommodations. Moreover, travelers are increasingly turning to their mobile devices for information about the region that hotel concierge services traditionally provided.

Like almost every industry, local food service establishments have been impacted by the increased reliance on mobile devices, as a growing number of food service establishments are adopting mobile platforms and tablets to facilitate order taking and collect payments.

Unfortunately, the food service industry is also ripe for AI, robots and automation to displace human workers. For example, a number of fast-food restaurant brands, such as McDonalds and Taco Bell, have already begun to set up and roll out automated kiosks. This trend is expected to greatly accelerate over the next decade.

To date, these changes in the industry have impacted the tasks and responsibilities that workers have been traditionally assigned, without impacting employment.

**Demand for workers in the accommodation and food service industry is projected to increase, but at a more moderate pace, expanding by nearly 7 percent over the next five years.**

### Professional, Scientific and Technical Services

The Los Angeles Basin remains a wide-ranging and leading hub of professional, scientific and technical services that serve businesses and consumers locally, nationally and globally.

For example, law firms based in the region not only serve local residents, but also export their services, representing clients across the nation and the world. Architectural and engineering firms help design buildings, bridges, road and water infrastructure, and renewable energy projects in Southern California, as well as across the United States and overseas. Likewise, scientific research firms conduct experiments and develop pharmaceuticals and new technologies that have worldwide implications.

Similar to other highly specialized industries, one major factor limiting job growth in the L.A. Basin’s professional, scientific and technical services industry has been the availability of qualified workers. Businesses have adopted various policies to retain local workers, such as telecommuting and flexible schedules, and to attract new ones, both locally and outside of the region and country. Altogether, there are 411,100 workers employed in the professional, scientific and technical services industry in the Los Angeles Basin (2016). Employment in this high-wage industry grew by nearly 10 percent over the last 10 years and is poised for further growth due to an expanding global economy.

**Regional employment in the professional, scientific and technical services industry is projected to expand by nearly 6 percent over the next five years.**

### Other Services

In 2016, 193,900 workers were employed in the “other services” industry in the Los Angeles Basin. Establishments in this industry include: private households, repair and maintenance businesses, and personal care and laundry services. The spectrum of services provided by this industry is broad; yet, when aggregated, the industry’s employment grew by nearly 9 percent from 2006 to 2016.

Job growth is attributable to increasing demand for services that simplify daily life, which also has contributed to the rise of the gig economy.

Services provided by nail salons, tanning salons, massage parlors, tattoo parlors, barbershops and pet care providers also have expanded over the last five years.

Not surprisingly, technological innovation is disrupting the other services industry, as many personal care service establishments have begun to use and rely on web-based, social media and mobile solutions to overcome certain start-up challenges and processes that used to bedevil businesses in previous generations, sometimes causing them to fail within their first few years of operation.

**The number of workers in L.A. Basin’s other services industry is projected to expand by nearly 6 percent over the next five years.**

### 3.2 Emergent Growth Industries

*There are two industries with particular importance to the economic landscape of the Los Angeles Basin that fall into the new growth category (Exhibit 3-2). These two industries are projected to grow substantially over the next five years, even though employment levels have barely changed over the last 10 years.*

**EXHIBIT 3-2**  
LOS ANGELES BASIN EMPLOYMENT 2016 TO 2021F

	2016 (000s)	2006 to 2016 Change	2016 to 2021 Forecast
<b>Administrative Support</b>	402.6	-1.4%	10.4%
<b>Education (Public and Private)</b>	479.3	0.9%	6.5%
<b>Total L.A. Basin</b>	<b>5,910.1</b>	<b>4.1%</b>	<b>3.8%</b>

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

### 3 Economic Environment: Los Angeles Basin

#### Administrative and Support Services

Job counts in the administrative and support services industry are typically very sensitive to the economic cycle. From 2006 to 2016, employment in the L.A. Basin's administrative and support services industry declined by one percent.

Approximately 40 percent of the jobs in this industry are in employment services, such as temporary employment agencies. Lingering effects of the economic recession and the Affordable Care Act mandates, requiring employers with at least 50 full-time-equivalent employees to offer health insurance to employees working 30 or more hours per week, have made it much more common for businesses to hire temporary staff through employment agencies as a means to cut labor and health care costs, and increase staffing flexibility. This trend is expected to continue, contributing to employment services growth for at least the next five years.

**Employment in the administrative and support services industry is projected to increase by 10 percent over the next five years.**

#### Education Services

Employment levels in the education industry (public and private) are generally expected to remain relatively stable, mirroring population growth. However, state budget cuts due to the economic recession and its reliance on sales and personal income tax revenues created a state fiscal crisis that deeply impacted funding appropriation-levels for the public education system during the economic downturn.

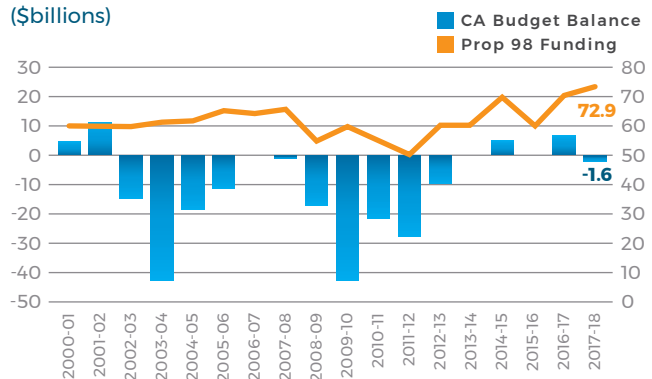
The adoption of new technologies, such as the expanded use of iPads in the classroom and the advent of massive open online courses, has begun to impact education services in recent years, and colleges and universities have greatly increased availability of their course offerings through online platforms that better accommodate student schedules. While these technological advances have certainly enriched the experience and services provided to students, they have so far had little impact on overall staffing.

However, while overall staffing levels may be largely unaffected, the composition of staffing will almost certainly be, reflecting the changing economy, a lack of skilled workers, particularly in science, technology, engineering and mathematics (STEM) fields, and the emphasis on workforce development education as a key determinant of future earnings.

State K-12 education funding through Proposition 98, the formula that sets annual K-12 revenues, is projected to grow, and K-12 hiring is expected to continue to trend upward as state finances improve (Exhibit 3-3).

**Regional employment in the education services industry will increase by nearly 7 percent over the next five years.**

**EXHIBIT 3-3**  
CALIFORNIA BUDGET AND PROP. 98 FUNDING  
(\$billions)



Source: California Governor's Budget Summary 2017-2018; California Legislative Analyst's Office, "A Historical Review of Proposition 98: Estimates by LAEDC."

### 3.3 Rebound Industries

Despite having contracted over the last 10 years, construction and wholesale trade are two rebound industries projected to grow over the next five years. (Exhibit 3-4).

**EXHIBIT 3-4**  
LOS ANGELES BASIN EMPLOYMENT 2016 TO 2021F

	2016 (000s)	2006 to 2016 Change	2016 to 2021 Forecast
<b>Construction</b>	229.0	-13.3%	10.2%
<b>Wholesale Trade</b>	306.8	-1.1%	4.0%
<b>Total L.A. Basin</b>	<b>5,910.1</b>	<b>4.1%</b>	<b>3.8%</b>

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

#### Construction

The construction industry was particularly hard hit by the collapse of the housing market in 2008. Many businesses suffered losses from unpaid contracts, the downsizing of projects and an overall reduction in demand for new buildings. There were 89,900 fewer jobs in the Los Angeles Basin's construction industry in 2011 than in 2006.

Construction businesses are experiencing better days, and many displaced workers are returning to jobs requiring specialized skills. However, despite an employment rebound in the region, job counts in 2016 fell short of 2006 levels. Nearly 300,000 workers were employed by the construction industry in 2016, 13 percent below 2006 employment.

While L.A. Basin construction job counts have not returned to pre-recession levels, developers are continuing to build in and around the region. Downtown Los Angeles is experiencing a major revitalization that will continue to spur more construction. Major projects are being planned in the San Gabriel and Santa Clarita valleys, as well as in the eastern and northern portions of Los Angeles County. Similarly, construction in Orange County is flourishing in cities such as Anaheim, Irvine and Fullerton. Despite the projected growth, construction employment is not expected to reach its pre-recession high over the next five years since it is projected that investors will begin to pull back on speculative development projects.

**Future construction employment in the L.A. Basin is projected to grow at a fast clip, with 23,500 new jobs created, representing 10 percent growth over the next five years.**

### Wholesale Trade

The Los Angeles Basin's wholesale trade industry employed 306,800 workers (2016).

Employment declined over the last 10 years due to the economic downturn. There were nearly 24,800 fewer jobs in 2016 than there were in 2006.

As an economic indicator, wholesale trade job counts are projected to follow traditional sales and inventory growth trends.

Thus far, there have been few major industry-specific technological breakthroughs that have changed the labor market. Autonomous forklifts are starting to be used by some larger companies, but the majority of the L.A. Basin's wholesale trade industry comprises smaller operations with fewer employees and limited warehouse space unlikely to benefit from new technologies.

Furthermore, a large share of the industry's employment remains in sales occupations that heavily depend on client relationships and management.

**The number of workers in L.A. Basin's wholesale trade industry is projected to expand by 4 percent over the next five years.**

### 3.4 Moderate Growth Industries

The financial activities industry is projected to experience moderate job growth over the next five years (Exhibit 3-5).

**EXHIBIT 3-5**  
LOS ANGELES BASIN EMPLOYMENT 2016 TO 2021F

	2016 (000s)	2006 to 2016 Change	2016 to 2021 Forecast
<b>Financial Activities</b>	336.5	-13.2%	3.1%
<b>Total L.A. Basin</b>	<b>5,910.1</b>	<b>4.1%</b>	<b>3.8%</b>

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

### 3 Economic Environment: Los Angeles Basin

#### Financial Activities

The economic recession and housing crisis impacted the financial activities industry two-fold. First, real estate firms experienced rapid and large declines in property values and much lower transaction volumes. Second, finance and insurance firms dealt with a high number of foreclosures, loan modifications and write-offs, as well as a flurry of new federal rules and regulations, such as the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010, that changed the ways commercial and investment banks operate.

Employment in the L.A. Basin's financial activities industry has yet to recover. In 2016, there were 336,500 workers employed in the region's financial activities industry, 51,500 fewer jobs than in 2006, representing a 13 percent decline.

Several economic forces will affect the financial activities industry over the next few years.

For example, home prices have been growing at a robust pace, and mortgage rates have yet to respond to changes in monetary policy. The number of real estate transactions should continue to grow over the next few years, while loan-refinancing activity may pick up as some homeowners take out home equity lines of credit and others try to rid themselves of private mortgage insurance.

Meanwhile, on the technological front, establishments that rely on a customer base have adopted mobile apps that let consumers make banking and investment decisions remotely. Indeed, the number of physical banks across the United States has dropped by almost half between 1995 and 2015.

The use of physical cash is being replaced by blockchain-based digital currencies, such as Bitcoin, and electronic share-payments from companies like Venmo/PayPal, Apple and Google, while banks are providing increasingly faster and more efficient ways to directly exchange money with other clients, further reducing transaction costs. And, lenders and other entities can process far more loans with digital signature services from companies like DocuSign.

For better or worse, high frequency trading has grown in market share, and the rapid rise of passively-managed exchange-traded funds (ETFs), which have grown from \$1 trillion in assets in 2010 to over \$3 trillion in 2016, as an alternative to actively-managed mutual funds has changed the financial services industry dramatically. Finally, the mass of well-capitalized, VC-backed big data, financial-based platforms and "FinTech" companies, which are not subject to the same federal regulations as traditional banks, portend major disruptions for this industry.

Through it all, total employment in the region's financial activities industry is projected to grow by 3 percent over the next five years. However, with the disruptive technological innovations that are sure to come, employment composition by occupation and core job activities or competencies will likely change in many ways, as will skills requirements.

#### 3.5 Slow Growth Industries

Four industries of regional economic significance are projected to experience slow job growth over the next five years: arts and entertainment, transportation, information and government (Exhibit 3-6).

**EXHIBIT 3-6**  
LOS ANGELES BASIN EMPLOYMENT 2016 TO 2021F

	2016 (000s)	2006 to 2016 Change	2016 to 2021 Forecast
Arts and Entertainment	136.0	30.4%	2.1%
Transportation (inc. Postal Services)	225.2	5.1%	0.2%
Information	255.2	8.0%	-2.0%
Government (ex. Postal Service, Education, and Health Care)	278.2	2.3%	1.9%
<b>Total L.A. Basin</b>	<b>5,910.1</b>	<b>4.1%</b>	<b>3.8%</b>

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

#### Arts and Entertainment

Record numbers of tourists and increased consumption by local residents in the Los Angeles Basin have propelled job growth in the arts and entertainment industry over the last 10 years. Employment in the industry grew by 30 percent from 2006 to 2016, with most of that growth occurring over the last five years.

The services provided through the arts and entertainment industry are varied, including major sports stadiums and complexes, museums, theme parks and theaters, some of which have operated for decades. Recent additions like the Broad museum in downtown Los Angeles and the proposed Lucas Museum of Narrative Art will attract tourists from all over the world.

Agents and managers for public figures are a major contributor of job growth in Los Angeles County's arts and entertainment industry, with more than 6,000 jobs created from 2011 to 2016.

This industry, however, also includes many temporary placement agencies that provide staffing services for other businesses in the industry. Unfortunately, many of these jobs are not as secure as those in other industries.

In recent years, promoters with facilities have spurred robust job growth, with the addition of 2,500 jobs from 2011 to 2016. This industry sector includes many venues that serve residents, such as wedding venues and other local event organizers. With limited population growth expected in the future, job growth in this area will likely decelerate.

Establishments identified as sports teams and clubs are a major contributor to recent job growth in Orange County's arts and entertainment industry. For example, construction at the Orange County Great Park in Irvine has kicked into high gear to meet growing demand for access to sports activities.

**Overall, the L.A. Basin's arts and entertainment industry will expand by a modest 2 percent over the next five years.**

## Transportation

In 2016, 225,200 workers were employed in the L.A. Basin's transportation industry, which includes rail, water, air, truck, transit transportation, courier and messenger transportation, as well as warehousing and postal service workers. From 2006 to 2016, employment growth in the transportation industry was a moderate 5 percent.

Recent technological advances in goods movement have greatly reduced costs. And, the widespread adoption of partially and fully autonomous vehicles in the near- to medium-term future will almost certainly affect the transportation industry's workforce from warehousing operations, to long-haul transportation, to last-mile delivery.

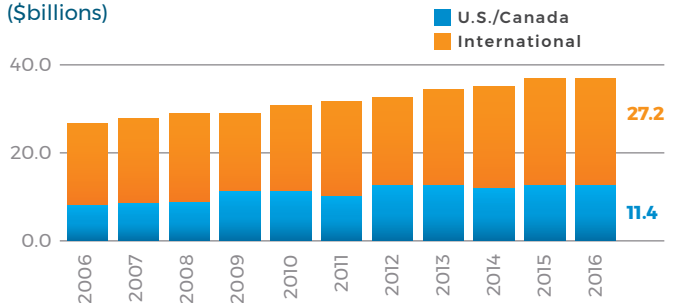
**Employment growth in the L.A. Basin's transportation industry is expected to be dramatically slower than over the last decade, increasing by only 0.2 percent over the next five years.**

## Information

The Los Angeles region's film industry has a long history of providing entertainment for consumers throughout the world. The motion picture and sound recording industry accounts for 60 percent of employment in the L.A. Basin's information industry, which employed 255,200 workers overall in 2016.

Changes in how films and other video and sound productions are produced, distributed and consumed have affected workers more so than perhaps in any other field in recent memory outside of maybe journalism and retail (see below). High quality videos can be filmed with iPhones, while on-site production is being replaced by green stages and other new technology. Still, the demand for motion pictures continues to grow globally (Exhibit 3-7), so while the composition of employment in the industry may change somewhat dramatically, total jobs will likely expand.

**EXHIBIT 3-7**  
WORLDWIDE BOX OFFICE  
(\$billions)



Source: Motion Picture Association of America, Theatrical Market Statistics

Regional employment in the information industry grew by 8 percent from 2006 to 2016, though the industry, like almost every other, endured layoffs during the economic recession.

Hiring from 2011 to 2016 shows different trends occurring within various subsectors of the information industry. For example, employment in telecommunications has weakened over the last five years. Note, however, that this industry includes employment at retail centers where mobile electronics and mobile phone service contracts are sold. Consumers have drastically shifted to purchasing these goods and services online, reducing the need for retail sales workers.

### 3 Economic Environment: Los Angeles Basin

Meanwhile, employment in data processing, hosting and related services has been growing over the last five years. These businesses provide web hosting, streaming services, application hosting and other types of services that provide digital content directly to consumers.

**Employment in the L.A. Basin's information industry is projected to stagnate overall, although there will be changes in job types, activities and skills. Overall, information industry employment is expected to decline by 2 percent over the next five years in the L.A. Basin.**

#### Government

When postal service, education and health care are eliminated from the equation, employment in public administration has held steady over the last 10 years. More than 278,000 workers are employed by government in the Los Angeles Basin (2016), an increase of 2 percent from 2006.

**Government employment is projected to grow in the L.A. Basin by nearly 2 percent over the next five years.**

#### 3.6 Challenged Industries

*Retail trade and manufacturing are considered challenged industries, with negative job growth projections over the next five years (Exhibit 3-8).*

**EXHIBIT 3-8**  
LOS ANGELES BASIN EMPLOYMENT 2016 TO 2021F

	2016 (000s)	2006 to 2016 Change	2016 to 2021 Forecast
<b>Retail Trade</b>	574.6	-2.0%	-0.5%
<b>Manufacturing</b>	510.3	-20.9%	-5.0%
<b>Total L.A. Basin</b>	<b>5,910.1</b>	<b>4.1%</b>	<b>3.8%</b>

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

#### Retail Trade

The retail trade industry largely resembles its wholesale trade counterpart in that employment counts have been sensitive to the economic cycle. Retail trade employment in the Los Angeles Basin totals 574,600 workers (2016). However, this number represents a 2 percent decline from 2006 employment, a loss of nearly 12,000 jobs.

Though retail trade employment fell by 51,600 jobs from 2006 to 2011, the industry has since rebounded from the economic recession, easing concerns that self-checkout machines would diminish the need for retail workers. Unfortunately, new technologies and other innovations, along with growing consumer adoption and use of platforms that further disintermediate the sector, such as Amazon, eBay and ASOS, are expected to hasten the retail industry's accelerating transition and continue to constrain employment growth over the next five years.

**Employment in the Los Angeles Basin's retail trade industry is projected to decline by 0.5 percent over the next five years.**

#### Manufacturing

The manufacturing industry remains an important component of the Los Angeles Basin's overall economic output. Over the last few decades, however, the composition of the industry has drastically changed.

Local textiles, apparel and footwear establishments are importing more products from overseas, and local operations are streamlining their focus to design and distribution. Other manufacturing industries are investing in and incorporating new technologies to replace manual labor.

A much higher proportion of workers in manufacturing are now required to have advanced degrees, specialized technical skills, or some combination of the two. Robust wage growth in the industry over the last decade supports this trend.

In 2016, the region's manufacturing industry employed more than 500,000 workers. Yet, this number is substantially lower than it was in 2006, when there were 135,000 more manufacturing jobs in the Los Angeles Basin. Between 2006 and 2016, industry employment declined by nearly 21 percent.

**Overall, employment in the L.A. Basin's manufacturing industry is projected to decrease further, by 5 percent, eliminating 25,400 jobs over the next five years.**



## 4 Occupational Analysis: Los Angeles Basin

**T**he number of additional workers that businesses will need is referred to as net new jobs.

Replacement jobs are those jobs created by workers who permanently retire or permanently change occupations.

When combined, net new jobs and replacement jobs constitute the total number of job openings.

Among the occupations with the highest replacement rates, various blue-collar occupations take the lead: locksmith and safe repairers; library technicians; social science research technicians; and forest and conservation technicians. In addition, some middle-skill occupations also have high replacement needs, including registered nurses and teacher assistants.

Careful examination of the occupations with the most job openings over the next five years reveals that many of these occupations require lower levels of educational attainment.

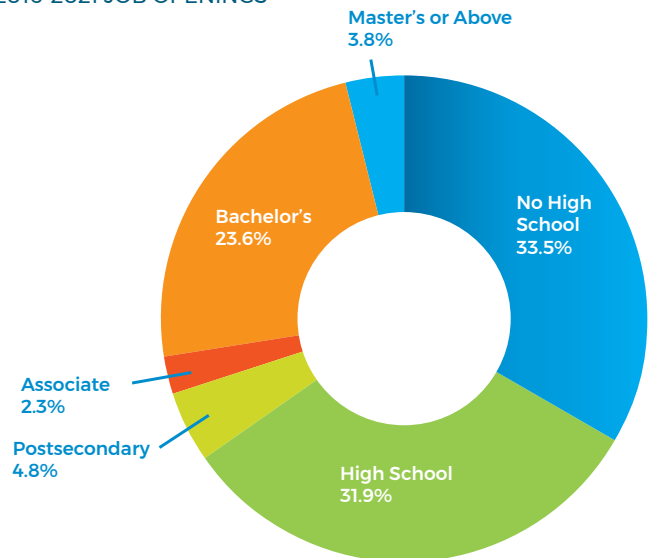
Exhibit 4-1 presents the typical entry-level education required across all projected occupations for the L.A. Basin.

More than 60 percent of occupations will require a high school education or less. One-third of projected openings require no high school education, and another one-third require only a high school diploma. These two categories represent entry-level jobs for unskilled workers across industries and occupations.

Of the remaining projected openings, nearly 25 percent require a bachelor's degree, while only 2 percent of occupations call for an associate degree.

One thing to consider is that education requirements will likely increase over time. As a result, technical training is expected to play a major role in helping new workers find employment in a fast-evolving labor market.

**EXHIBIT 4-1**  
ENTRY-LEVEL EDUCATION FOR  
2016-2021 JOB OPENINGS



**Technical training is expected to play a major role in helping new workers find employment in a fast-evolving labor market.**

## 5 Community Colleges and Middle-Skill Jobs

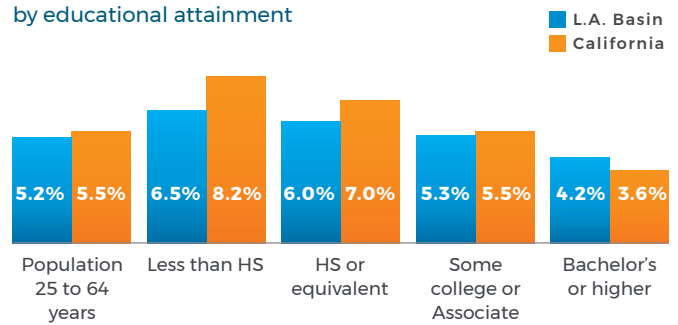
Understanding how industries are expected to grow or decline over a period of time and estimating their job creation potential provides one aspect of overall workforce needs. The more important aspect, however, is the composition of those expected jobs and their educational attainment and skills needs. In this section, we convert industry job creation projections into occupational projections in select industry targets for middle-skill jobs. From these target industries, 20 detailed occupations have been chosen as promising targets for post-secondary programs for Los Angeles Basin community colleges.

### Why Education Matters

Education is the primary vehicle an individual uses to better his or her economic position, whether it is to increase employment opportunities, earn higher wages, or seek out a better quality of life. Unemployment rates, median earnings and poverty levels all differ according to the highest level of education obtained; that is, an individual's educational attainment.

Educational attainment is a key element in understanding challenges and opportunities present in a region's workforce. It identifies the quality of the local labor pool to potential employers, quantifies the benefits of pursuing additional education to individuals, and can reveal whether an area is economically disadvantaged requiring higher levels of public services and resources.

**EXHIBIT 5-1**  
CIVILIAN UNEMPLOYMENT RATE 2016  
by educational attainment



Source: 2016 ACS 1-year estimates

The highest unemployment rates exist for individuals with lower levels of educational attainment.

Earnings differentials exist among employed individuals with varying levels of educational attainment. In the Los Angeles Basin, those with the highest level of education—a graduate or professional degree—earn an annual wage premium of about \$59,000 over those with less than a high school education. Individuals with an associate degree, postsecondary nondegree award or some college enjoy a wage premium over lower levels of educational attainment as well; approximately \$8,400 over those with a high school diploma or equivalent annually, and more than \$15,400 over those with less than a high school education annually.

The combination of higher rates of unemployment and lower annual median earnings yield higher levels of poverty for those with lower levels of education.

## Education and Automation

Automation can have a net-negative effect on employment. Robotics, digital platforms and artificial intelligence are changing the employment game. As an increasing number of industries become more capital-intensive and less labor-intensive, individuals with the lowest levels of education are most vulnerable to having their jobs eliminated as a result of automation and other forms of technological innovation.

While widespread automation is not a direct threat near-term (as it is cost prohibitive for many operations and legislation has failed to keep pace with advances in technology in certain industries), partial automation is quite prevalent in many workplaces today. This labor-technology substitution trend is expected to accelerate over time as continued innovation allows the capabilities of machines to surpass those of humans. Additionally, the cost of technology will continue to decline over time. Still, technology can also have a complementary effect on labor, increasing the demand for labor and making existing workers more productive. All things considered, it will be at least another decade, possibly two, before automation becomes a true pressing threat to employment.

Incentives exist for businesses to incorporate automation and other technological advances into their operations, while the upfront costs are steep, in the long term they can enjoy cost savings related to reduced labor costs, increased efficiencies, and increased output.

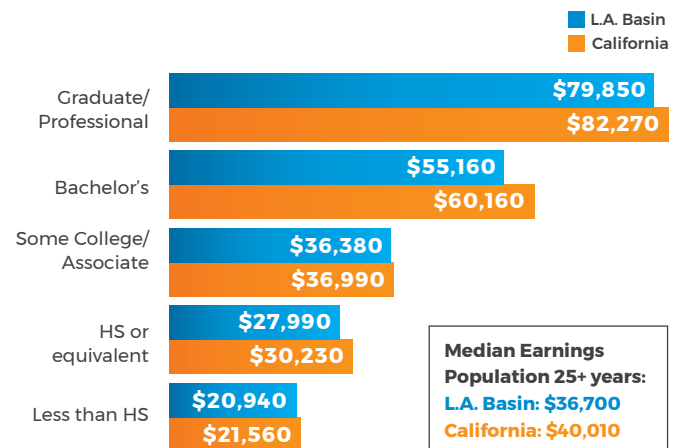
Government policy will have an important role to play as legislators balance the employment needs of their constituents with the obtainable productivity gains automation promises to the businesses operating in their districts.

The jobs most at risk of becoming automated include those that involve simple repetitive tasks and those that involve data; the first is at risk of being replaced by machines, and the other by algorithms. Individuals who lose their jobs to automation must be upskilled or retrained to fill other occupations less susceptible to the threat of automation. This puts enormous pressure on community colleges and other education systems to create programs that will do just that.

The McKinsey Global Institute (MGI) recently released *A Future That Works: Automation, Employment and Productivity*, a report that identifies the technical automation potential of the global economy.<sup>2</sup> In this report, MGI identified work activities that could be automated by adapting currently available technology. The report showed that these work activities exist across a large number of occupations in all industries. In particular, work activities that involve data collection, the processing of data, and work that requires a large amount of physical activity taking place in predictable environments are most vulnerable to the disemployment effects of automation.

Work activities that require the management of people, experience in decision making, planning or tasks requiring creativity, interactions with other people, and work with physical activity taking place in unpredictable environments have the least exposure to risk of being displaced. These skills will continue to be in demand, and represent opportunities for educational institutions, such as community colleges, to adapt their different program curricula to include more emphasis on STEM fields of study, soft skills required for successful professional interactions, and to promote more creative and critical thinking.

**EXHIBIT 5-2**  
MEDIAN EARNINGS AND EDUCATIONAL ATTAINMENT 2016  
Population 25 years and older



Source: 2016 ACS 1-yr estimates

<sup>2</sup> Manyika, James et. al., (2017). *A Future That Works: Automation, Employment and Productivity*, [online] McKinsey & Company. Available at: <http://www.mckinsey.com/global-themes/digital-disruption/harnessing-automation-for-a-future-that-works> [Accessed 03 Aug. 2017]

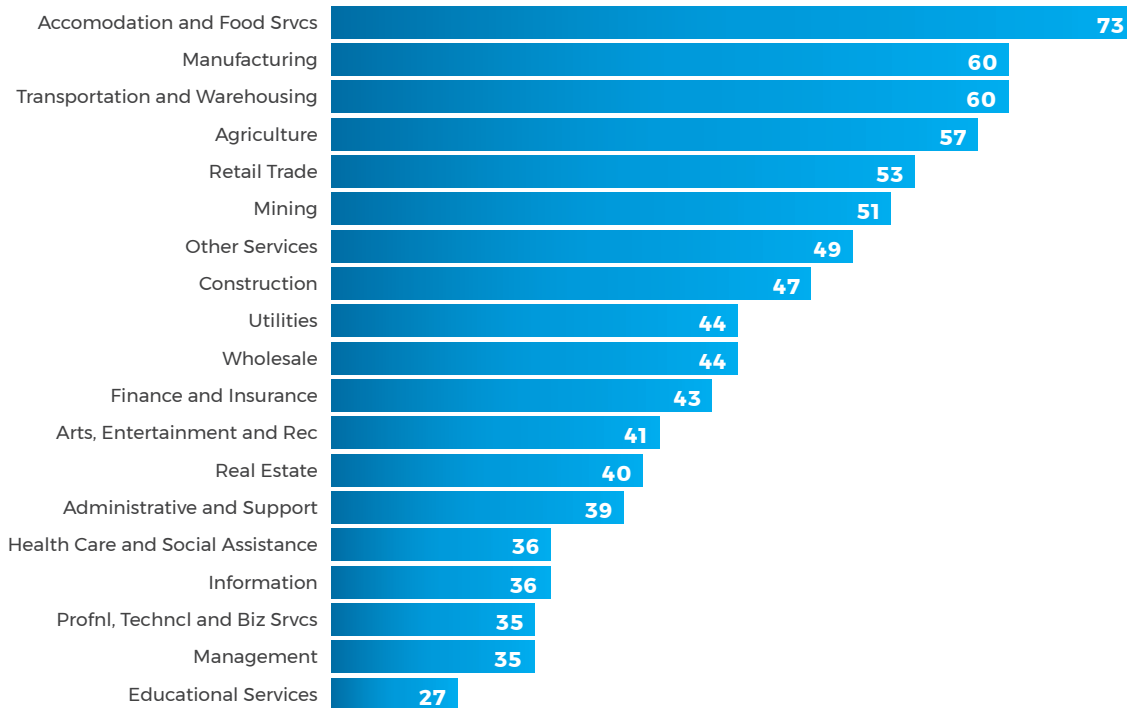
## 5 Community Colleges and Middle-Skill Jobs

In today's economy, some industries are more at risk of losing jobs as a result of automation compared to others, these include leisure and hospitality industries (especially food services), retail trade (due to the rise in e-commerce), and warehousing and logistics industries (as a result of widespread use of automatic storage, retrieval handling and logistics software) (Exhibit 5-3). Manufacturing industries have long been identified as vulnerable to disemployment related to technological innovation. For example, workers in factories have been moving away from traditional assembly functions for years and into higher-skilled positions, such as CNC (Computer Numerical Control) operators. Recent advancements in robotics, artificial intelligence and machine learning are poised to cause greater levels of disruption in the future, not only in manufacturing, but also across numerous other industries. Individuals will need skills that can be employed

in conjunction with the functions of machines. As industries continue to evolve, it will be a major challenge for educational providers to keep pace; teaching students the skills they need to be hired and remain employed in this increasingly technical world. Success will require heavy interaction with industry stakeholders and public-private partnerships for workforce development programs tailored to satisfy industry employment needs.

If educators cannot keep up and provide local industries with qualified workers with the skills they need, skills gaps will widen and result in unfilled job vacancies for businesses, causing them to seek out talent from other places or leave the region completely, which will increase unemployment and economic instability for individuals and their households and communities.

**EXHIBIT 5-3**  
**AUTOMATION POTENTIAL BY INDUSTRY SECTOR**  
 CURRENT POTENTIAL WITH DEMONSTRATED TECHNOLOGY  
 (Scale of 0 to 100)



Source: McKinsey Global Institute

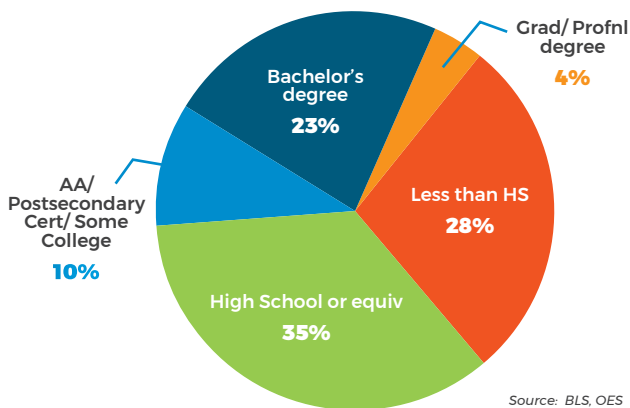
## Middle-Skill Education

Another way to illustrate the value of postsecondary education is by looking at occupational employment grouped together by entry-level educational requirements.

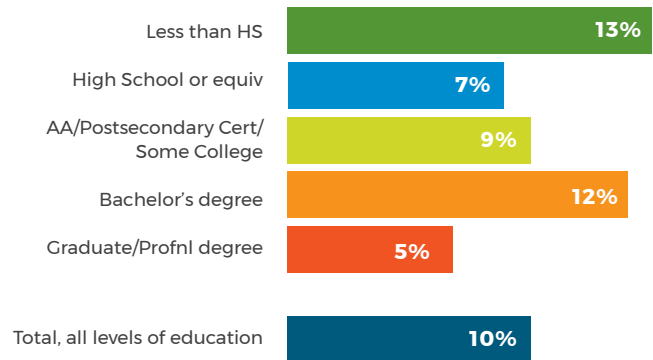
In the Los Angeles Basin in 2016, 10 percent of employment exists in occupations having the entry-level education requirement of an associate degree, postsecondary nondegree award, or some college (Exhibit 5-4). Occupations in this category include: paralegals, computer network specialists, and technicians and technologists related to several industries, such as health care and engineering, automotive service technicians, licensed vocational nurses (LVNs), heavy and tractor truck drivers, teacher assistants, and bookkeeping, accounting and auditing clerks.

Occupations requiring the lowest level of education, less than high school, account for 28 percent of occupational employment in the basin, but these occupations, including cashiers and retail salespersons, janitors, food preparation workers and landscaping workers, are also associated with the lowest wages.

**EXHIBIT 5-4**  
**JOB DISTRIBUTION IN L.A. BASIN 2016**  
**ENTRY-LEVEL EDUCATION REQUIREMENTS**



**EXHIBIT 5-5**  
**JOB GROWTH BY ENTRY-LEVEL EDUCATION**  
**Percentage change from 2012 to 2016**



The net change in jobs in the Los Angeles Basin between 2012 and 2016 by entry-level education, provides insight into hiring trends over time.<sup>3</sup> Over the four-year period, the number of jobs in occupations requiring an associate degree, postsecondary nondegree award, or some college grew by 9 percent, which is a faster growth rate than jobs requiring an entry-level education of a high school diploma or equivalent (7 percent).

While jobs requiring an entry-level education of less than high school grew at the fastest rate (13 percent), over the period, this growth is primarily related to the rehiring of these jobs post-recession (December 2007 to June 2009) (Exhibit 5-5). During a contractionary period, jobs in lower skilled occupations are shed at a disproportionately higher rate compared to middle- and high-skill occupations, and are rehired during expansionary periods in the business cycle, as has been the case from 2012 through 2016.

In conclusion, jobs in occupations with an entry-level education requirement of an associate degree, postsecondary nondegree award, or some college, these jobs are growing at a faster rate compared to occupations requiring high school for entry-level. Additionally, some students completing community college programs will continue on to obtain higher levels of educational attainment, as such, it is relevant to note that occupations requiring a bachelor's degree for entry grew by 12 percent over the period, meaning employment prospects for these individuals are also promising.

<sup>3</sup>2012 OES data used rather than 2011 data due to SOC revision

## 5 Community Colleges and Middle-Skill Jobs

### The Demand for Middle-Skill Jobs

Where are middle-skill jobs found? Demand for labor is generated by local and regional businesses across all industries. This is a function of the economic health of the regional economy and its expected growth, as well as locational and hiring decisions made by growing businesses.

Projected demand for labor (total openings, including net new jobs and replacement jobs) from 2016 to 2021 by industry sector is broken out according to the job's entry-level education requirements (Exhibit 5-6).

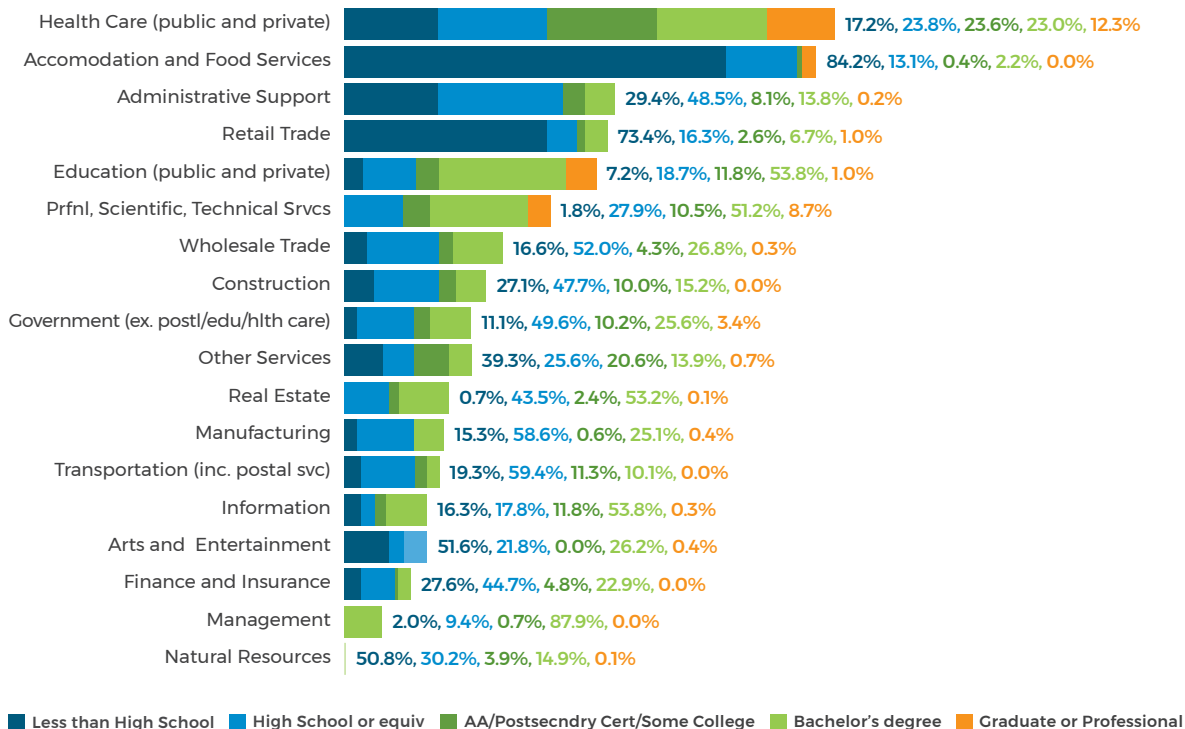
Occupations requiring an education of an associate degree, postsecondary nondegree award, or some college figure prominently in every industry, but especially in health care services (23.6 percent of projected total openings), other services (20.6 percent of total openings), which includes maintenance and repair industries, and transportation industries (11.3 percent of total openings).

In conclusion, jobs in occupations with an entry-level education requirement of an associate degree, postsecondary nondegree award, or some college, these jobs are growing at a faster rate compared to occupations requiring high school for entry-level. Additionally, some students completing community college programs will continue on to obtain higher levels of educational attainment, as such, it is relevant to note that occupations requiring a Bachelor's degree for entry grew by 12 percent over the period, meaning employment prospects for these individuals are also promising.

Industry employment projections can be combined with other metrics to provide an indication of whether a particular industry has the potential to be an attractive target for postsecondary nondegree award, career technical education programs, and Associate's degree programs.

In the next two sections, we identify target industries that are most promising in terms of middle-skill jobs, and use the occupational composition of the expected jobs in those industries to identify the top 20 detailed occupations classified as middle-skill, presenting their predicted job needs from 2016 to 2021.

**EXHIBIT 5-6**  
**PROJECTED JOB DEMAND BY INDUSTRY 2016 TO 2021F**  
 Distribution of total projected openings by entry-level education requirements



## 6 Identifying Target Industries

**E**conomic development efforts are organized around several priorities, including encouraging job growth in industries that are export oriented, most competitive, regionally concentrated, and that will generate high paying jobs that, through their spillover effects, will drive economic growth, further job creation, and increase wages for a greater number of residents.

The LAEDC identified industries in the Los Angeles Basin that would be prime targets for new or continued investments made to programs specializing in the training and/or education of individuals to fill the projected demand for middle-skill jobs over the next five years. These training and education programs, to be provided by community colleges, include postsecondary nondegree awards, career education (CE) and associate degree programs.

With an industry base as diverse as the Los Angeles Basin's, there are a number of ways in which to identify target industries.

Industries with the most middle-skill job growth potential are an obvious choice, but these industries may be local-serving and thus not the most impactful to the regional economy in terms of overall wealth generation. Therefore, consideration is given to whether an industry is export oriented, and the economic output and value added it brings to the region. Average annual wages in an industry are also a consideration, as higher earnings translate into increased levels of spending, which is associated with a larger ripple of economic activity (induced effects) in the regional economy.

Additionally, the competitiveness of an industry is a valuable metric in determining what industries are more prominent in the Los Angeles Basin compared to other areas. Using this metric allows for the identification of industries in which the region holds a comparative or productive advantage, such as industries with deep roots, a well-developed and specialized supply chain, a deep and concentrated talent pool, requisite infrastructure, etc.

Emerging and growing sectors are also key in establishing targets. These include nascent industries, such as autonomous vehicles, privatized space flight, alternative energy and clean-tech industries, in addition to established industries that are exhibiting strong growth and building capacity in the basin. While these industries might not be obvious workforce development targets, they help to identify industries on the rise and aid in anticipating potential workforce needs in the future.

To choose target industries in the Los Angeles Basin that incorporate all these considerations, the LAEDC identified five target industries in each of the following three categories: prominent industries; emerging and growing industries; and so-called "matrix" industries. Matrix industry selection uses a multi-metric matrix developed to identify industries providing the greatest economic benefit, in terms of both wealth generation and the most opportunities for middle-skill job growth. The final six industry targets were selected from these three listings.

## 6 Identifying Target Industries

### 6.1 Targets: Prominent Industries

While large employing industries are valuable in terms of their ability to provide job opportunities for local residents, other industries, while still relatively small in terms of employment, may be important for promoting overall economic growth and prosperity. These industries are likely to be exposed to the larger global market, and if they are competitive with their counterparts elsewhere, they can gain market share by growing the number and/or output of their companies and creating jobs.

Industry competitiveness in this sense is measured using relative employment shares. An industry with a presence in the Los Angeles Basin that is larger (as a percentage of total employment in the region) than its presence elsewhere would indicate that the L.A. Basin has a concentration of this industry and is evidence of the region having a competitive advantage.

The L.A. Basin is home to numerous prominent industries that are concentrated more heavily here versus other parts of the nation. Still, not all prominent industries are suitable for workforce development intervention. For example, there are few middle-skill jobs and wages tend to be low in textile and apparel manufacturing and food manufacturing, although these are highly concentrated industries in the region. As such, they are not suitable targets.

**EXHIBIT 6-1**  
PROMINENT INDUSTRIES - TARGETS IN L.A. BASIN

NAICS	Industry	LQ 2016	Total Jobs 2016	Total MS Openings 2016-21
512,515,711	Entertainment	6.51	223,320	5,690
3364	Aerospace	2.36	47,920	1,250
334	Electronic Product Manufacturing	1.79	70,756	2,700
541 less 5417	Professional and Technical Services	1.24	383,290	17,030
481,483,488	Port Related Transport and Support Activities	1.76	83,750	3,095

Source: Estimates by LAEDC

Exhibit 6-1 presents the top five industries (prominent industries) with both large relative employment shares and a significantly large share of middle-skill employment. Projected middle-skill job openings (new jobs and replacement jobs) between 2016 and 2021 are also provided.

**EXHIBIT 6-2**  
EMERGING AND GROWING INDUSTRIES - TARGETS IN L.A. BASIN

NAICS	Industry	2011 to 2016			2016 to 2021	
		Change in LQ 2011-16	Net Job Change	Net Job Change	Net Job Change	Total MS Openings 2016-21
512,515,711	Entertainment	0.86	48,050	20.6%	-0.9%	<b>5,960</b>
3254, 3391	Bio-Medical	0.34	6,990	10.9%	-7.8%	<b>650</b>
481,483,488	Port Related Transport and Support Activities	0.34	17,620	22.3%	1.2%	<b>3,095</b>
42, 454	Wholesale and eCommerce	0.00	9,910	3.1%	4.4%	<b>13,361</b>
541 less 5417	Professional and Technical Services	0.09	18,060	10.4%	5.4%	<b>17,030</b>

Source: Estimates by LAEDC



## 6.2 Targets: Emerging and Growing Industries

Emerging and growing industries are those that are building capacity in the region. These can be either nascent industries, such as the autonomous vehicle industry, or existing industries, that are in the midst of developing a cluster of activity in the L.A. Basin, such as the bio-medical industry, which combines pharmaceutical and medicine manufacturing, and medical equipment and supplies manufacturing.

An industry's job creation potential is a product of its projected growth rate and the industry's current size. A small industry growing quickly may add jobs, but the absolute number of jobs added will likely be smaller than a large industry growing more slowly. Both metrics are considered when selecting the top five emerging and growing industries to target. Additionally, an industry that is increasing its concentration in the region is also becoming stronger. Over time, the change in location quotient (LQ), which is calculated by comparing the industry's share of regional employment with its share of national employment, will reveal changes in industry concentration.

Exhibit 6-2 presents the top five industries with the change in industry concentration (LQ) relative to the nation and the net job change (number and percentage) from 2011 to 2016, along with the expected growth rate of middle-skill jobs in the industry and total projected middle-skill job openings (new jobs and replacement jobs) between 2016 and 2021.

## 6.3 Targets: Matrix Industries

Matrix industries were selected by developing a multi-metric matrix to identify industries in the Los Angeles Basin with the most economic benefit, in terms of both wealth generation and the most opportunities for middle-skill job growth (Exhibit 6-3).

Our criteria for choosing the matrix target industries include:

- (1) *Middle-skill jobs* – those industries with the highest job share and a high proportion of middle-skill jobs are given preference;
- (2) *Middle-skill jobs growth rate* – those industries demonstrating high rates of middle skill job growth are given preference;
- (3) *Potential middle-skill job creation* – those industries with a greater number of middle-skill jobs projected to be added are given preference;
- (4) *Industry competitiveness* – those industries that are prominent, or competitive against other regions, are given preference;
- (5) *Prevailing wages* – those industries with higher wages are given preference; and
- (6) *Economic output and value added* – those industries with high value adds are given preference, as they produce the largest ripple effects in terms of their indirect and induced economic activity in the region.

**EXHIBIT 6-3**  
MATRIX INDUSTRIES - TARGETS IN L.A. BASIN

NAICS	Industry	Total Jobs 2016	Middle Skill Jobs	
			Total Jobs 2016	Projected Openings 2016-21
512,515,711	Entertainment	223,320	122,280	5,960
621,622,623	Health Care Services	591,940	382,900	27,740
23	Construction	229,000	129,610	16,110
481,483,488	Port Related Transport and Support Activities	83,750	50,765	3,095
42, 454	Wholesale and eCommerce	325,510	143,810	9,910

Source: Estimates by LAEDC

## 6 Identifying Target Industries

### 6.4 Selected Industry Targets

The three industry targets lists provided—matrix industries, prominent industries, and emerging and growing industries—present nine distinct industries from which to select the final six target industries with the most promising middle-skill potential (Exhibit 6-4).

Industries present in more than one list were natural selections; these industries include entertainment, port-related transportation and supporting activities, and professional and technical business services.

Additionally, one target industry unique to each list was chosen. The leading industry target using the multi-metric matrix was health care services. For prominent industries in the region, aerospace was selected. And finally, bio-medical manufacturing was selected as a target from the growing and emerging industries list.

#### EXHIBIT 6-4 COMPREHENSIVE LISTING OF INDUSTRY TARGETS

NAICS	Industry
3364	Aerospace Product Parts and Manufacturing
3254, 3391	Bio-Medical Manufacturing
23	Construction
334	Electronic Product Manufacturing
512,515,711	Entertainment
621,622,623	Health Care Services
481,483,488	Ports and Supporting Transportation Activities
541 less 5417	Professional and Technical Business Services
42,454	Wholesale and eCommerce

Source: Estimates by LAEDC

### Final Target Industries

The six selected target industries with promising middle-skill potential in alphabetical order are as follows: (1) aerospace; (2) biomedical manufacturing; (3) entertainment; (4) health care services; (5) ports and related transportation support activities; (6) professional and technical services (Exhibit 6-5).

Together these six industries are expected to have an estimated 55,725 total openings for middle-skill jobs over the five-year period of 2016 through 2021.

These industries are discussed individually below, including a brief overview of each in the region.

#### Aerospace

With a 100-year history in the Los Angeles Basin, the aerospace vehicles and parts manufacturing industry remains one of the region's prominent industries, serving private and government consumers worldwide. Industry employment is nearly two and a half times more concentrated in the L.A. Basin versus nationwide.

Though the industry suffered drastically during the 1990s as federal contracts plummeted and the industry consolidated, private investment has picked up over the last few decades, particularly in the form of private space exploration and commercial aircrafts. The combination of continued federal contracts and increasing amounts of private investment directed towards new consumer-facing aerospace products and services bode well for the future of the L.A. Basin's aerospace industry as the industry will be less susceptible to the ups and downs of fiscal policy.

Employment in the industry will continue to comprise many mid- to high-skill workers in the near future. The demand for workers with technical skills, as well as in-depth knowledge of mathematics and science will continue to remain a high priority for aerospace establishments. Simultaneously, many workers in the industry across all occupations are nearing retirement age, including those in middle-skill occupations such as aircraft mechanics and service technicians, representing a critical training opportunity for local community colleges.

## Bio-Medical

The biomedical industry is an emerging industry in the Los Angeles Basin, with pharmaceutical operations primarily concentrated in Los Angeles County and medical device manufacturing primarily concentrated in Orange County. From 2011 through 2016, employment grew by 10.9 percent and industry concentration increased, with a positive change in the industry LQ (up by 0.34) over the period.

A wide-range of world-renowned academic institutions and health care establishments support local businesses in the industry through research and workforce preparation. The industry remains poised for growth as demand for innovations that will improve the health and well-being of the population continues to grow.

Aside from the hundreds of high-skill, high-wage workers employed as chemists, industrial and medical engineers, and software developers, many workers in the industry are also middle-skill workers. For example, hundreds of workers in the industry are employed as laboratory technicians, inspectors, testers, sorters, samplers, and weighers.

## Entertainment

The Los Angeles motion picture and video production industry has a long established history of providing entertainment for consumers throughout the world. The rise in digital media (characterized by digitized content that is encoded and can be distributed over computer networks) has become a transformative change for the industry. Entertainment-related businesses have been contending with and/or adapting to increased use of social media, while a traditional television set is being persistently replaced by computer monitors, tablets and smart phones.

Despite changes in how entertainment is produced, distributed and consumed, the demand for middle-skill workers will continue to be a primary driver of future job openings. Among the wide range of occupations in the industry, thousands of middle-skill workers serve as audio and video equipment technicians, and film and video editors.

**EXHIBIT 6-5**  
SELECTED TARGET INDUSTRIES IN L.A. BASIN

NAICS	Industry	Total Jobs 2016	Middle Skill Jobs	
			Total Jobs 2016	Projected Openings 2016-21
3364	Aerospace	47,920	19,920	1,250
3254, 3391	Bio-Medical	38,630	15,350	650
512,515,711	Entertainment	223,320	122,280	5,960
621,622,623	Health Care Services	591,940	382,900	27,740
481,483,488	Port Related Transport and Support Activities	83,750	50,765	3,095
541 less 5417	Professional and Technical Services	383,290	157,280	17,030

Source: Estimates by LAEDC

## 6 Identifying Target Industries

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### Health Care Services

Health care establishments provide services for residents of the Los Angeles Basin that extend far beyond the hospital. These include outpatient services, diagnostics, in-home services, and nursing and residential care facilities. Policy changes related to the Affordable Care Act have had less overall impact on the demand and supply of workers than the region's aging population. Augmented by its anticyclical nature, the Los Angeles Basin's health care industry expanded persistently even as the economy was in recession.

Perhaps more than any other industry, health care establishments employ a wide range of workers by occupation, skill level, educational attainment, and experience. Middle-skill occupations account for a large portion of workers in the industry. For example, tens of thousands of registered nurses, medical and nursing assistants, medical secretaries, and dental assistants are employed throughout the Los Angeles Basin.

### Port-Related Transportation and Support Activities

The Los Angeles Customs District is the nation's busiest customs district by total trade value, and the L.A. Basin is home to the two largest seaports in the United States and one of the busiest origin and destination airports in the world.

While recent technological advances in goods movement have greatly reduced costs, the widespread adoption of partially and fully autonomous vehicles in the near- to medium-term future will almost certainly affect the transportation industry's workforce, from warehousing operations, to long-haul transportation, to last-mile delivery.

Thousands of workers in middle-skill occupations within the ports and supporting transportation activities industry are employed as cargo and freight agents, drivers of heavy and tractor trailer trucks, and aircraft mechanics and service technicians. With the rapid technological changes expected in the industry, the demand for highly specialized technical training will almost certainly grow.

### Professional and Technical Services

The Los Angeles Basin is headquarters to a number of worldwide industry leaders in the professional and technical services industry, serving businesses and consumers locally, nationally and globally. Some of the most prestigious law, accounting, architectural, and engineering firms are either based in the region or have secondary offices.

While often associated with high-skill, high-wage jobs, the industry also offers a wide range of middle-skill employment opportunities. For example, there are thousands of workers employed at law firms as legal secretaries, paralegals, and legal assistants; thousands of workers employed at accounting and bookkeeping firms as clerks and office and administrative support managers; and thousands of workers employed at architectural and engineering firms as architectural and civil drafters. Even so, the professional and technical services industry, along with its associated middle-skill occupations, is ripe for major disruptions brought on by technological innovation.

Careful examination of the detailed middle-skill occupations within these six target industries that will provide the most job openings in the next five years are covered in section seven, following the target industry pages.

## 6.5 Target Industry Pages

Together, these six target industries account for approximately 23.2 percent of total employment and 33.2 percent of all middle-skill jobs in the L.A. Basin in 2016, with 55,725 total middle-skill openings expected from 2016 to 2021 in the region.

Infographics for each industry shown in Exhibit 6-5 are included in the following section with these details:

- Industry description and definition;
- 2016 and 2021f employment levels;
- Total industry employment with its middle-skill job share in 2016;
- Average annual wages paid in 2016 in the L.A. Basin;
- The distribution of workers by major occupation group;
- Middle-skill jobs data and projected openings for workers in the L.A. Basin in 2016 and through 2021;
- The automation potential of workers in the industry's sector; this is expressed as the share of workers' activities which could be automated based on current demonstrated technology;
- A selection of several industry occupations most vulnerable to displacement in the future due to automation; and
- A selection of other metrics specific to each industry, including economic output, value added, industry concentration and wage data.

The report also includes a section detailing occupations which stand to benefit from either a postsecondary nondegree award or career education provided by community colleges.

**The six industries are expected to have an estimated 55,725 total openings for middle-skill jobs over the five-year period of 2016 through 2021.**

## Directory of Target Industries

- Aerospace Manufacturing (NAICS 3364)
- Bio-Medical Manufacturing (NAICS 3254 and 3391)
- Entertainment (NAICS 512, 515 and 711)
- Health Care Services (NAICS 621, 622 and 623)
- Ports and Supporting Transportation Activities (NAICS 481, 483 and 488)
- Professional and Technical Business Services (NAICS 541 less 5417)

# Aerospace Product and Parts Manufacturing (NAICS 3364)

Aerospace manufacturing includes establishments primarily engaged in: (1) manufacturing complete aircraft, missiles, or space vehicles; (2) manufacturing aerospace engines, propulsion units, auxiliary equipment or parts; (3) developing and making prototypes of aerospace products; (4) aircraft conversion (i.e., major modifications to systems); and (5) complete aircraft or propulsion systems overhaul and rebuilding (i.e., periodic restoration of aircraft to original design specifications).

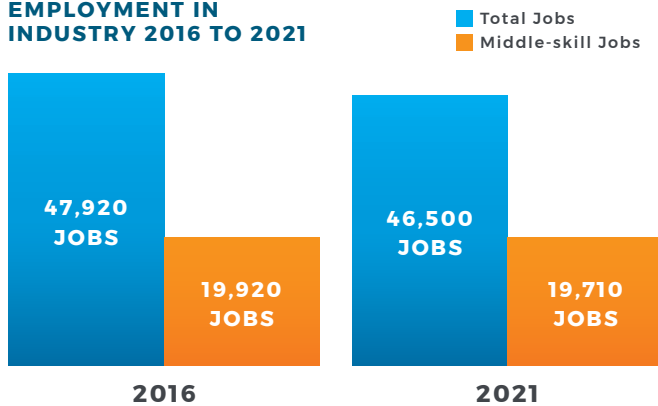


Average Wage in 2016:  
**\$100,450**



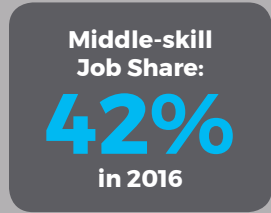
Source: McKinsey&Company

## EMPLOYMENT IN INDUSTRY 2016 TO 2021

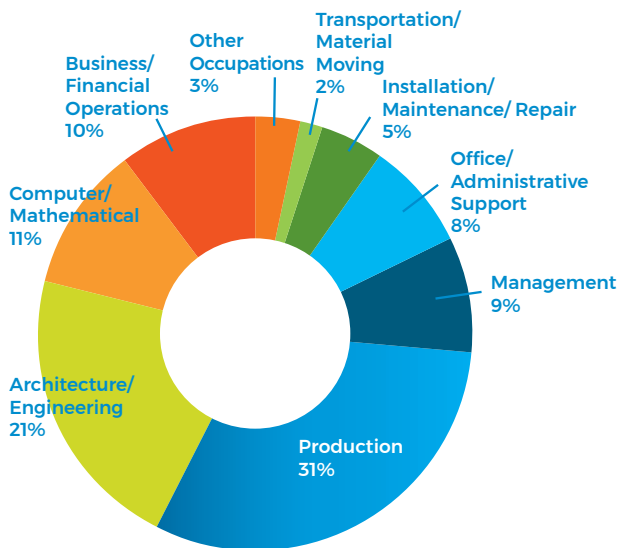


## Middle-skill Jobs 2016-2021:

- 2016 jobs: 19,920
- 2021 jobs: 19,710
- Projected job growth: -1%
- Projected new jobs: -210
- Projected 5-year replacement rate: 11%
- Projected total openings: 1,250



## EMPLOYMENT DISTRIBUTION BY OCCUPATION L.A. BASIN 2016



## Business Revenues:

- \$27 billion in 2015

## 1% of Gross Regional Product:

- Valued at \$10 billion in 2015

## Employment Growth:

- 2016 to 2021: -3.0%

Sources: BLS, QCEW and OES; IMPLAN, forecasts and estimates by LAEDC

## INDUSTRY OCCUPATIONS MOST VULNERABLE TO DISPLACEMENT

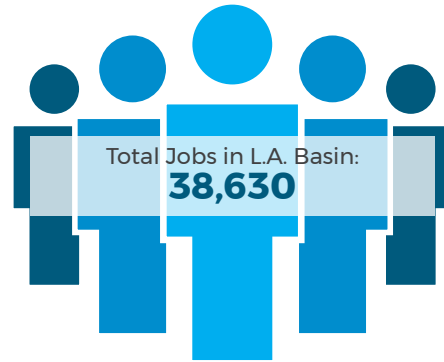
SOC	Detailed Occupation	Displacement Threat
51-2022	Electrical and Electronic Equipment Assemblers	Automated systems risk
51-9022	Grinding and Polishing Workers, Hand	Automated systems risk
51-2091	Fiberglass Laminators and Fabricators	Automated systems risk
43-5071	Shipping, Receiving, and Traffic Clerks	Automated systems risk

Source: LAEDC

# Bio-Medical

(NAICS 3254 and 3391)

This industry comprises establishments primarily engaged in one or more of the following: (1) manufacturing biological and medicinal products; (2) processing (i.e., grading, grinding and milling) botanical drugs and herbs; (3) isolating medicinal principals from botanical drugs and herbs; and (4) manufacturing pharmaceutical products intended for internal and external consumption. This industry also comprises establishments that manufacture medical equipment and supplies.

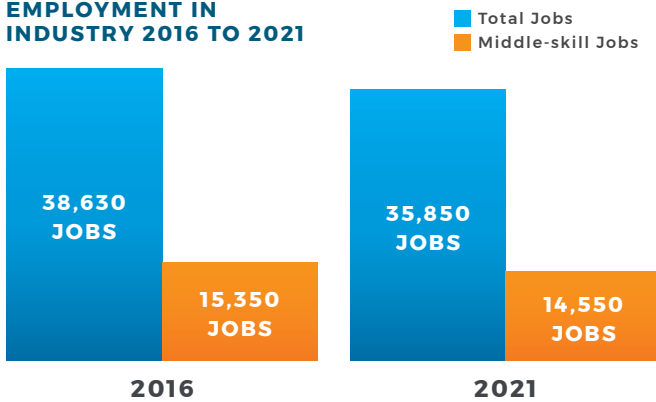


Average Wage  
in 2016:  
**\$70,390**

AUTOMATION  
POTENTIAL  
**60**  
out of 100

Source: McKinsey&Company

## EMPLOYMENT IN INDUSTRY 2016 TO 2021



## Middle-skill Jobs 2016-2021:

- 2016 jobs: 15,350
- 2021 jobs: 14,550
- Projected job growth: -6%
- Projected new jobs: -790
- Projected 5-year replacement rate: 11%
- Projected total openings: 650

Middle-skill  
Job Share:  
**40%**  
in 2016

## Business Revenues:

- \$22 billion in 2015

## 1% of Gross Regional Product:

- Valued at \$8 billion in 2015

## Employment by Industry 2016:

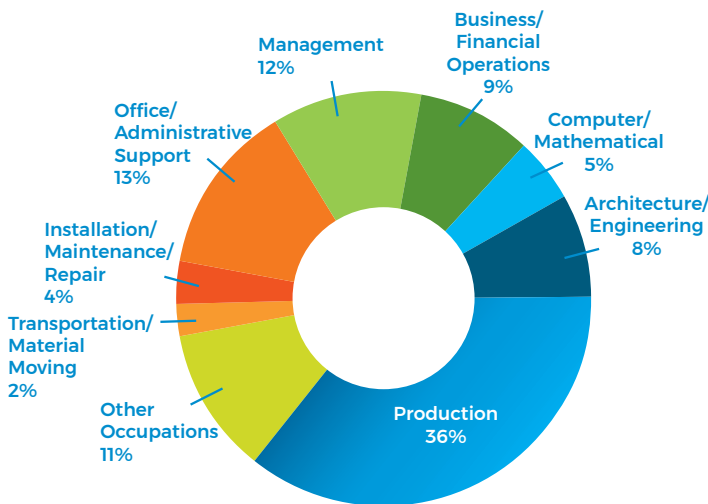
- Medical equipment and supplies manufacturing: 68%
- Pharmaceutical and medicine manufacturing: 32%

## Employment Growth:

- 2016 to 2021: -8%

Sources: BLS, QCEW and OES; IMPLAN, forecasts and estimates by LAEDC

## EMPLOYMENT DISTRIBUTION BY OCCUPATION L.A. BASIN 2016



## INDUSTRY OCCUPATIONS MOST VULNERABLE TO DISPLACEMENT

SOC	Detailed Occupation	Displacement Threat
27-3042	Technical Writers	Data automation risk
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	Automated systems risk
43-9021	Data Entry Keyers	Data automation risk
51-6031	Sewing Machine Operators	Automated systems risk
51-9198	Helpers--Production Workers	Robotics risk

Source: LAEDC

# Entertainment

(NAICS 512, 515 and 711)

This industry comprises establishments involved in the production and distribution of motion pictures and sound recordings as well as establishments that create content or acquire the right to distribute content and broadcast the content. The industry also comprises establishments that produce or organize and promote live presentations involving the performances of actors, singers, dancers, musical groups, artists, athletes and other entertainers.



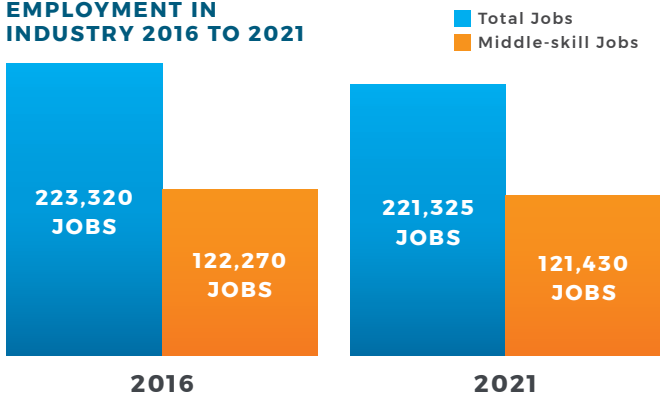
Average Wage  
in 2016:  
**\$112,865**

**AUTOMATION POTENTIAL**

**41**  
out of 100

Source: McKinsey&Company

## EMPLOYMENT IN INDUSTRY 2016 TO 2021

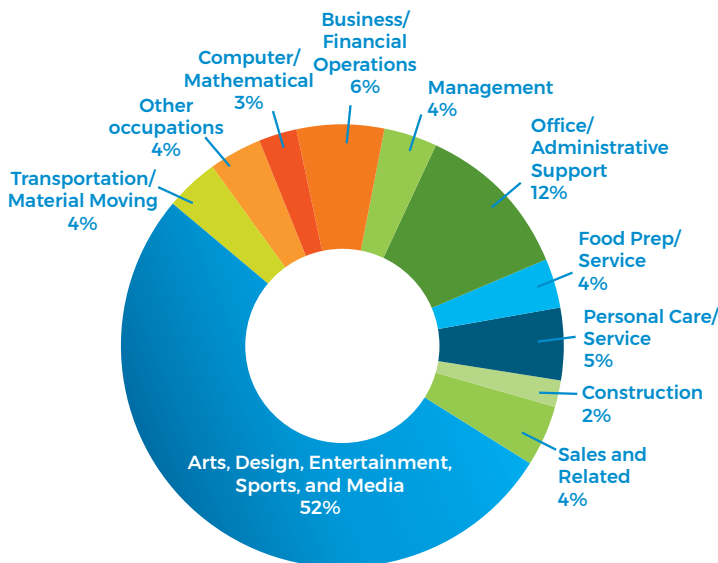


**Middle-skill Jobs 2016-2021:**

- 2016 jobs: 122,280
- 2021 jobs: 121,430
- Projected job growth: -1%
- Projected new jobs: -850
- Projected 5-year replacement rate: 12%
- Projected total openings: 5,960

**Middle-skill Job Share: 55% in 2016**

## EMPLOYMENT DISTRIBUTION BY OCCUPATION L.A. BASIN 2016



**Business Revenues:**

- \$112 billion in 2015

**10% of Gross Regional Product:**

- Valued at \$86 billion in 2015

**Employment by Industry 2016:**

- Motion picture and sound recording industries: 69%
- Performing arts and spectator sports: 22%
- Broadcasting, except internet: 10%

**Employment Growth:**

- 2016 to 2021: -1%

Sources: BLS, QCEW and OES; IMPLAN, forecasts and estimates by LAEDC

## INDUSTRY OCCUPATIONS MOST VULNERABLE TO DISPLACEMENT

SOC	Detailed Occupation	Displacement Threat
53-3032	Heavy and Tractor-Trailer Truck Drivers	Autonomous vehicle risk
53-6021	Parking Lot Attendants	Automated systems risk
53-3041	Taxi Drivers and Chauffeurs	Autonomous vehicle risk
43-2011	Switchboard Operators, Including Answering Service	Automated systems risk

Source: LAEDC



# Health Care Services

(NAICS 621, 622 and 623)

This industry comprises businesses that offer health care services directly and indirectly to ambulatory patients as well as hospitals that provide medical, diagnostic and treatment services to patients as well as specialized accommodation services required by inpatients. This industry includes establishments that provide residential care combined with either nursing, supervisory or other types of care as required by residents.

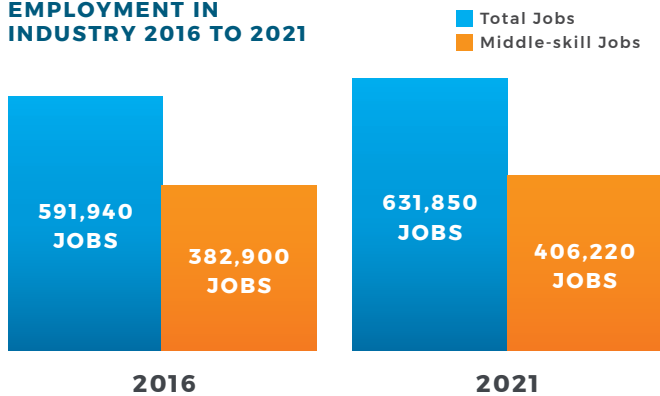


Average Wage  
in 2016:  
**\$60,570**

**AUTOMATION POTENTIAL**  
**36**  
out of 100

Source: McKinsey&Company

## EMPLOYMENT IN INDUSTRY 2016 TO 2021

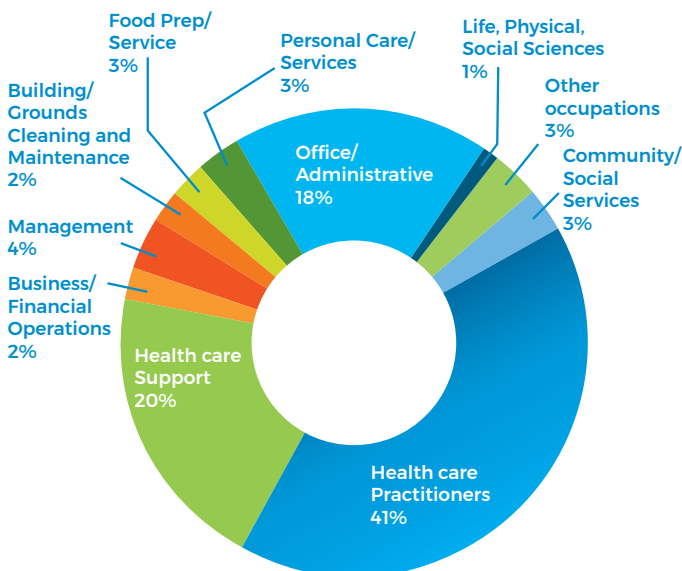


### Middle-skill Jobs 2016-2021:

- 2016 jobs: 382,900
- 2021 jobs: 406,220
- Projected job growth: 6%
- Projected new jobs: 23,320
- Projected 5-year replacement rate: 11%
- Projected total openings: 27,740

**Middle-skill Job Share:**  
**65%**  
in 2016

## EMPLOYMENT DISTRIBUTION BY OCCUPATION L.A. BASIN 2016



### Business Revenues:

- \$73 billion in 2015

### 5% of Gross Regional Product:

- Valued at \$47 billion in 2015

### Employment by Industry 2016:

- Ambulatory health care services: 49%
- Hospitals: 33%
- Nursing and residential care facilities: 18%

### Employment Growth:

- 2016 to 2021: 6%

Sources: BLS, QCEW and OES; IMPLAN, forecasts and estimates by LAEDC

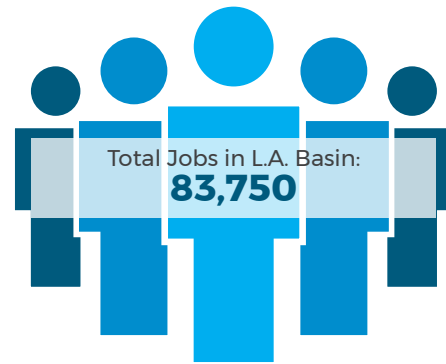
## INDUSTRY OCCUPATIONS MOST VULNERABLE TO DISPLACEMENT

SOC	Detailed Occupation	Displacement Threat
31-9095	Pharmacy Aides	Automated systems risk
31-9094	Medical Transcriptionists	Data automation risk
53-3041	Taxi Drivers and Chauffeurs	Autonomous vehicle risk
43-9021	Data Entry Keyers	Data automation risk

Source: LAEDC

# Ports and Supporting Transportation Activities (NAICS 481, 483 and 488)

This industry comprises establishments primarily engaged in: air transportation of passengers and/or cargo using aircraft; water transportation of passengers and cargo using ships, barges or boats; and services that support transportation. These services may be provided to transportation carrier establishments or the general public.

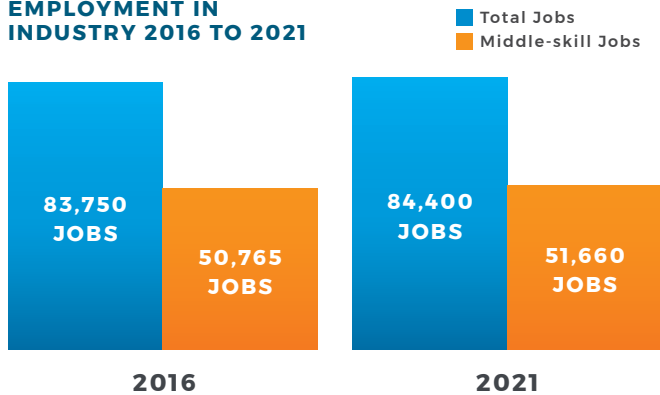


Average Wage  
in 2016:  
**\$70,870**



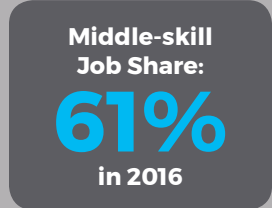
Source: McKinsey&Company

## EMPLOYMENT IN INDUSTRY 2016 TO 2021

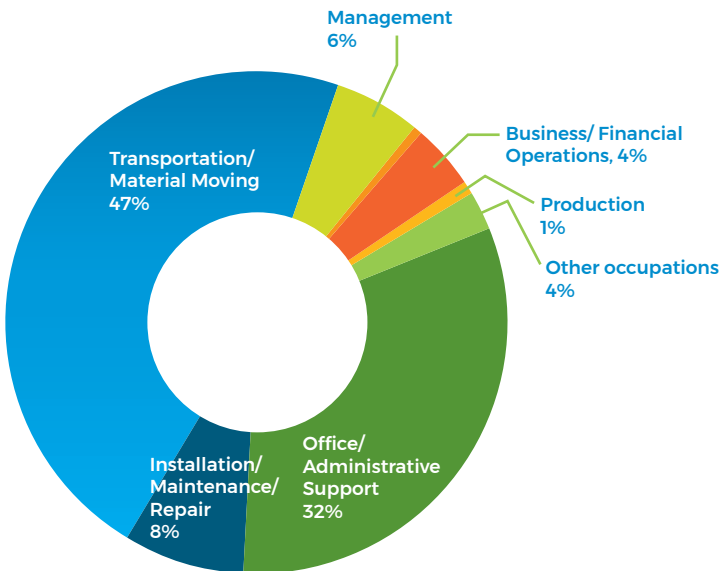


## Middle-skill Jobs 2016-2021:

- 2016 jobs: 50,765
- 2021 jobs: 51,660
- Projected job growth: 2%
- Projected new jobs: 890
- Projected 5-year replacement rate: 12%
- Projected total openings: 3,095



## EMPLOYMENT DISTRIBUTION BY OCCUPATION L.A. BASIN 2016



## Business Revenues:

- \$19 billion in 2015

## 1% of Gross Regional Product:

- Valued at \$9 billion in 2015

## Employment by Industry 2016:

- Support activities for transportation: 66%
- Air transportation: 30%
- Water transportation: 4%

## Employment Growth:

- 2016 to 2021: 1%

Sources: BLS, QCEW and OES; IMPLAN, forecasts and estimates by LAEDC

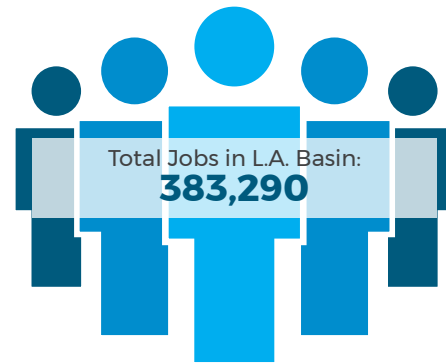
## INDUSTRY OCCUPATIONS MOST VULNERABLE TO DISPLACEMENT

SOC	Detailed Occupation	Displacement Threat
53-3032	Heavy and Tractor-Trailer Truck Drivers	Autonomous vehicle risk
53-7051	Industrial Truck and Tractor Operators	Autonomous vehicle risk
53-3033	Light Truck or Delivery Services Drivers	Data automation risk
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	Robotics risk

Source: LAEDC

# Professional and Technical Business Services (NAICS 541 Less 5417)

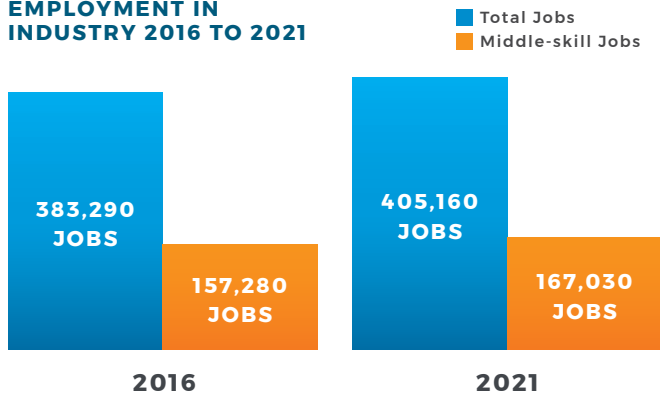
This industry comprises establishments primarily engaged in processes where human capital is the major input. These establishments make available the knowledge and skills of their employees, often on an assignment basis, where an individual or team is responsible for the delivery of services to the client.



Average Wage  
in 2016:  
**\$94,540**

**AUTOMATION POTENTIAL**  
**35**  
out of 100  
Source: McKinsey & Company

## EMPLOYMENT IN INDUSTRY 2016 TO 2021

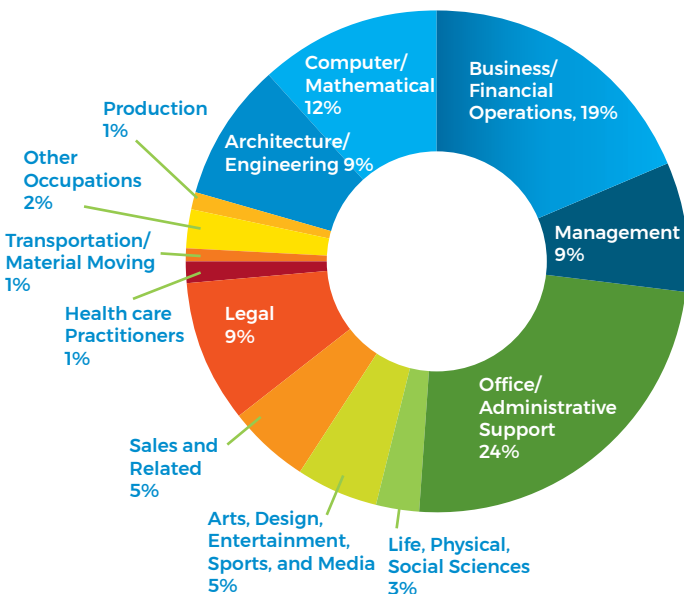


**Middle-skill Jobs 2016-2021:**

- 2016 jobs: 157,280
- 2021 jobs: 167,030
- Projected job growth: 6%
- Projected new jobs: 9,750
- Projected 5-year replacement rate: 10%
- Projected total openings: 17,030

**Middle-skill Job Share: 41% in 2016**

## EMPLOYMENT DISTRIBUTION BY OCCUPATION L.A. BASIN 2016



**Business Revenues:**

- \$104 billion in 2015

**8% of Gross Regional Product:**

- Valued at \$71 billion in 2015

**Employment Growth:**

- 2016 to 2021: 5%

Sources: BLS, QCEW and OES; IMPLAN, forecasts and estimates by LAEDC

## INDUSTRY OCCUPATIONS MOST VULNERABLE TO DISPLACEMENT

SOC	Detailed Occupation	Displacement Threat
13-2011	Accountants and Auditors	Data automation risk
13-2041	Credit Analysts	Data automation risk
13-1051	Cost Estimators	Data automation risk
17-1022	Surveyors	UAV and data automation risk

Source: LAEDC

## 7 Target Industry Occupations

In this section, we convert industry job creation projections into occupational projections and select 20 middle-skill detailed occupations from our identified target industries as promising targets for post-secondary programs for community colleges.

### 7.1 Selecting Occupations

The growth of industries in the region will precipitate the growth of particular occupations. From each of the six target industries, the occupations with the most job creation potential and the highest replacement rate were selected and compiled in a comprehensive list. These occupations were examined, not only for their prominence in the target industry, but also for their skill and competency relevance across all industries, as other industries hiring this occupation are also viable job targets for student completing a training program.

The overall net growth of an occupation is a consequence of its contribution to industries that are growing and to industries that are declining. Additionally, workers within industries leave current positions, either through retirement or through promotion, or for other reasons, leaving positions open and in need of replacement.

This may result in an occupation experiencing no or little growth as workers that had been employed in a failing industry shift to similar roles in industries that are growing, or as workers in certain occupations are replaced with improved technologies or processes.

Exhibit 7-1 presents the top 20 detailed middle-skills occupations selected as target industry occupations with the most potential for community college programs.

In this section, we provide a detailed occupational data sheet for each identified detailed occupation selected as a target industry occupation from our six identified target industries outlined in the previous section.

**EXHIBIT 7-1**  
TARGET INDUSTRY OCCUPATIONS IN L.A. BASIN  
Middle-Skill Occupations

SOC	Detailed Occupation	Total Jobs 2016	Projected Openings 2016-21
11-3071	Transportation, Storage and Distribution Managers	6,210	1,330
15-1134	Web Developers	8,680	1,780
15-1151	Computer User Support Specialists	23,500	3,880
27-1022	Fashion Designers	5,270	760
27-1024	Graphic Designers	12,650	2,410
27-4011	Audio and Video Equipment Technicians	10,710	1,880
27-4032	Film and Video Editors	12,588	1,070
29-1141	Registered Nurses	102,749	18,470
29-2061	Licensed Practical/ Licensed Vocational Nurses	28,170	5,220
31-1014	Nursing Assistants	42,070	6,540
43-3031	Bookkeeping, Accounting and Auditing Clerks	76,510	3,920
43-3051	Payroll and Timekeeping Clerks	9,220	1,900
43-5061	Production, Planning and Expediting Clerks	23,110	4,610
47-2111	Electricians	17,180	2,990
49-3011	Aircraft Mechanics and Service Technicians	5,250	650
49-3042	Mobile Hvy Equipmnt Mechanics, Except Engines	3,800	880
49-9041	Industrial Machinery Mechanics	7,810	1,670
51-4011	Computer-Controlled Machine Tool Operators, Metal/ Plastic	6,610	1,490
51-4121	Welders, Cutters, Solderers and Brazers	9,610	2,170
51-9061	Inspectors, Testers, Sorters, Samplers/ Weighers	22,380	3,840
<b>TOTAL</b>	<b>Target Industry Occupations</b>	<b>434,070</b>	<b>67,450</b>

Source: Estimates by LAEDC

## 7.2 Target Industry Occupational Pages

The focus of this occupational analysis is on middle-skill occupations in selected target industries that are predicted to have significant job prospects over the next five years and that stand to benefit from investment in postsecondary nondegree and career education programs.

Together, these 20 target industry occupations account for approximately 21.2 percent of all projected new jobs in the Los Angeles Basin from 2016 through 2021.

In the pages that follow, each of the occupations listed in the directory is detailed as follows:

- *Description and core tasks and importance* are outlined and detailed. Importance is the degree of importance, on a scale of zero to 100, of a particular core task to the occupation. Core tasks, those with the criteria a relevance of  $\geq 67$  percent, are considered critical to the occupation.
- *Hourly wages* paid in 2016 for workers in this occupation in Los Angeles and Orange counties compared to the living wage.
- The *distribution* of workers in this occupation across industry sectors in the L.A. Basin.
- Metrics for this occupation including: number of current jobs and projected openings, community college supply data, and identified technology used (or which must be taught).
- *Worker characteristics*, such as educational attainment, age distribution, race and ethnicity, and gender of workers in this occupation.
- *Related occupations* with similar skills, knowledge and abilities, as a potential source for projected workforce needs.
- A *crosswalk between work activities* performed in this occupation and similar, related occupations.

## Directory of Target Industry Occupations

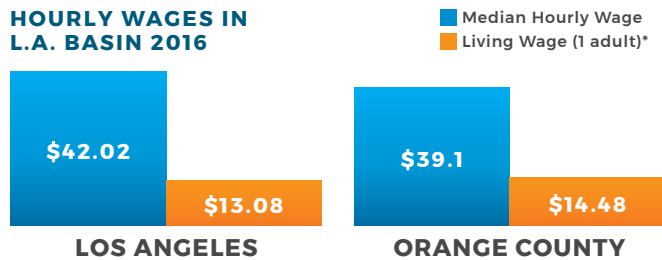
- Transportation, Storage and Distribution Managers (SOC 11-3071)
- Web Developers (SOC 15-1134)
- Computer User Support Specialists (SOC 11-1151)
- Fashion Designers (SOC 27-1022)
- Graphic Designers (SOC 27-1024)
- Audio and Video Equipment Technicians (SOC 27-4011)
- Film and Video Editors (SOC 27-4032)
- Registered Nurses (SOC 29-1141)
- Licensed Practical and Licensed Vocational Nurses (SOC 29-2061)
- Nursing Assistants (SOC 31-1014)
- Bookkeeping, Accounting and Auditing Clerks (SOC 43-3031)
- Payroll and Timekeeping Clerks (SOC 43-3051)
- Production, Planning and Expediting Clerks (SOC 43-5061)
- Electricians (SOC 47-2111)
- Aircraft Mechanics and Service Technicians (SOC 49-3011)
- Mobile Heavy Equipment Mechanics (not engines) (SOC 49-3042)
- Industrial Machinery Mechanics (SOC 49-9041)
- Computer-Controlled Machine Tool Operators, Metal and Plastic (SOC 51-4011)
- Welders, Cutters, Solderers and Brazers (SOC 51-4121)
- Inspectors, Testers, Sorters, Samplers and Weighers (SOC 51-9061)

Together, these 20 target industry occupations account for approximately 21.2 percent of all projected new jobs in the Los Angeles Basin from 2016 through 2021.

# Transportation, Storage and Distribution Managers (SOC 11-3071)

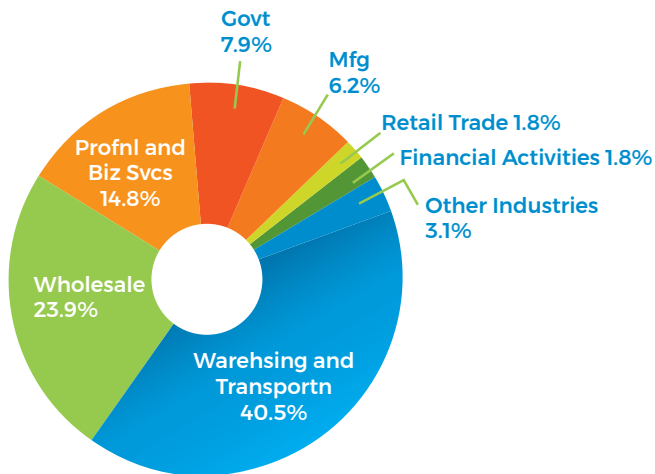
Transportation, storage and distribution managers are identified as a middle-skill occupation. They plan, direct, or coordinate transportation, storage, or distribution activities in accordance with organizational policies and applicable government laws or regulations. Includes logistics managers.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Transportation, storage and distribution managers are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Warehousing and transportation hires the most workers in this occupation in the L.A. Basin. The three industry subsectors that employ the largest number of transportation, storage and distribution managers in the L.A. Basin are:

- Support Activities for Transportation (NAICS 488)
- Wholesalers, Nondurable Goods (NAICS 424)
- Wholesalers, Durable Goods (NAICS 423)

## Jobs in L.A. Basin

**6,210**  
in 2016

## Total Openings

**1,330**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 1,330 Total Openings (5-yr)
- 650 Net Job Change
- 680 5-yr Replacements

### Community Colleges Supply:

- 1,258 Awards
- 4 Programs
- 21 Colleges

### Technology:

- Analytical or scientific software
  - FRCOS software; IMSure Solutions SHIPflex
- Route navigation software
  - ALK Technologies FleetSuite; CoPilot Truck; Integrated Decision Support Corporation Route Systems Fleet Commander
- Inventory management software
  - Aljex Inventory; Iptor Supply Chain; MRA Technologies MRATrack Warehouse Management System
- Materials requirements planning logistics and supply chain software
  - Cadre Technologies Cadence Transportation Management System

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 89** Supervise the activities of workers engaged in receiving, storing, testing and shipping products or materials.
- 83** Plan, develop or implement warehouse safety and security programs and activities.
- 83** Inspect physical conditions of warehouses, vehicle fleets, or equipment and order testing, maintenance, repairs or replacements.
- 82** Plan, organize or manage the work of subordinate staff to ensure that the work is accomplished in a manner consistent with organizational requirements.
- 82** Direct activities related to dispatching, routing or tracking transportation vehicles, such as aircraft or railroad cars.
- 78** Collaborate with other departments to integrate logistics with business systems or processes, such as customer sales, order management, accounting or shipping.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

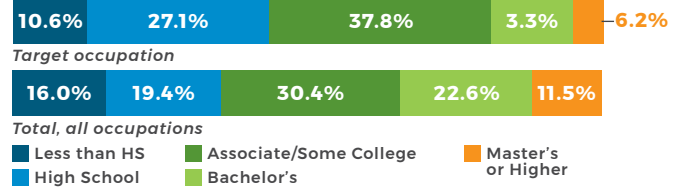
- Most workers have the educational attainment of associate degree or some college.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this occupation is diverse, with the largest shares held by Hispanic, white and Asian workers, accounting for 91 percent.
- The workforce is predominantly male, accounting for 83 percent of all workers.

## Related Occupations

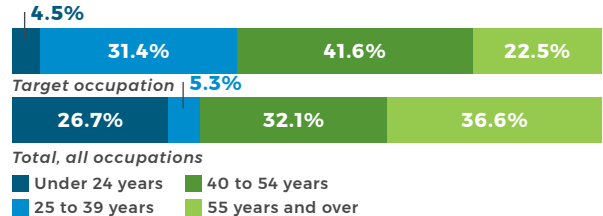
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 51-4031** Cutting, punching and press machine setters, operators and tenders, metal and plastic (6,430 workers)
- **SOC 13-1081** Logisticians (6,040 workers),
- **SOC 11-3061** Purchasing managers (3,390 workers),
- **SOC 13-1023** Purchasing agents, except wholesale, retail, and farm products (11,970 workers), and
- **SOC 11-1021** General and operations manager (101,490 workers).

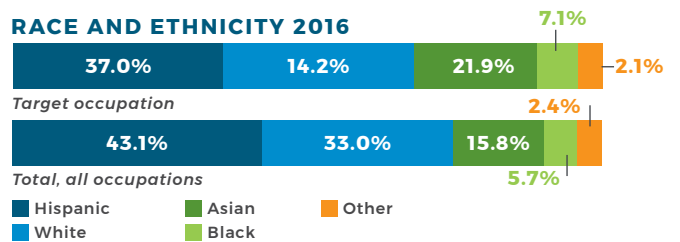
### EDUCATIONAL ATTAINMENT 2016



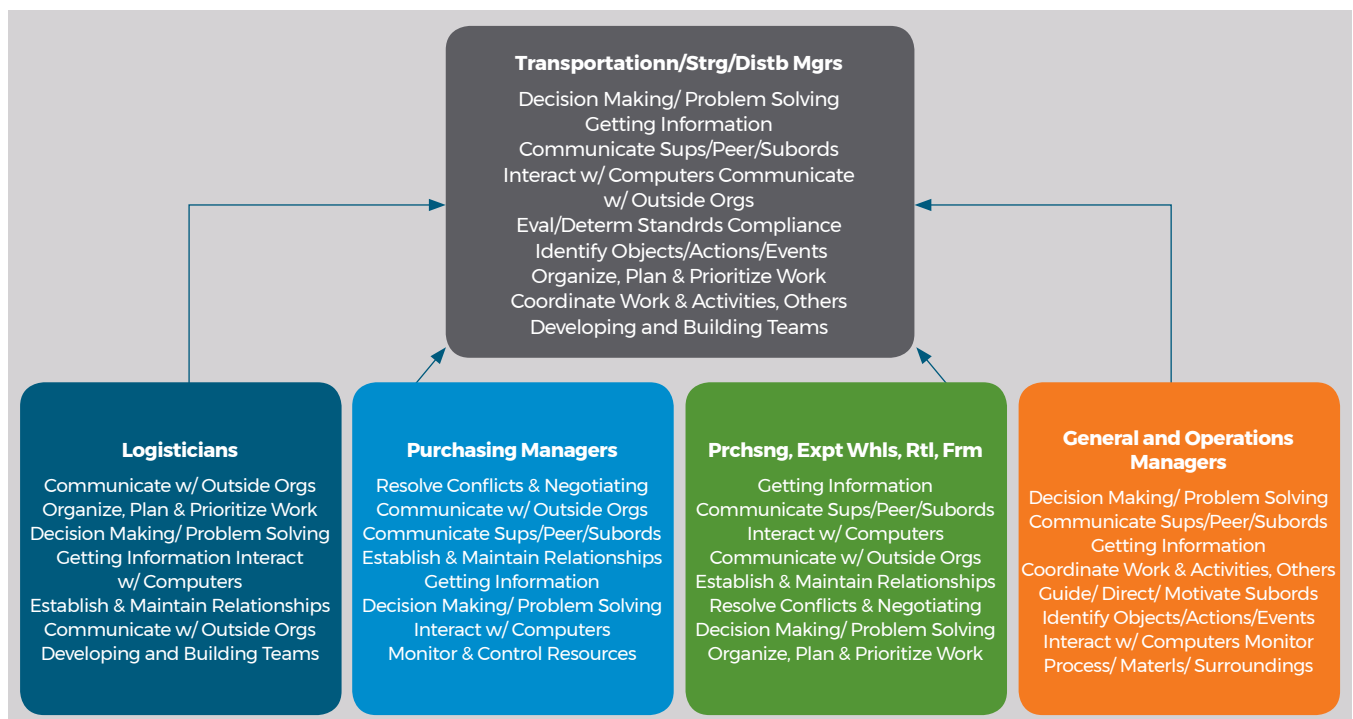
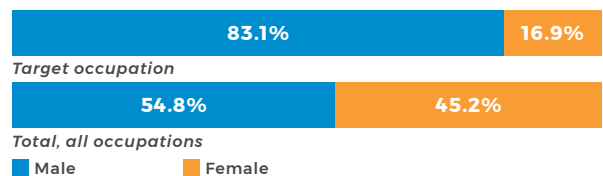
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

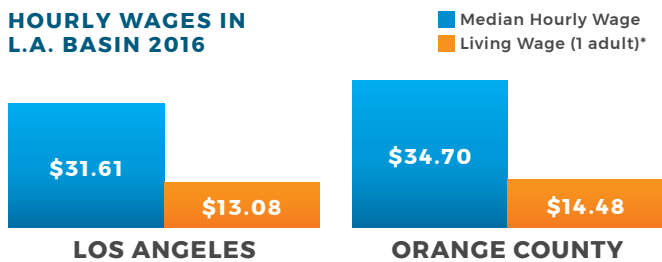


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Web Developers (SOC 15-1134)

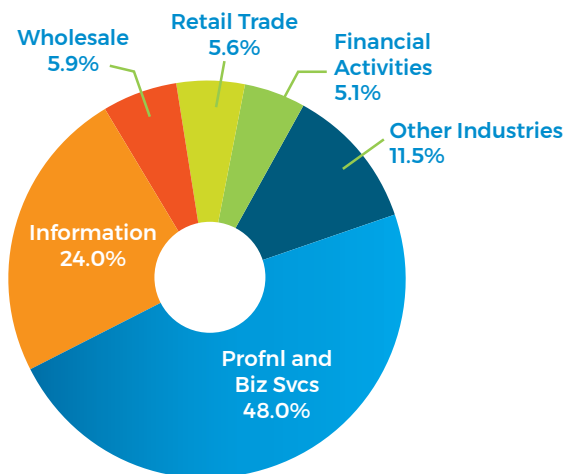
Web developers are identified as a middle-skill occupation. Design, create, and modify websites. Analyze user needs to implement website content, graphics, performance, and capacity. May integrate websites with other computer applications. May convert written, graphic, audio, and video components to compatible web formats by using software designed to facilitate the creation of web and multimedia content.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Web developers are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Professional and business services hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of web developers in the L.A. Basin are:

- Profnl, Scientific and Technical Svcs (NAICS 541)
- Mgmt of Companies and Enterprises (NAICS 551)
- Data Processing, Hosting and Related (NAICS 518)

## Jobs in L.A. Basin

**8,680**  
in 2016

## Total Openings

**1,780**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 1,780 Total Openings (5-yr)
- 1,220 Net Job Change
- 560 5-yr Replacements

### Community Colleges Supply:

- 52 Awards
- 2 Programs
- 10 Colleges

### Technology:

- Data base management system software
  - Apache Hadoop; NoSQL; Teradata Database
- Development environment software
  - Apache Maven; C; Integrated Development Environment IDE software
- Object or component oriented development software
  - Apache Spark; C++; Oracle Java; Python
- Operating system software
  - Linux; Oracle Solaris; Ubuntu
- Web platform development software
  - AJAX; Drupal; JavaScript; Ruby on Rails

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 90** Write supporting code for web applications or websites.
- 86** Design, build or maintain websites, using authoring or scripting languages, content creation tools, management tools and digital media.
- 84** Back up files from websites to local directories for instant recovery in case of problems.
- 83** Write, design or edit web page content, or direct others producing content.
- 79** Select programming languages, design tools or applications.
- 77** Evaluate code to ensure that it is valid, is properly structured, meets industry standards, and is compatible with browsers, devices, or operating systems.



## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

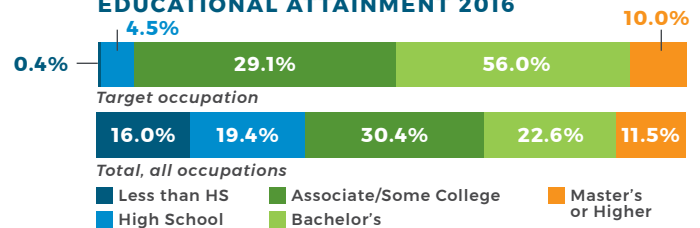
- Most workers have the educational attainment of a bachelor's degree, but 29 percent have an associate or some college.
- A very small share of workers are ages 55 years and over in this occupation.
- The workforce in this occupation is predominantly white, accounting for 57 percent of all workers.
- The workforce is predominantly male, accounting for 65 percent of all workers.

## Related Occupations

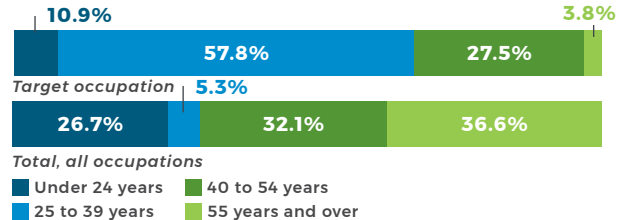
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 15-1121** Computer systems analysts (20,871 workers),
- **SOC 15-1141** Database administrators (4,490 workers),
- **SOC 15-1133** Software developers, systems software (24,160 workers), and
- **SOC 15-1143** Computer network architects (4,580 workers).

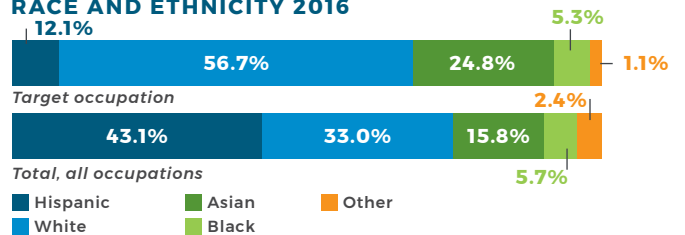
### EDUCATIONAL ATTAINMENT 2016



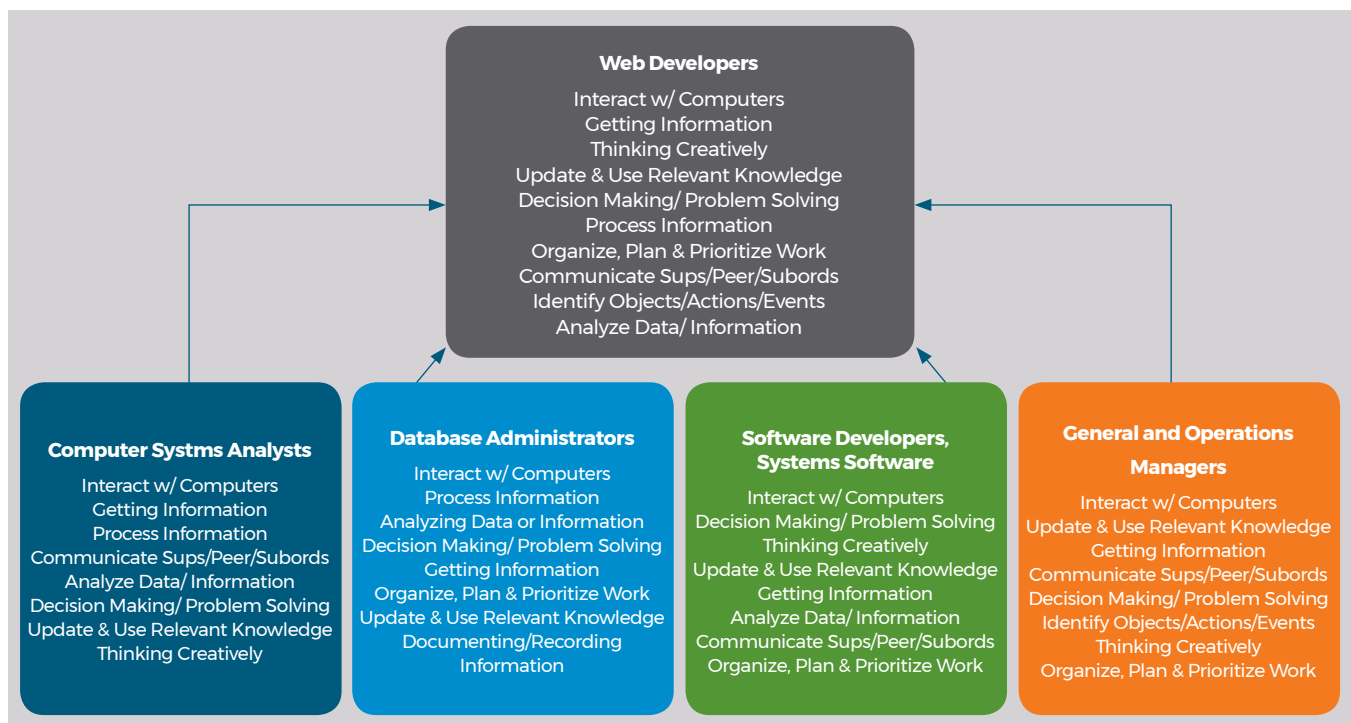
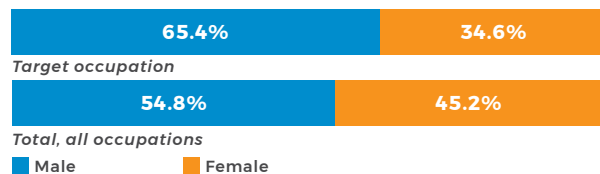
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

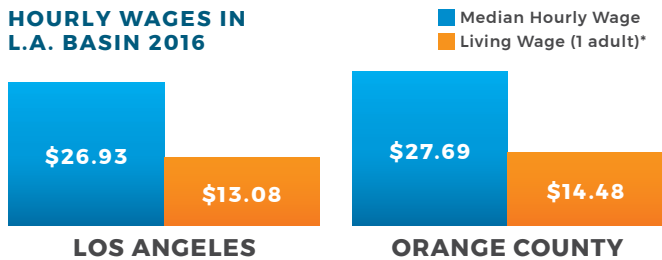


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Computer User Support Specialists (SOC 15-1151)

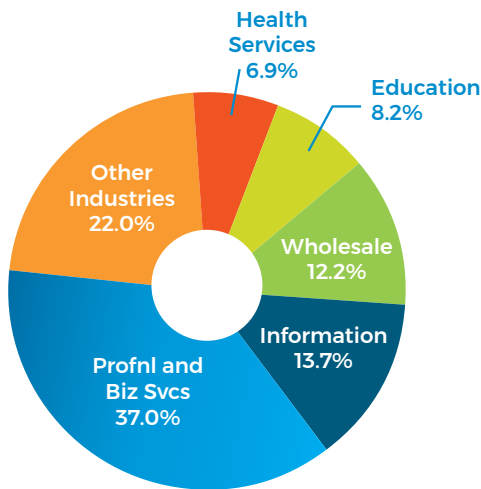
Computer user support specialists are identified as a middle-skill occupation. Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, or via telephone or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Computer user support specialists are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Professional and business services hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of computer user support specialists in the L.A. Basin are:

- Profnl, Scientific and Technical Svcs (NAICS 541)
- Administrative and Support Services (NAICS 561)
- Wholesalers, Durable Goods (NAICS 423)

## Jobs in L.A. Basin

**23,500**  
in 2016

## Total Openings

**3,880**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 3,880 Total Openings (5-yr)
- 2,370 Net Job Change
- 1,510 5-yr Replacements

### Community Colleges Supply:

- 430 Awards
- 4 Programs
- 23 Colleges

### Technology:

- Data base management system software
  - FileMaker Pro; MySQL; Oracle JDBC
- Desktop communications software
  - CrossTec NetOp Remote Control; Stac Software ReachOut
- Development environment software
  - Apache Maven; C; Eclipse IDE; Microsoft PowerShell
- Operating system software
  - Cisco Systems IOS; Hewlett Packard HP-UX; Linux
- Web platform development software
  - Apache Tomcat; Drupal; LAMP Stack

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 90** Answer user inquiries regarding computer software or hardware operation to resolve problems.
- 82** Oversee the daily performance of computer systems.
- 81** Read technical manuals, confer with users or conduct computer diagnostics to investigate and resolve problems or to provide technical assistance and support.
- 79** Set up equipment for employee use, performing or ensuring proper installation of cables, operating systems or appropriate software.
- 77** Develop training materials and procedures, or train users in the proper use of hardware or software.
- 76** Refer major hardware or software problems or defective products to vendors or technicians for service.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

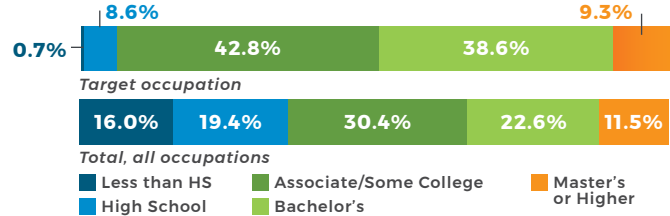
- Most workers have the educational attainment of an associate degree or some college.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this occupation is diverse. Hispanic, white and Asian workers account for 89 percent of all workers.
- The workforce is predominantly male, accounting for 76 percent of all workers.

## Related Occupations

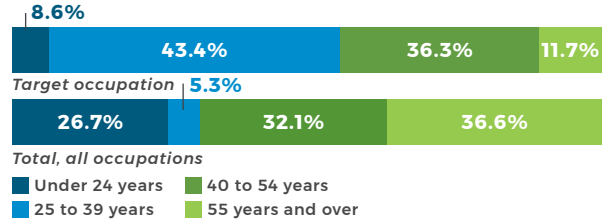
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 27-4012** Broadcast technicians (2,800 workers),
- **SOC 43-9011** Computer operators (1,320 workers),
- **SOC 27-4011** Audio and video equipment technicians (10,710 workers), and
- **SOC 25-9011** Audio-visual and multimedia collections specialists (630 workers).

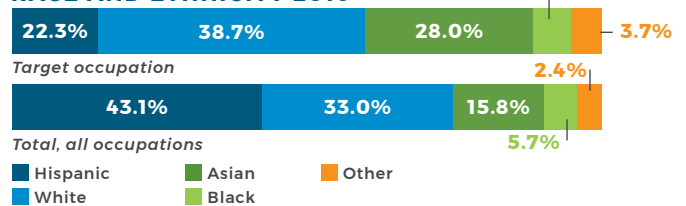
### EDUCATIONAL ATTAINMENT 2016



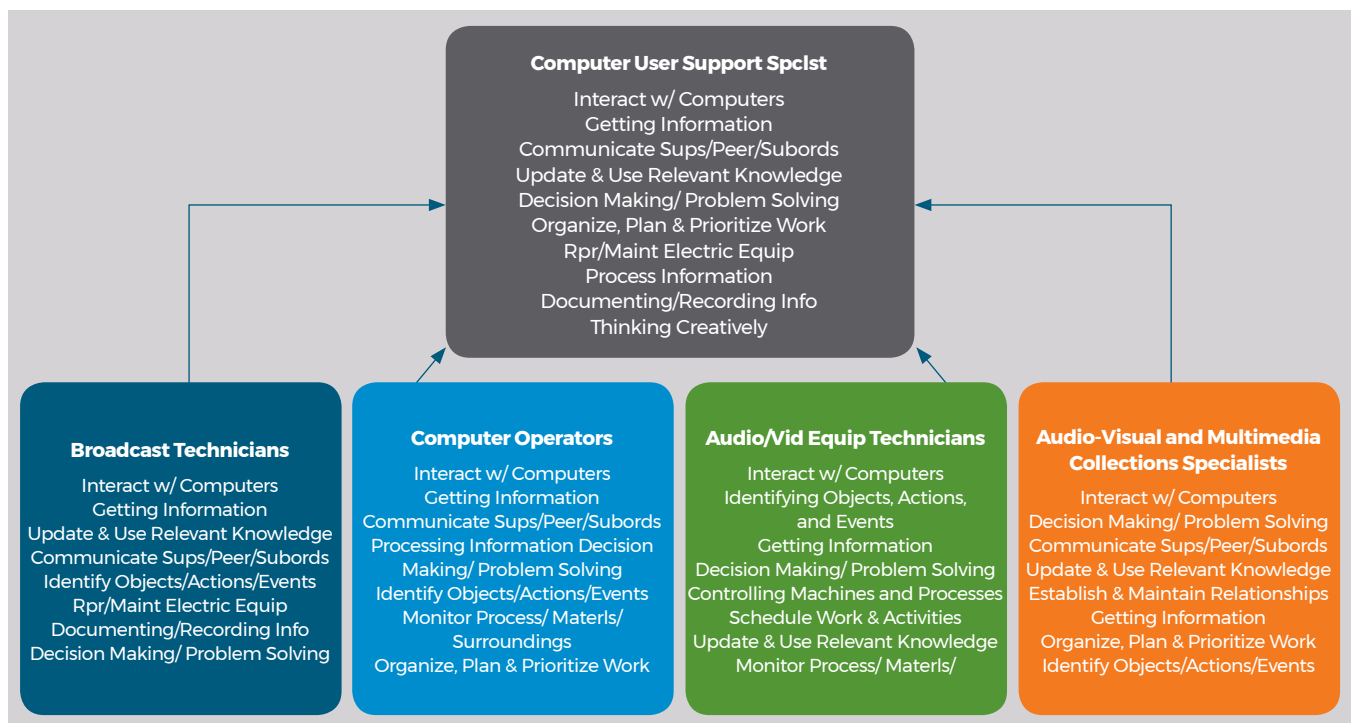
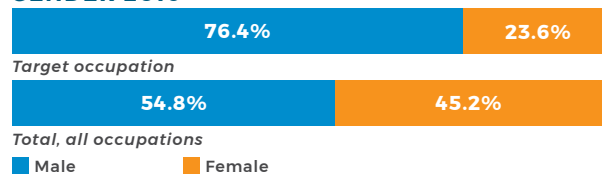
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

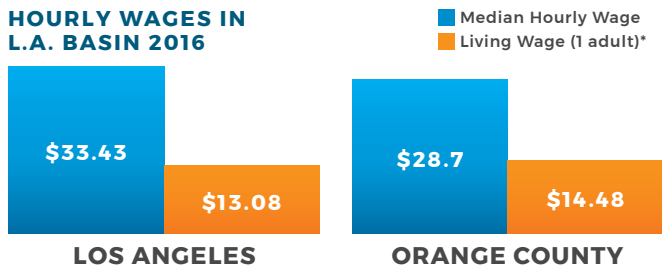


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Fashion Designers (SOC 27-1022)

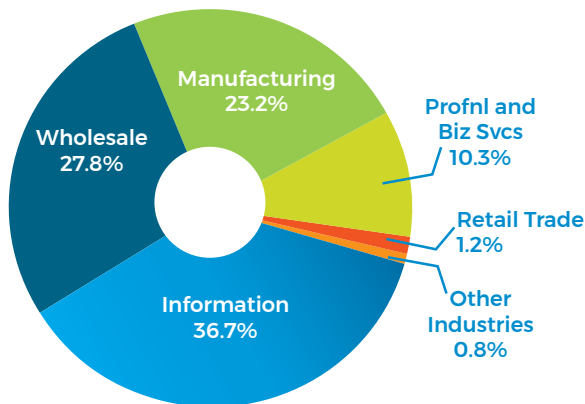
Fashion designers are identified as a middle-skill occupation. They design clothing and accessories. Create original designs or adapt fashion trends.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Fashion designers are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Information (NAICS 51) hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of fashion designers in the L.A. Basin are:

- Motion Picture and Sound Recording (NAICS 512)
- Wholesalers, Nondurable Goods (NAICS 424)
- Apparel Manufacturing (NAICS 315)

## Jobs in L.A. Basin

**5,270**  
in 2016

## Total Openings

**760**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 760 Total Openings (5-yr)
- 130 Net Job Change
- 630 5-yr Replacements

### Community Colleges Supply:

- 199 Awards
- 2 Programs
- 12 Colleges

### Technology:

- Accounting software
- Computer aided design CAD software Hot technology
  - Autodesk AutoCAD Design Suite;
  - C-DESIGN Fashion
- Development environment software
  - Apache Maven; C; Eclipse IDE;
  - Microsoft PowerShell
- Electronic mail software
- Graphics or photo imaging software
  - Adobe Systems Adobe Illustrator;
  - Adobe Photoshop
- Spreadsheet software

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 89** Direct and coordinate workers involved in drawing and cutting patterns and constructing samples or finished garments.
- 89** Examine sample garments on and off models, modifying designs to achieve desired effects.
- 87** Sketch rough and detailed drawings of apparel or accessories, and write specifications such as color schemes, construction, material types, and accessory requirements.
- 86** Confer with sales and management executives or with clients to discuss design ideas.
- 82** Identify target markets for designs, looking at factors such as age, gender, and socioeconomic status.
- 82** Attend fashion shows and review garment magazines and manuals to gather information about fashion trends and consumer preferences.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

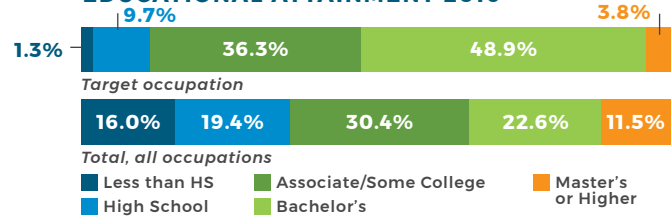
- Most workers have the educational attainment of a bachelor's, but 36 percent have an associate degree or some college.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this has a large share of Asian workers, White and Asian workers each account for 35 percent of all workers.
- The workforce is predominantly female, accounting for 76 percent of all workers.

## Related Occupations

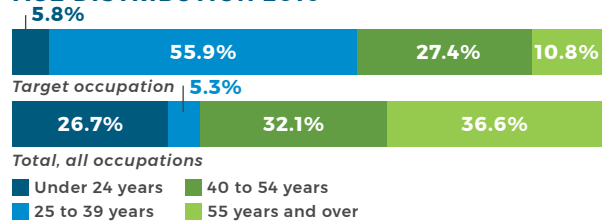
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 51-6092** Fashion and apparel patternmakers (1,280 workers),
- **SOC 27-1025** Interior designers (3,380 workers),
- **SOC 11-2021** Marketing managers (11,250 workers), and
- **SOC 43-9031** Desktop publishers (760 workers).

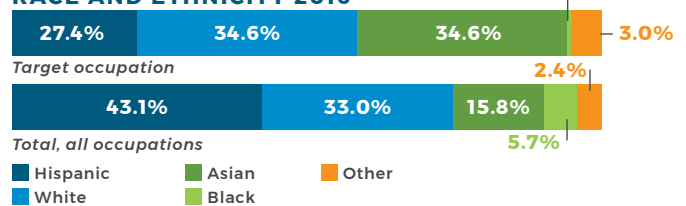
### EDUCATIONAL ATTAINMENT 2016



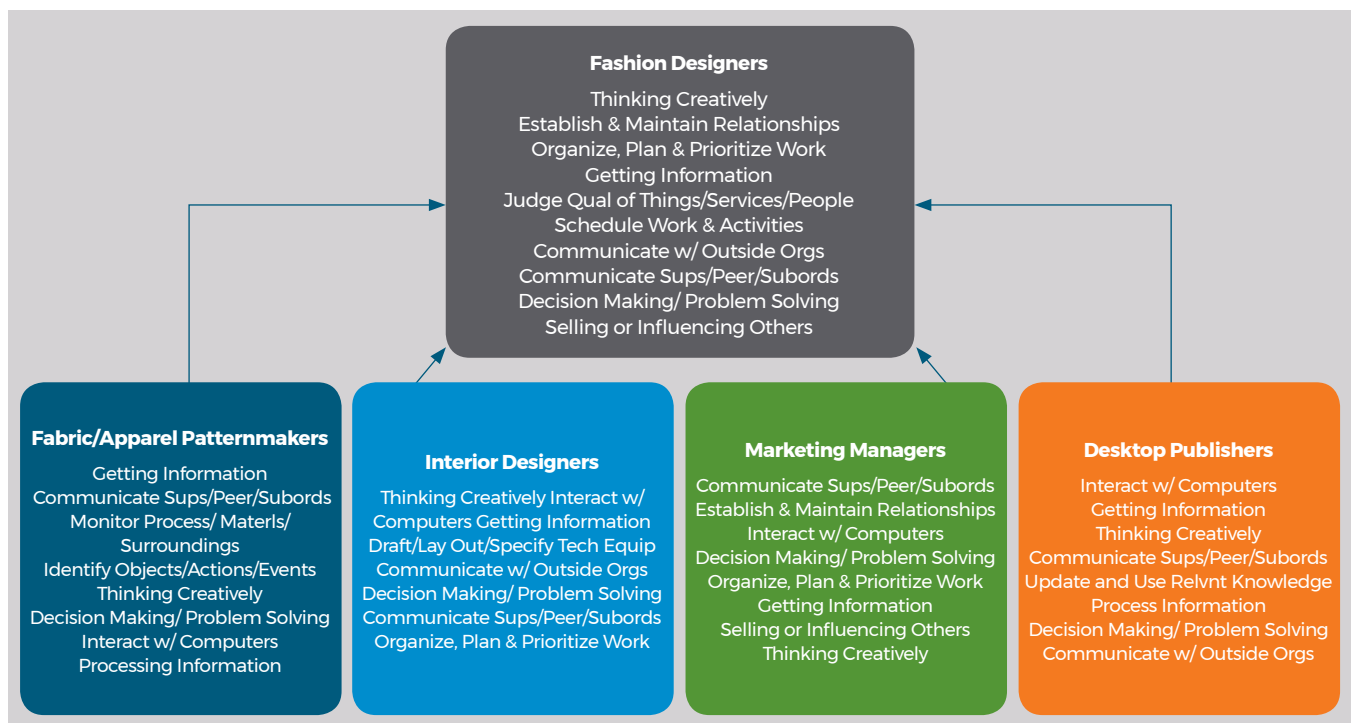
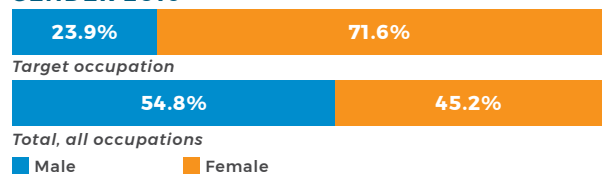
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

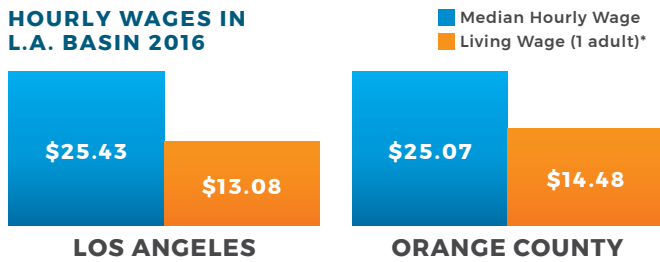


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Graphic Designers (SOC 27-1024)

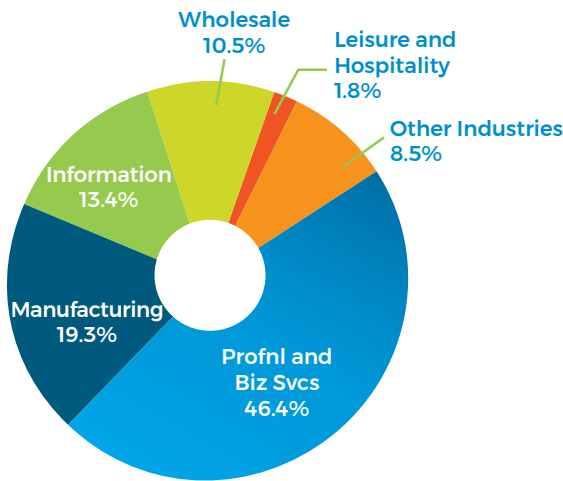
Graphic designers are identified as a middle-skill occupation. They design or create graphics to meet specific commercial or promotional needs, such as packaging, displays, or logos. May use a variety of mediums to achieve artistic or decorative effects.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Graphic designers are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Professional and business services hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of graphic designers in the L.A. Basin are:

- Profnl, Scientific and Technical Svcs (NAICS 541)
- Printing and Related Support (NAICS 323)
- Motion Picture and Sound Recording (NAICS 512)

Jobs in L.A. Basin <b>12,650</b> in 2016	Total Openings <b>2,410</b> 2016 to 2021
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### At A Glance

**Projected Openings 2021:**

- 2,410 Total Openings (5-yr)
- 910 Net Job Change
- 1,510 5-yr Replacements

**Community Colleges Supply:**

- 342 Awards
- 4 Programs
- 23 Colleges

**Technology:**

- Computer aided design CAD software Hot technology
  - Autodesk aided design CAD;
  - Dassault Systemes CATIA
- Desktop publishing software
  - Adobe InDesign; QuarkXPress
- Graphics or photo imaging software
  - Adobe Flash; Adobe Photoshop;
  - Microsoft Visio
- Video creation and editing software
  - Apple Final Cut Pro; MAXON CINEMA 4D
- Web platform development software
  - AJAX; Drupal; Hypertext markup language HTML

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 86** Determine size and arrangement of illustrative material and copy, and select style and size of type.
- 85** Confer with clients to discuss and determine layout design.
- 85** Create designs, concepts, and sample layouts, based on knowledge of layout principles and esthetic design concepts.
- 83** Develop graphics and layouts for product illustrations, company logos, and websites.
- 81** Use computer software to generate new images.
- 80** Review final layouts and suggest improvements as needed.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

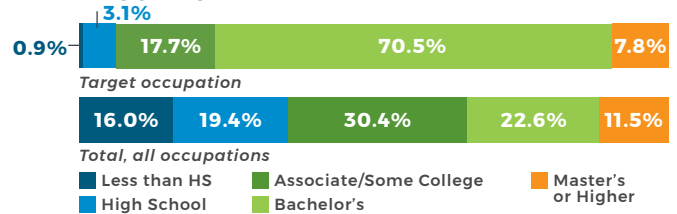
- Most workers have the educational attainment of a bachelor's, but 18 percent have an associate degree or some college.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this occupation is predominantly White and Asian, accounting for 74 percent of all workers.
- The workforce is almost evenly split between both genders.

## Related Occupations

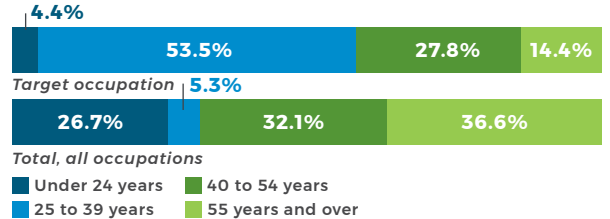
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 27-1011** Art directors(3,970 workers),
- **SOC 27-1014** Multimedia artists and animators (6,490 workers),
- **SOC 27-4032** Film and video editors (12,590 workers), and
- **SOC 11-2011** Advertising and promotions managers (1,700 workers).

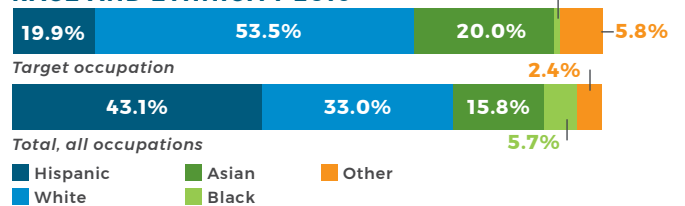
### EDUCATIONAL ATTAINMENT 2016



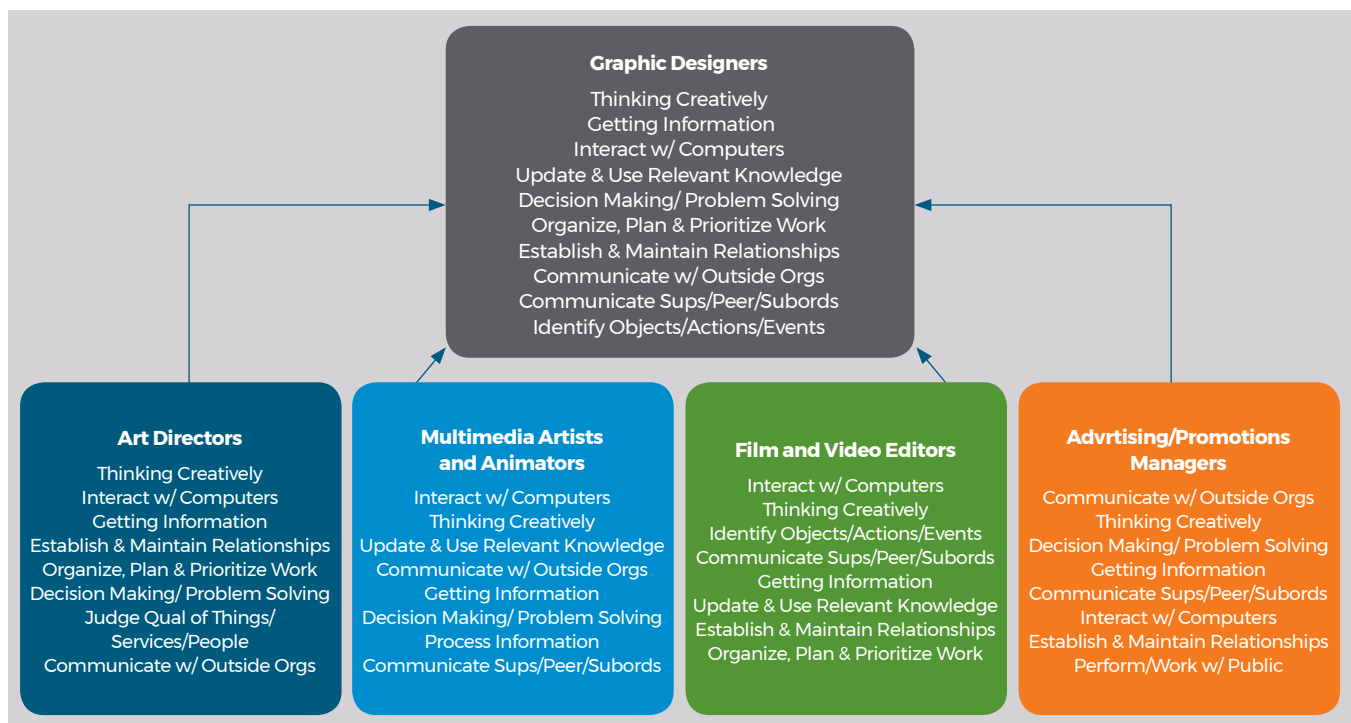
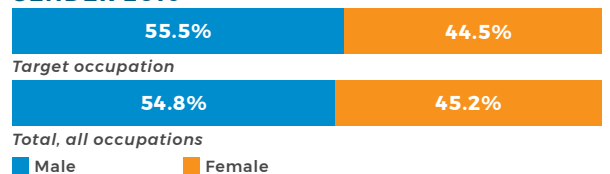
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

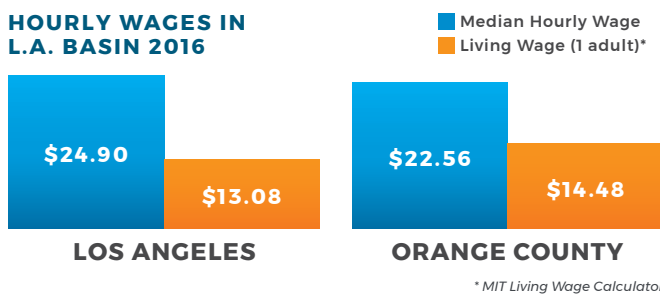


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

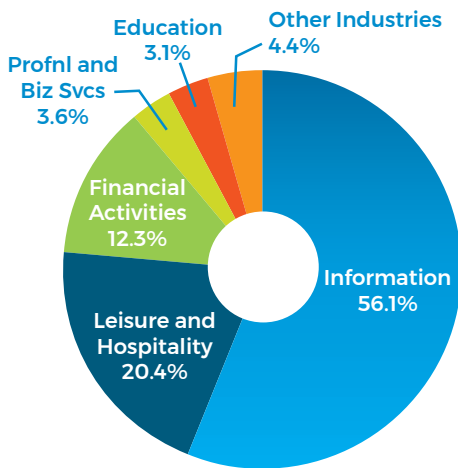
# Audio and Video Equipment Technicians (SOC 27-4011)

Audio and video equipment technicians are identified as a middle-skill occupation. They 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.

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



## Industry Distribution:

Audio and video equipment technicians are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Information (NAICS 51) hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of audio and video equipment technicians in the L.A. Basin are:

- Motion Picture and Sound Recording (NAICS 512)
- Performing Arts, Spectator Sports and Related (NAICS 711)
- Rental and Leasing Services (NAICS 532)

Jobs in L.A. Basin <b>10,710</b> in 2016	Total Openings <b>1,880</b> 2016 to 2021
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## At A Glance

**Projected Openings 2021:**

- 1,880 Total Openings (5-yr)
- 860 Net Job Change
- 1,010 5-yr Replacements

**Community Colleges Supply:**

- 294 Awards
- 2 Programs
- 15 Colleges

**Technology:**

- Graphics or photo imaging software
  - Adobe Flash; Adobe Illustrator; Adobe Photoshop
- Operating system software
- Spreadsheet software
- Video creation and editing software
  - Adobe AfterEffects; Apple Final Cut Pro
- Web page creation and editing software
  - Adobe Dreamweaver; Adobe Flash Player

Sources: BLS OES, O\*NET, LAEDC

## Core Tasks and Importance:

- 77** Install, adjust, and operate electronic equipment to record, edit, and transmit radio and television programs, motion pictures, video conferencing, or multimedia presentations.
- 75** Diagnose and resolve media system problems.
- 74** Switch sources of video input from one camera or studio to another, from film to live programming, or from network to local programming.
- 72** Mix and regulate sound inputs and feeds or coordinate audio feeds with television pictures.
- 72** Compress, digitize, duplicate, and store audio and video data.
- 69** Perform minor repairs and routine cleaning of audio and video equipment.



## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

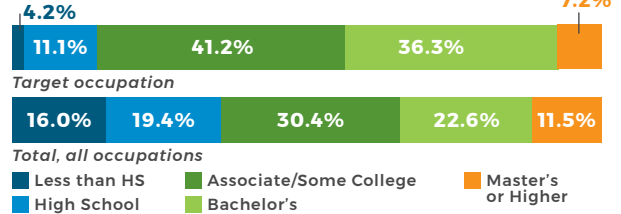
- Just over 40 percent of workers have the educational attainment of an associate degree or some college.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this occupation is predominantly white, accounting for 69 percent of all workers.
- The workforce is predominantly male, accounting for 93 percent of all workers.

## Related Occupations

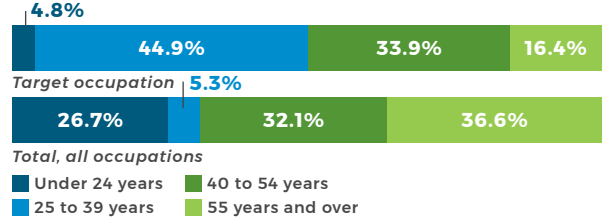
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 27-4012** Broadcast technicians (2,800 workers),
- **SOC 27-4014** Sound engineering technicians (4,040 workers),
- **SOC 25-9011** Audio-visual and multimedia collections specialists (630 workers), and
- **SOC 43-9011** Computer operators (1,320 workers).

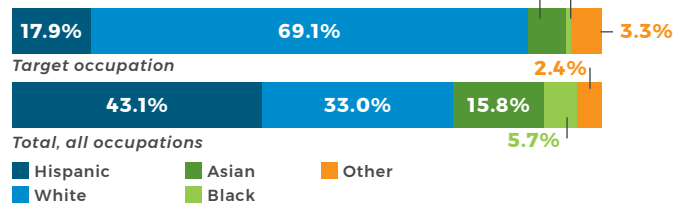
### EDUCATIONAL ATTAINMENT 2016



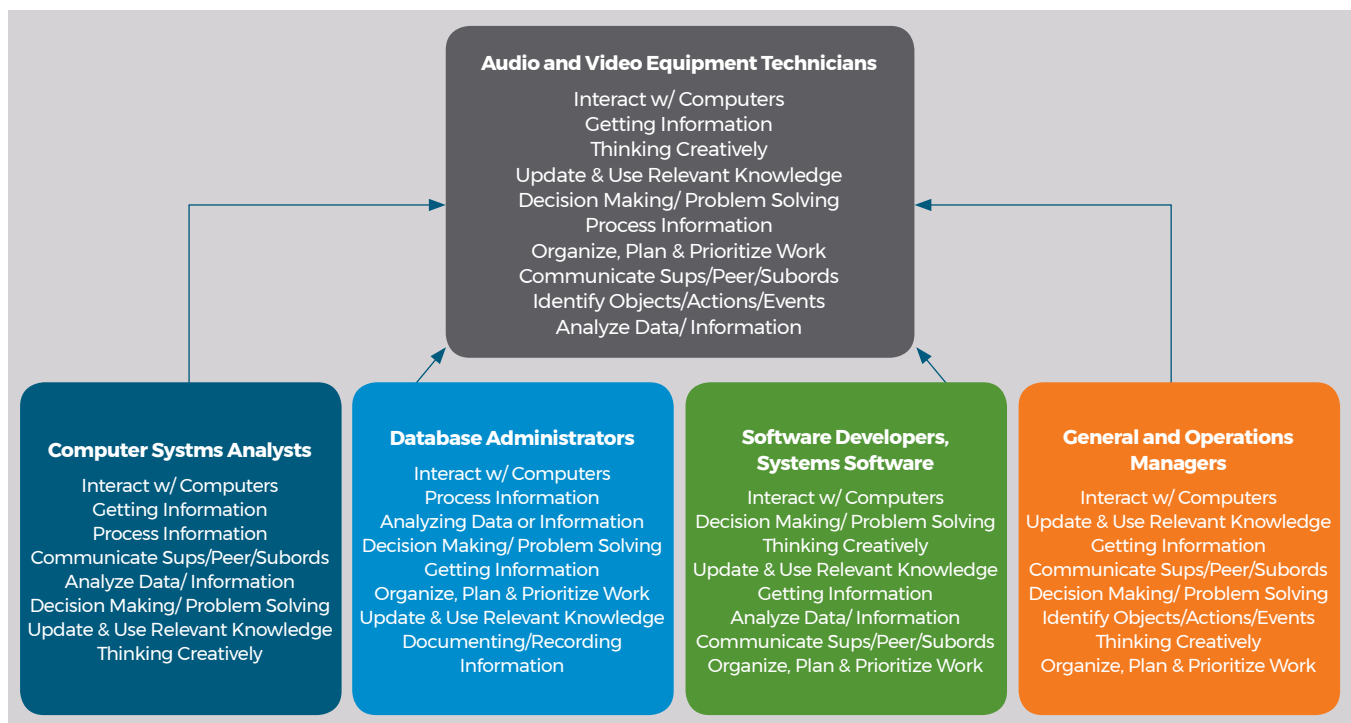
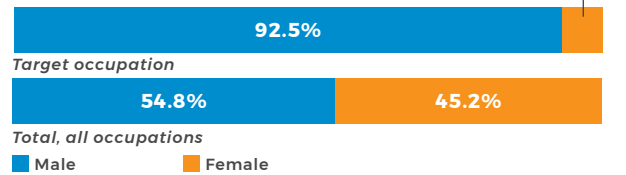
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

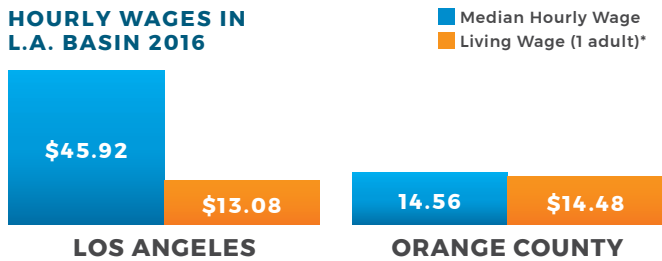


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Film and Video Editors (SOC 27-4032)

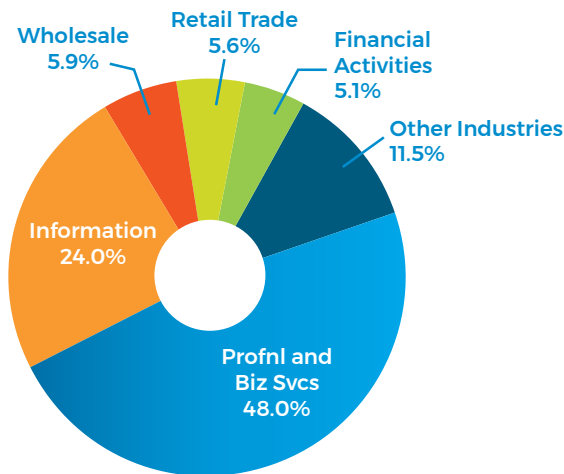
Film and video editors are identified as a middle-skill occupation. They edit moving images on film, video, or other media. May edit or synchronize soundtracks with images.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Film and video editors are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Information (NAICS 51) hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of film and video editors in the L.A. Basin are:

- Motion Picture and Sound Recording (NAICS 512)
- Broadcasting (except Internet) (NAICS 515)
- Performing Arts, Spectator Sports, and Related Industries (NAICS 711)

Jobs in L.A. Basin <b>12,590</b> in 2016	Total Openings <b>1,070</b> 2016 to 2021
--	--

## At A Glance

**Projected Openings 2021:**

- 1,070 Total Openings (5-yr)
- 500 Net Job Change
- 570 5-yr Replacements

**Community Colleges Supply:**

- 468 Awards
- 3 Programs
- 17 Colleges

**Technology:**

- Graphics or photo imaging software
  - Adobe After Effects; Adobe Creative Cloud; Adobe Illustrator; Adobe Photoshop
- Music or sound editing software
  - Avid Digidesign Pro Tools
- Video creation and editing software
  - Adobe After Effects; Apple Final Cut Pro; Boris FX Continuum Complete
- Web page creation and editing software
  - Adobe Flash Player; Brightcove
- Web platform development software
  - AJAX; Hypertext markup language HTML; JavaScript

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 82** Organize and string together raw footage into a continuous whole according to scripts or the instructions of directors and producers.
- 82** Review assembled films or edited videotapes on screens or monitors to determine if corrections are necessary.
- 82** Trim film segments to specified lengths and reassemble segments in sequences that present stories with maximum effect.
- 80** Determine the specific audio and visual effects and music necessary to complete films.
- 79** Set up and operate computer editing systems, electronic titling systems, video switching equipment, and digital video effects units to produce a final product.
- 79** Select and combine the most effective shots of each scene to form a logical and smoothly running story.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

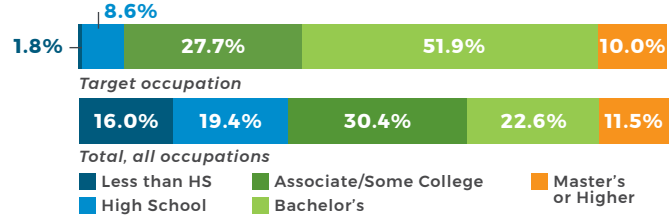
- Most workers have the educational attainment of a bachelor's, but 28 percent have an associate degree or some college.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this occupation is predominantly White, accounting for 68 percent of all workers.
- The workforce is predominantly male, accounting for 87 percent of all workers.

## Related Occupations

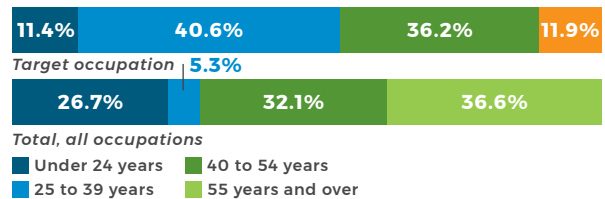
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 51-5111** Prepress technicians and workers (1,580 workers),
- **SOC 27-4011** Audio and video equipment technicians (10,710 workers),
- **SOC 43-9011** Computer operators (1,320 workers), and
- **SOC 43-9031** Desktop publishers (760 workers).

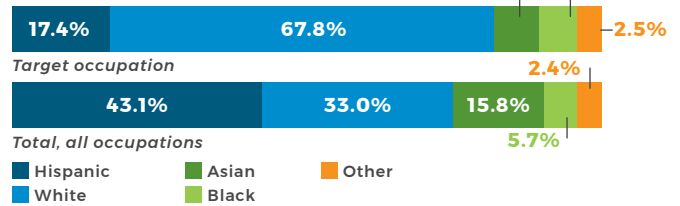
### EDUCATIONAL ATTAINMENT 2016



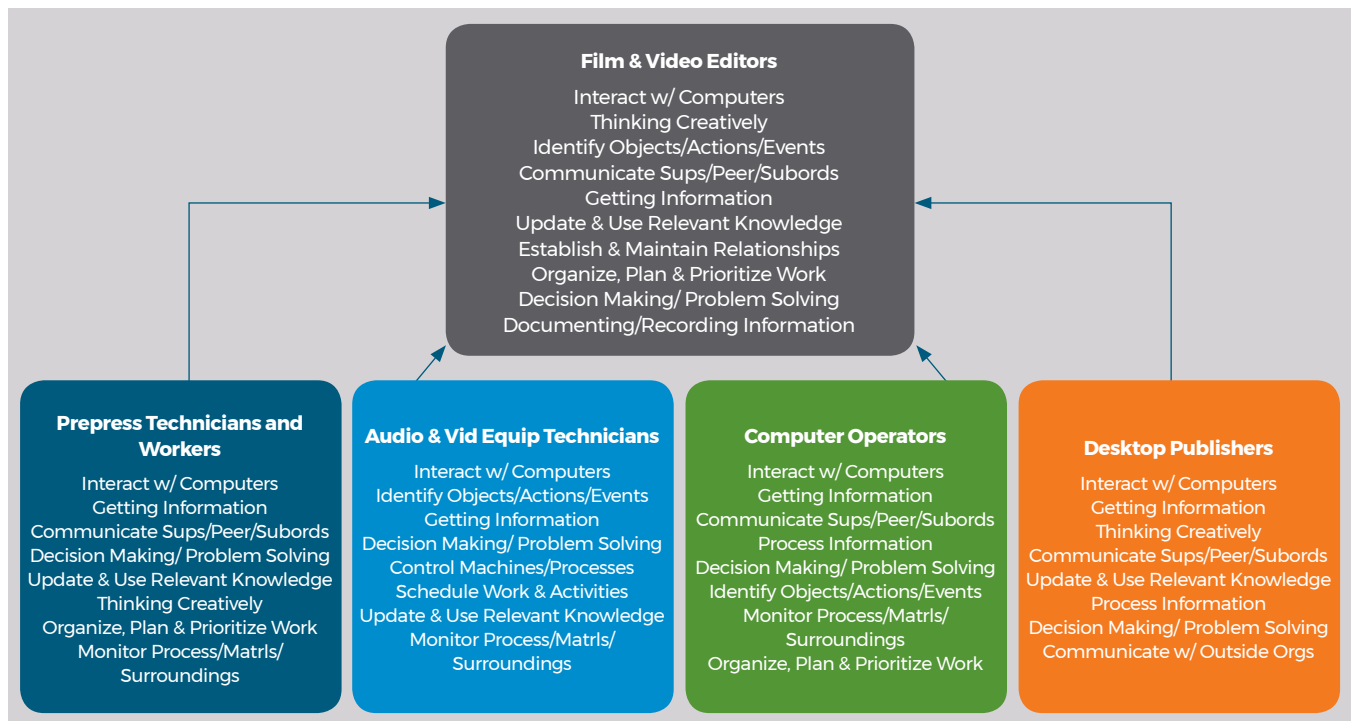
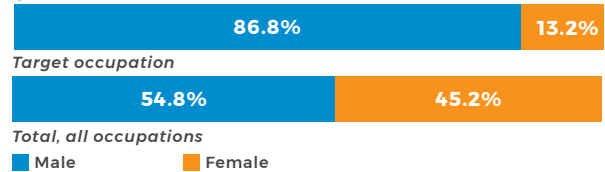
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

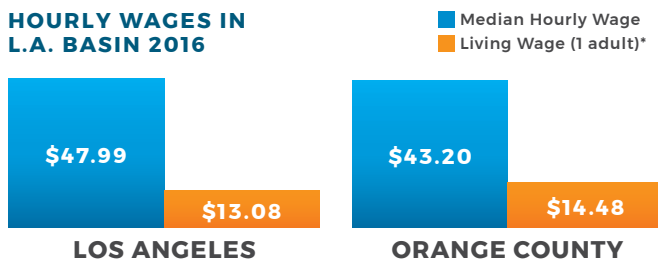


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Registered Nurses (SOC 29-1141)

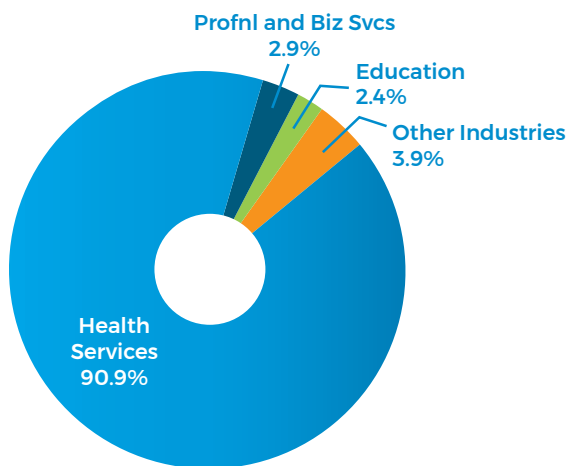
Registered nurses are identified as a middle-skill occupation. They assess patient health problems and needs, develop and implement nursing care plans, and maintain medical records. Administer nursing care to ill, injured, convalescent, or disabled patients. May advise patients on health maintenance and disease prevention or provide case management.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Registered nurses are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Health services hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of registered nurses in the L.A. Basin are:

- Hospitals (NAICS 622)
- Ambulatory Health Care Services (NAICS 621)
- Nursing Residential Care Facilities (NAICS 623)

## Jobs in L.A. Basin

**102,750**  
in 2016

## Total Openings

**18,470**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 18,470 Total Openings (5-yr)
- 6,350 Net Job Change
- 12,120 5-yr Replacements

### Community Colleges Supply:

- 1,943 Awards
- 1 Program
- 21 Colleges

### Technology:

- Categorization or classification software
- Database user interface and query software
  - Data entry software; IDX Systems; Microsoft Access
- Electronic mail software
  - IBM Notes
- Medical software
  - Epic Systems; Medical procedure coding software; MEDITECH software
- Spreadsheet software

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 96** Maintain accurate, detailed reports and records.
- 95** Administer medications to patients and monitor patients for reactions or side effects.
- 93** Record patients' medical information and vital signs.
- 93** Monitor, record, and report symptoms or changes in patients' conditions.
- 87** Consult and coordinate with health care team members to assess, plan, implement, or evaluate patient care plans.
- 87** Modify patient treatment plans as indicated by patients' responses and conditions.

## Middle Skills Relevance:

Registered nurses do not need a bachelor's degree. Individuals can complete a nursing program at either a community or career college. A minimum number of clinical hours must be booked and they must successfully pass the licensing exam to practice.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

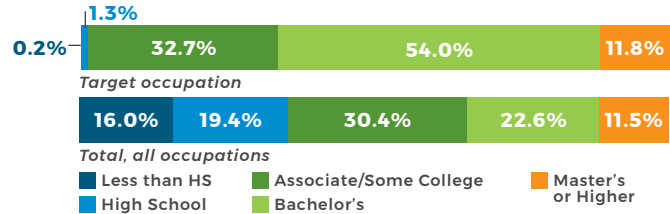
- Most workers have the educational attainment of a bachelor's, but a third have an associate degree or some college.
- Workers ages 55 years and over in this occupation account for a quarter of all workers.
- The workforce has a large share of Asian workers, accounting for 42 percent.
- The workforce is predominantly female, accounting for 86 percent of all workers.

## Related Occupations

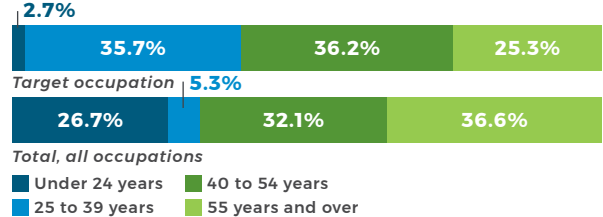
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 29-1126** Respiratory therapists (6,540 workers),
- **SOC 29-2061** Licensed practical and licensed vocational nurses (29,170 workers),
- **SOC 29-2031** Cardiovascular technologists and technicians (1,660 workers), and
- **SOC 29-2041** Emergency medical technicians and paramedics (6,170 workers).

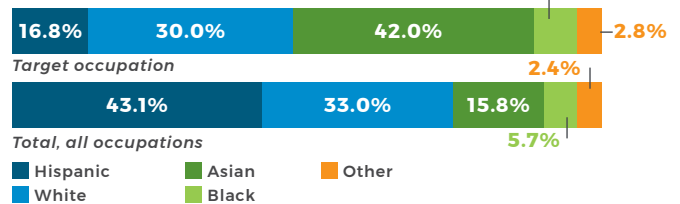
### EDUCATIONAL ATTAINMENT 2016



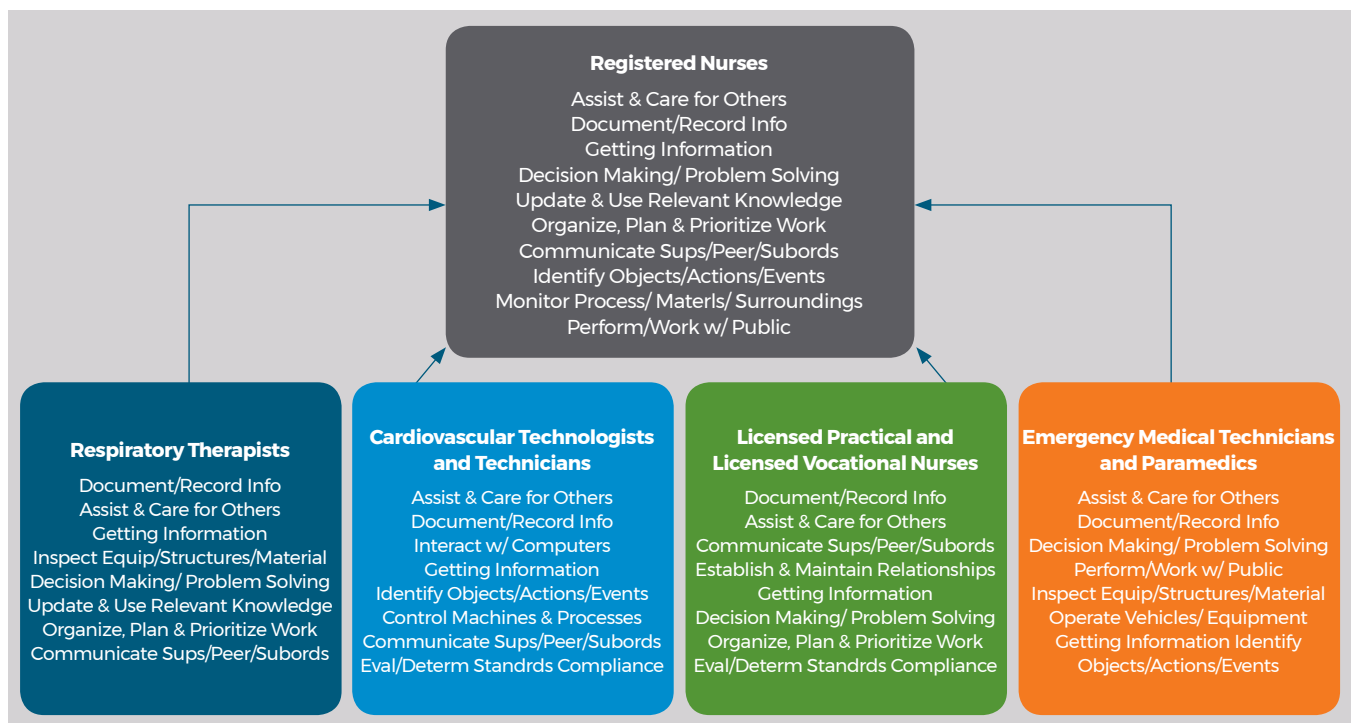
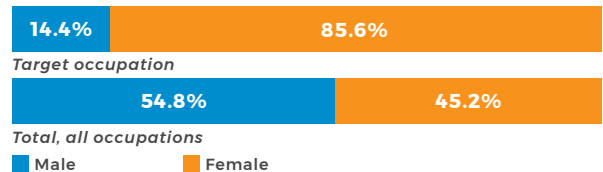
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

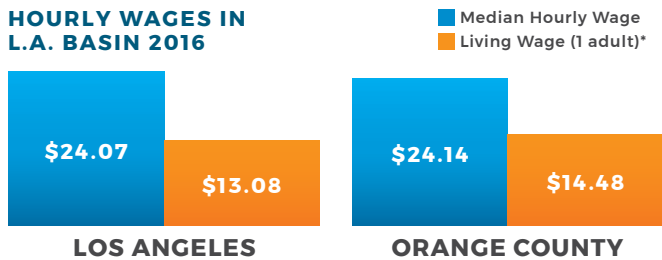


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Licensed Practical and Licensed Vocational Nurses (SOC 29-2061)

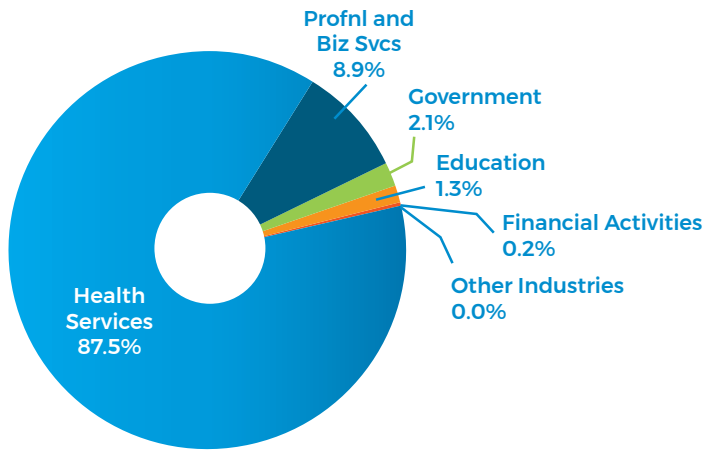
Licensed practical and licensed vocational nurses (LPNs and LVNs) are identified as a middle-skill occupation. They care for ill, injured, or convalescing patients or persons with disabilities in hospitals, nursing homes, clinics, private homes, group homes, and similar institutions. May work under the supervision of a registered nurse. Licensing required.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

LPNs and LVNs are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Health services hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of LPNs and LVNs in the L.A. Basin are:

- Hospitals (NAICS 622)
- Ambulatory Health Care Services (NAICS 621)
- Nursing Residential Care Facilities (NAICS 623)

Jobs in L.A. Basin <b>28,170</b> in 2016	Total Openings <b>5,220</b> 2016 to 2021
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### At A Glance

**Projected Openings 2021:**

- 5,220 Total Openings (5-yr)
- 1,210 Net Job Change
- 4,010 5-yr Replacements

**Community Colleges Supply:**

- 115 Awards
- 1 Program
- 5 Colleges

**Technology:**

- Categorization or classification software
  - Diagnostic and procedural coding software
- Medical software
  - Medical procedure coding software; MEDITECH software
- Object or component oriented development software
  - Apache Spark, C++; Oracle Java; Python
- Office suite software
- Spreadsheet software
- Word processing software

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 95** Administer prescribed medications or start intravenous fluids, noting times and amounts on patients' charts.
- 93** Observe patients, charting and reporting changes in patients' conditions, such as adverse reactions to medication or treatment, and taking any necessary action.
- 89** Answer patients' calls and determine how to assist them.
- 89** Measure and record patients' vital signs, such as height, weight, temperature, blood pressure, pulse, or respiration.
- 89** Provide basic patient care or treatments, such as taking temperatures or blood pressures, dressing wounds, treating bedsores, giving enemas or douches, rubbing with alcohol, massaging, or performing catheterizations.
- 88** Work as part of a health care team to assess patient needs, plan and modify care, and implement interventions.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

- Most workers have the educational attainment of an associate degree or some college.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this occupation is predominantly Hispanic and Asian, accounting for 65 percent of all workers.
- The workforce is predominantly female, accounting for 80 percent of all workers.

## Related Occupations

Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 31-9092** Medical assistants (31,010 workers),
- **SOC 29-1141** Registered nurses (102,750 workers),
- **SOC 31-1014** Nursing assistants (42,070 workers), and
- **SOC 29-2054** Respiratory therapy technicians (310 workers).

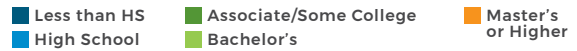
### EDUCATIONAL ATTAINMENT 2016



#### Target occupation



#### Total, all occupations



### AGE DISTRIBUTION 2016



#### Target occupation



#### Total, all occupations



### RACE AND ETHNICITY 2016



#### Target occupation



#### Total, all occupations



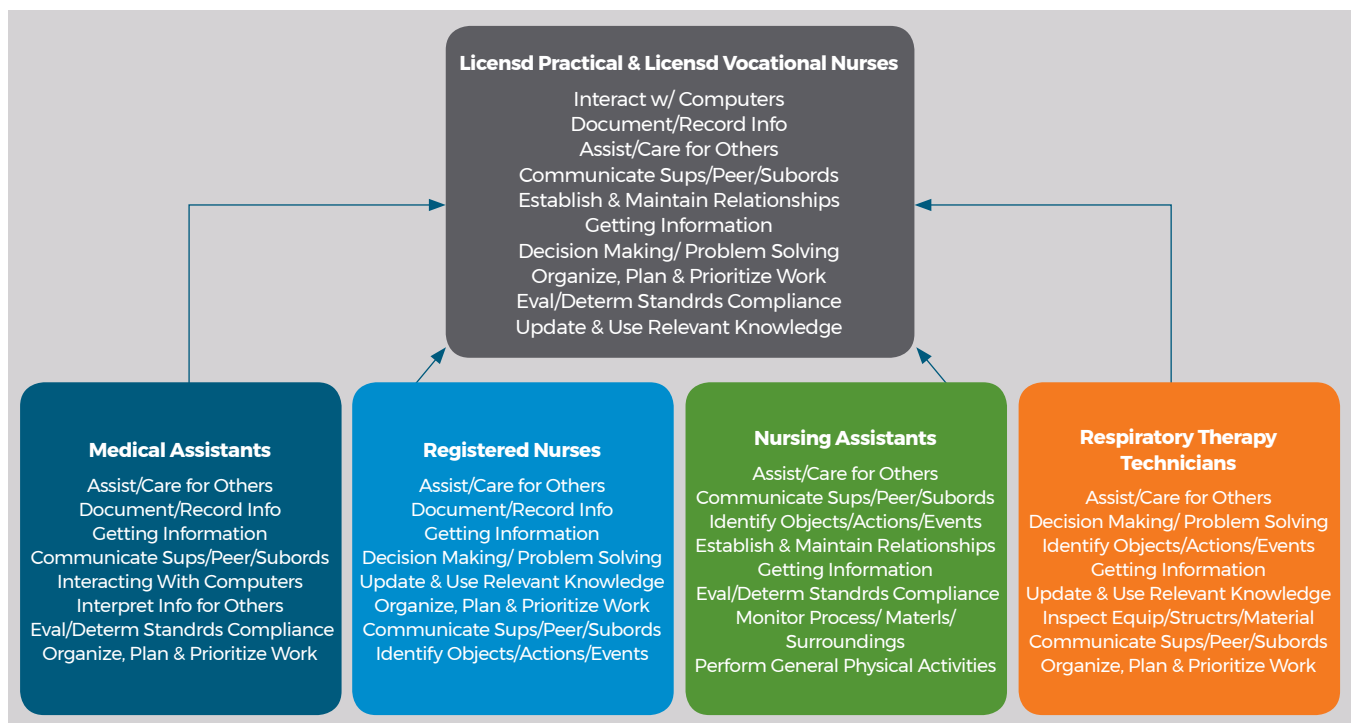
### GENDER 2016



#### Target occupation



#### Total, all occupations

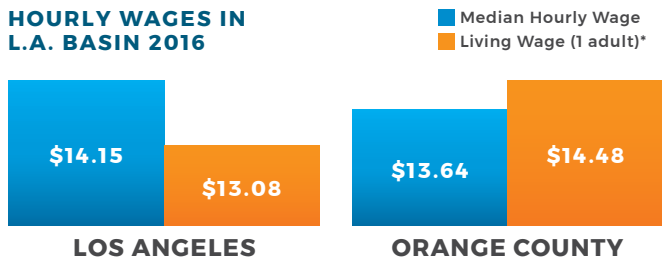


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Nursing Assistants (SOC 31-1014)

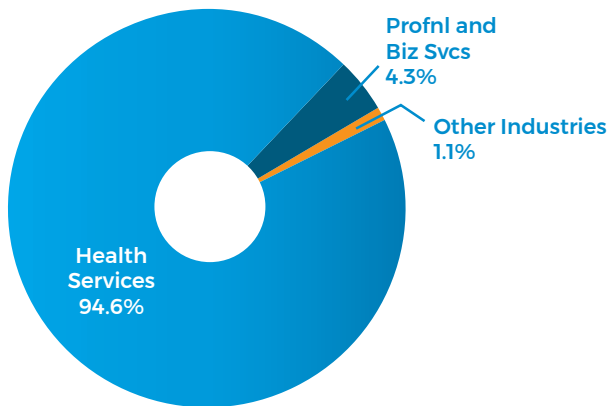
Nursing assistants are identified as a middle-skill occupation. They provide basic patient care under direction of nursing staff. Perform duties such as feed, bathe, dress, groom, or move patients, or change linens. May transfer or transport patients. Includes nursing care attendants, nursing aides, and nursing attendants.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



### Industry Distribution:

Nursing assistants are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Health services hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of nursing assistants in the L.A. Basin are:

- Nursing and Residential Care Facilities (NAICS 623)
- Hospitals (NAICS 622)
- Administrative and Support Services (NAICS 561)

Jobs in L.A. Basin <b>42,070</b> in 2016	Total Openings <b>6,540</b> 2016 to 2021
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### At A Glance

**Projected Openings 2021:**

- 6,540 Total Openings (5-yr)
- 1,800 Net Job Change
- 4,750 5-yr Replacements

**Community Colleges Supply:**

- 16 Awards
- 1 Program
- 2 Colleges

**Technology:**

- Accounting software
- Medical software
  - GE Healthcare Centricity EMR;
  - MEDITECH software
- Office suite software
- Spreadsheet software
- Word processing software

Sources: BLS OES, O'NET, LAEDC

### Core Tasks and Importance:

- 94** Answer patient call signals, signal lights, bells or intercom systems to determine patients' needs.
- 94** Turn or reposition bedridden patients.
- 91** Provide physical support to assist patients to perform daily living activities, such as getting out of bed, bathing, dressing, using the toilet, standing, walking or exercising.
- 91** Review patients' dietary restrictions, food allergies and preferences to ensure patient receives appropriate diet.
- 90** Measure and record food and liquid intake or urinary and fecal output, reporting changes to medical or nursing staff.
- 90** Record vital signs, such as temperature, blood pressure, pulse or respiration rate, as directed by medical or nursing staff.



## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

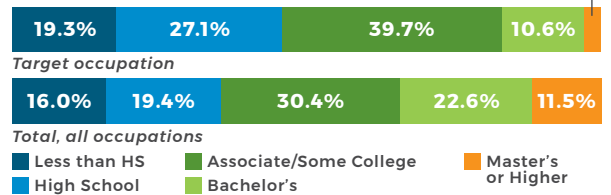
- Most workers have the educational attainment of an associate degree or some college.
- A quarter of workers are ages 55 years and over in this occupation.
- The workforce in this occupation is predominantly Hispanic and Asian, accounting for 73 percent of all workers.
- The workforce is predominantly female, accounting for 77 percent of all workers.

## Related Occupations

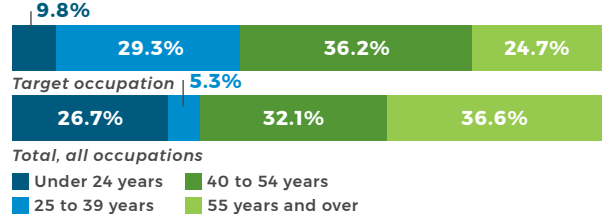
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 31-9092** Medical assistants (31,010 workers),
- **SOC 29-2052** Pharmacy technicians (13,220 workers),
- **SOC 29-2061** Licensed practical and licensed vocational nurses (28,170 workers), and
- **SOC 29-2053** Psychiatric technicians (1,490 workers).

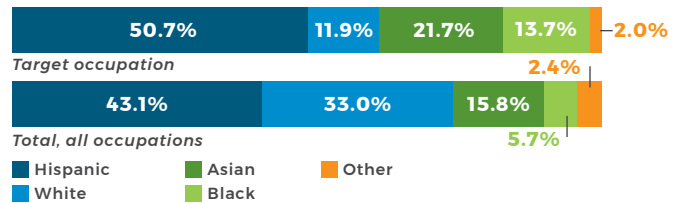
### EDUCATIONAL ATTAINMENT 2016



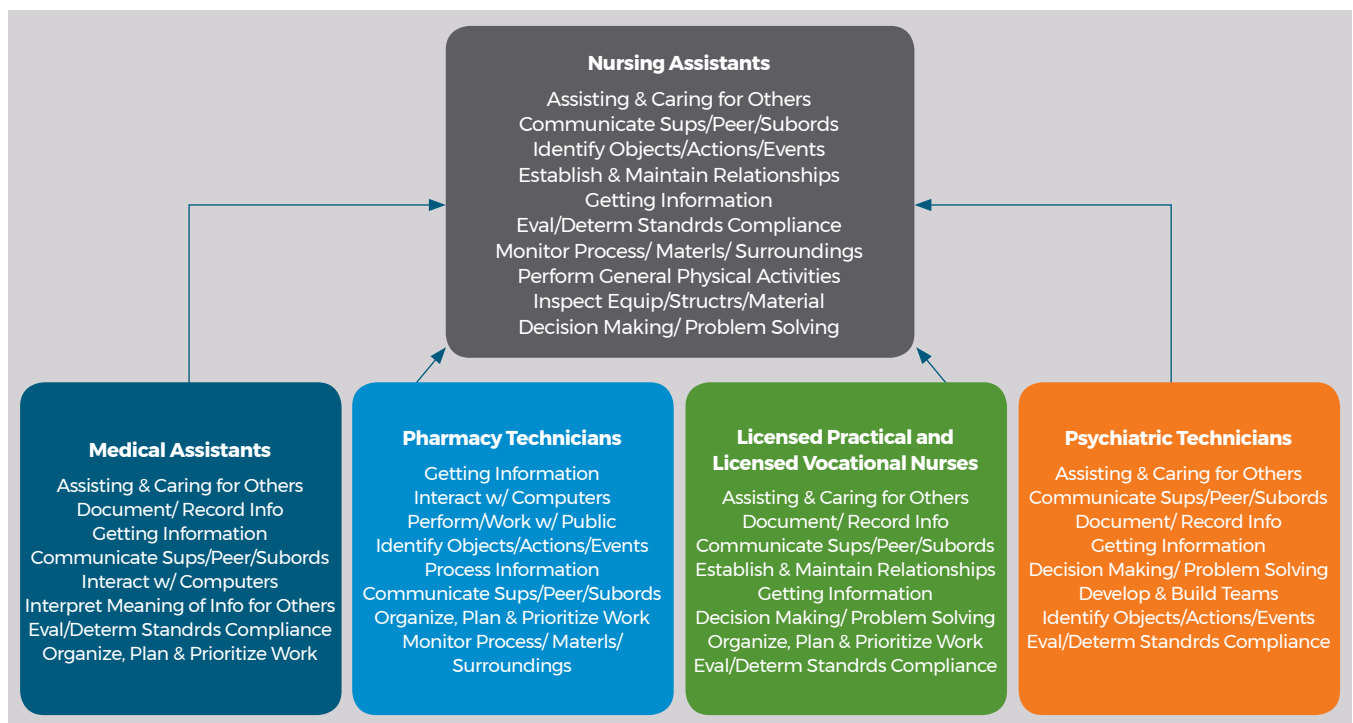
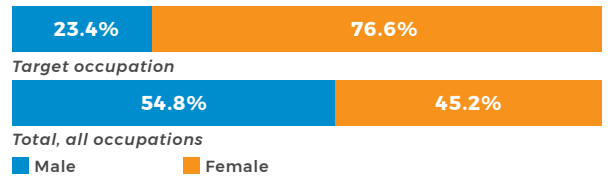
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

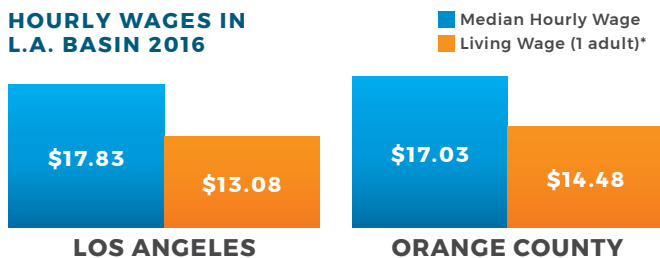


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Bookkeeping, Accounting and Auditing Clerks (SOC 43-3031)

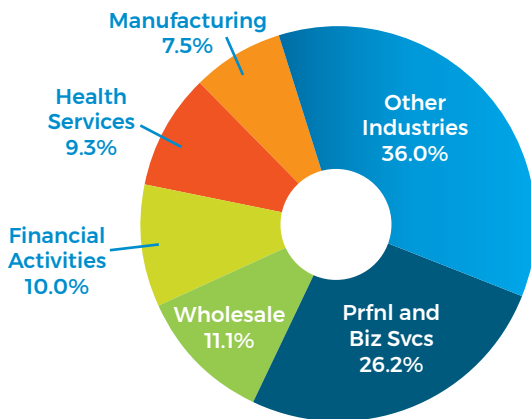
Bookkeeping, accounting and auditing clerks are identified as a middle-skill occupation. They compute, classify, and record numerical data to keep financial records complete. Perform any combination of routine calculating, posting, and verifying duties to obtain primary financial data for use in maintaining accounting records. May also check the accuracy of figures, calculations, and postings pertaining to business transactions recorded by other workers.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Bookkeepers, accountants and auditing clerks are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Professional and business services hire the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of bookkeepers, accountants and auditing clerks in the L.A. Basin are:

- Professional, Scientific, and Technical Services (NAICS 541)
- Administrative and Support Services (NAICS 561)
- Merchant Wholesalers, Durable Goods (NAICS 423)

## Jobs in L.A. Basin

**76,510**  
in 2016

## Total Openings

**3,920**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 3,920 Total Openings (5-yr)
  - 17- Net Job Change
  - 3,750 5-yr Replacements

### Community Colleges Supply::

- 1,190 Awards
- 1 Program
- 28 Colleges

### Technology:

- Accounting software
  - FlexiFinancials FlexiLedger;
  - Intuit Quickbooks; Sage 50 Accounting
- Compliance software
  - FLS eDP.Payrolltax; Intrax ProcedureNet;
  - Paisley Cardmap
- Database user interface and query software
  - Data entry software; Microsoft Access; Yardi
- Financial analysis software
  - Oracle E-Business Suite Financials;
  - AuditWare
- Medical software
  - Healthcare common procedure coding system HCPCS; Medical condition coding software

Sources: BLS OES, O\*NET, LAEDC

## Core Tasks and Importance:

- 94** Operate computers programmed with accounting software to record, store, and analyze information.
- 92** Check figures, postings, and documents for correct entry, mathematical accuracy, and proper codes.
- 89** Comply with federal, state, and company policies, procedures, and regulations.
- 87** Operate 10-key calculators, typewriters, and copy machines to perform calculations and produce documents.
- 87** Receive, record, and bank cash, checks, and vouchers.
- 83** Code documents according to company procedures.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

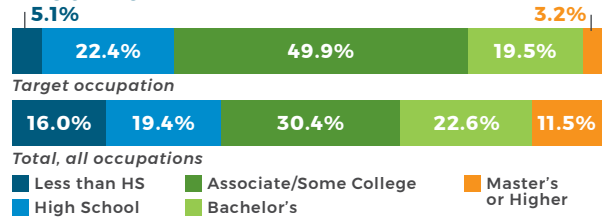
- Most workers have the educational attainment of some college or an associate degree.
- Nearly one third of workers are ages 55 years and over in this occupation.
- The workforce in this occupation is predominantly Hispanic or white, accounting for 70 percent of all workers.
- The workforce is predominantly female, accounting for 80 percent of all workers.

## Related Occupations

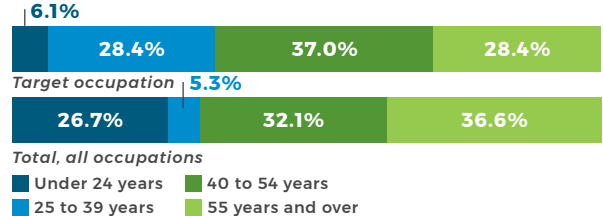
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 13-2082** Tax preparers (4,480 workers),
- **SOC 43-3021** Billing and posting clerks (25,540 workers),
- **SOC 43-3051** Payroll and timekeeping clerks (9,220 workers), and
- **SOC 43-4011** Brokerage clerks (2,080 workers).

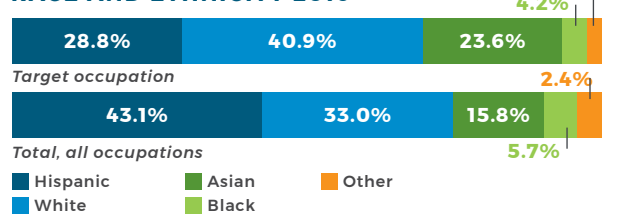
### EDUCATIONAL ATTAINMENT 2016



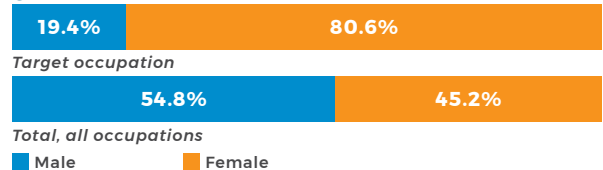
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

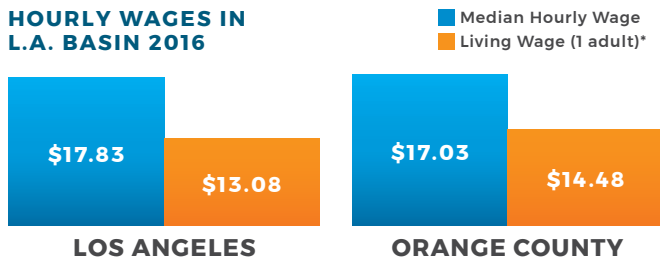


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Payroll and Timekeeping Clerks (SOC 43-3051)

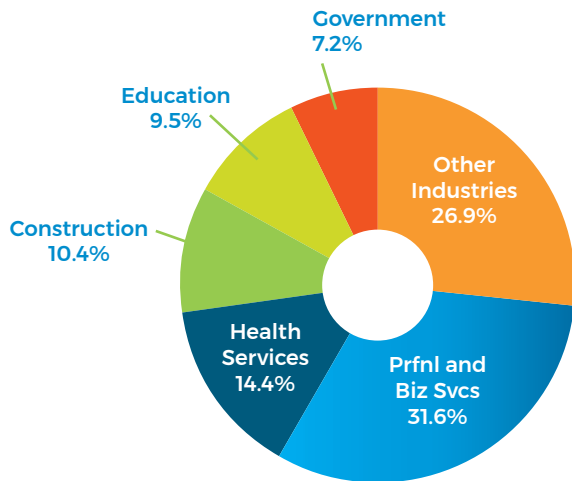
Payroll and timekeeping clerks are identified as a middle-skill occupation. They compile and record employee time and payroll data. May compute employees' time worked, production, and commission. May compute and post wages and deductions, or prepare paychecks.

## HOURLY WAGES IN L.A. BASIN 2016



\* MIT Living Wage Calculator

## INDUSTRY DISTRIBUTION



## Industry Distribution:

Payroll and timekeeping clerks are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Professional and business services hire the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of accounting technicians, HR assistants, payroll administrators and payroll clerks in the L.A. Basin are:

- Professional, Scientific, and Technical Services (NAICS 541)
- Administrative and Support Services (NAICS 561)
- Educational Services (NAICS 611)

Jobs in L.A. Basin <b>9,220</b> in 2016	Total Openings <b>1,900</b> 2016 to 2021
---	--

### At A Glance

**Projected Openings 2021:**

- 1,900 Total Openings (5-yr)
- 660 Net Job Change
- 1,240 5-yr Replacements

**Community Colleges Supply:**

- 1,190 Awards
- 1 Program
- 28 Colleges

**Technology:**

- Accounting software
  - Intuit Quickbooks; Sage 50 Accounting; Intuit Quicken
- Electronic mail software
  - IBM Notes
- Enterprise resource planning ERP software
  - Microsoft Dynamics; NetSuite ERP; Oracle People Soft; SAP
- Human resources software
  - Human Resource Management Software HRMS
- Time accounting software
  - Kronos Workforce Payroll; UNITIME

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 94** Process and issue employee paychecks and statements of earnings and deductions.
- 94** Compute wages and deductions, and enter data into computers.
- 93** Review time sheets, work charts, wage computation, and other information to detect and reconcile payroll discrepancies.
- 91** Compile employee time, production, and payroll data from time sheets and other records.
- 90** Process paperwork for new employees and enter employee information into the payroll system.
- 88** Verify attendance, hours worked, and pay adjustments, and post information onto designated records.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

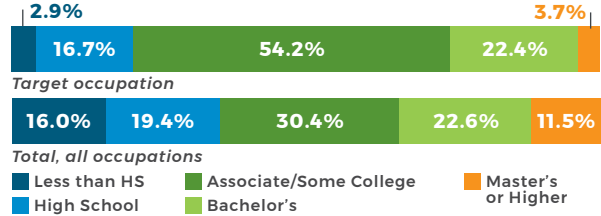
- Most workers have the educational attainment of some college or an associate degree.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this occupation is predominantly Hispanic or white, accounting for 70 percent of all workers.
- The workforce is predominantly male, accounting for 80 percent of all workers.

## Related Occupations

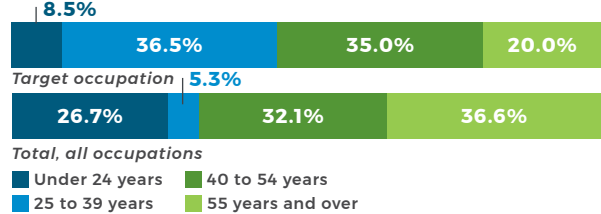
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 43-3031** Bookkeeping, accounting and auditing clerks (76,510 workers),
- **SOC 43-4171** Reception and information clerks (44,620 workers),
- **SOC 43-9041** Insurance claims and policy processing clerks (13,430 workers), and
- **SOC 43-3011** Bill and account collectors (17,050 workers).

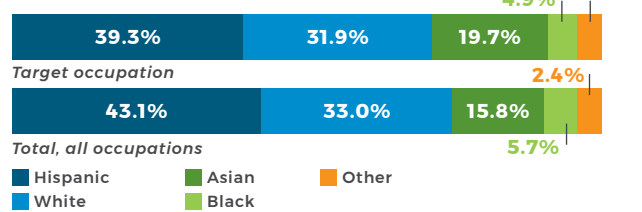
### EDUCATIONAL ATTAINMENT 2016



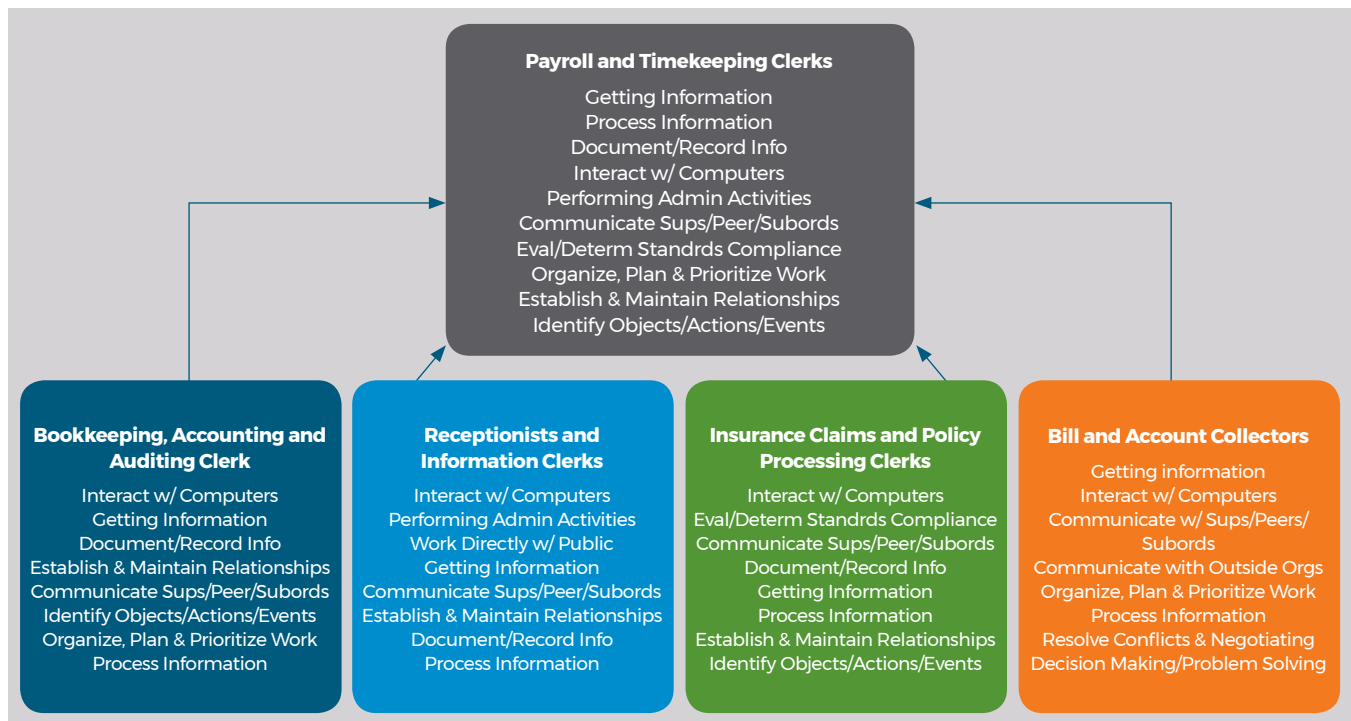
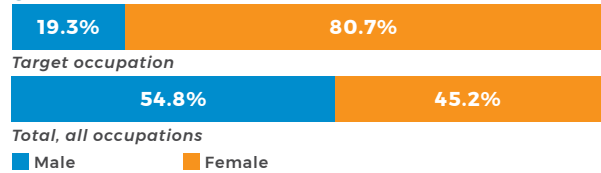
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

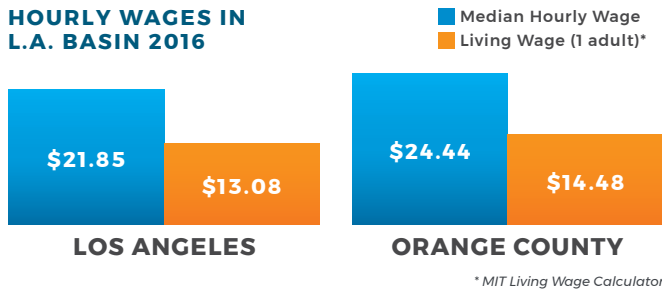


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

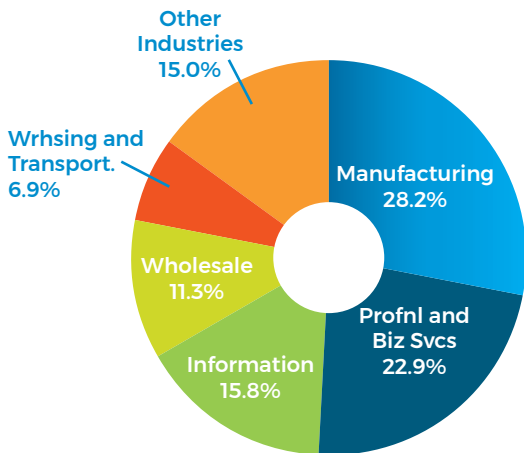
# Production, Planning and Expediting Clerks (SOC 43-5061)

Production, planning and expediting clerks are identified as a middle-skill occupation. They compile information and records to draw up purchase orders for procurement of materials and services.

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



## Industry Distribution:

Production, planning, and expediting clerks are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Manufacturing hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of schedulers, planners and production assistants in the L.A. Basin are:

- Motion Picture and Sound Recording Industries (NAICS 512)
- Professional, Scientific, and Technical Services (NAICS 541)
- Administrative and Support Services (NAICS 561)

Jobs in L.A. Basin  
**23,110**  
in 2016

Total Openings  
**4,610**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 4,610 Total Openings (5-yr)
- 1,470 Net Job Change
- 3,140 5-yr Replacements

### Community Colleges Supply:

- 217 Awards
- 1 Program
- 4 Colleges

### Technology:

- Accounting software
  - Fund Accounting Software;
  - Intuit QuickBooks
- Analytical or scientific software
  - KAPES; Micro Estimating FabPlan
- Database user interface and query software
  - FileMaker Pro; Microsoft Access; SQL
- Enterprise resource planning ERP software
  - Oracle JD Edwards Enterprise One; SAP
- Materials requirements planning logistics and supply chain software
  - LSA Visual Easy Lean; Bill of lading software

Sources: BLS OES, O\*NET, LAEDC

## Core Tasks and Importance:

- 84** Distribute production schedules or work orders to departments.
- 83** Review documents, such as production schedules, work orders, or staffing tables, to determine personnel or materials requirements or material priorities.
- 82** Requisition and maintain inventories of materials or supplies necessary to meet production demands.
- 79** Arrange for delivery, assembly, or distribution of supplies or parts to expedite flow of materials and meet production schedules.
- 78** Confer with department supervisors or other personnel to assess progress and discuss needed changes.
- 74** Revise production schedules when required due to design changes, labor or material shortages, backlogs, or other interruptions, collaborating with management, marketing, sales, production, or engineering.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

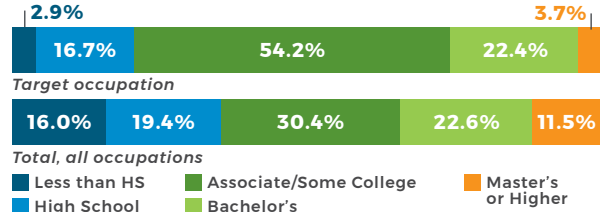
- Most workers have the educational attainment of some college or an associate degree.
- The workforce in this occupation is predominantly under the age of 40, accounting for 58 percent of all workers.
- A larger share of workers are white in this occupation compared to the regional average.
- A smaller share of workers are male in this occupation compared to the regional average.

## Related Occupations

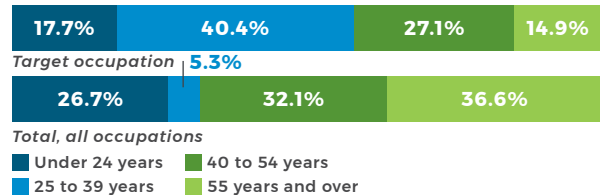
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 43-3061** Procurement clerks (2,710 workers),
- **SOC 43-5011** Cargo and freight agents (8,160 workers),
- **SOC 43-5111** Weighers, measurers, checkers, and samplers, recordkeeping (5,380 workers), and
- **SOC 43-507** Shipping, receiving and traffic clerks (38,780 workers).

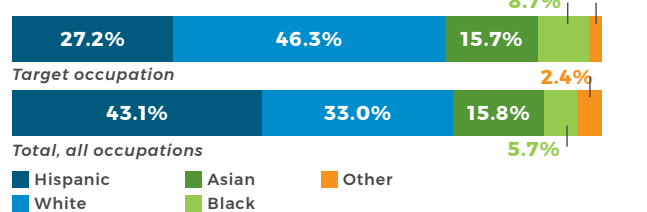
### EDUCATIONAL ATTAINMENT 2016



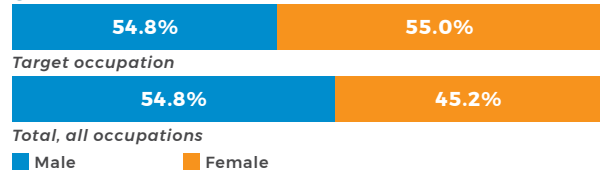
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

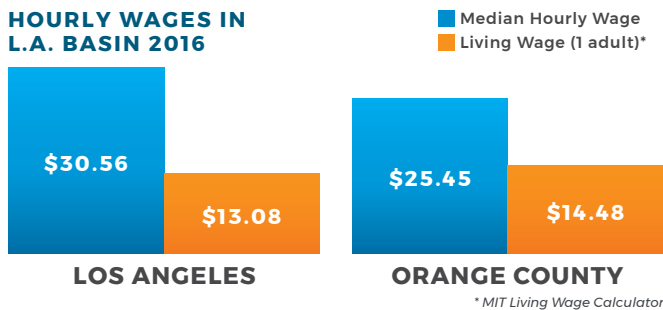


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

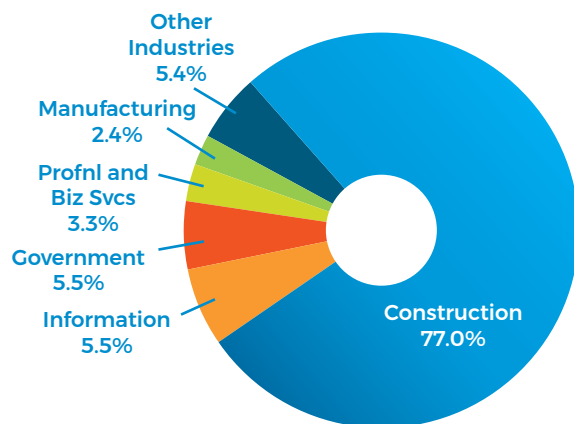
# Electricians (SOC 47-2111)

Electricians are identified as a middle-skill occupation. They 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.

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



## Industry Distribution:

Electricians are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Construction hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of electricians, craft workers and inside wiremen in the L.A. Basin are:

- Specialty Trade Contractor (NAICS 238)
- Motion Picture and Sound Recording Industries (NAICS 512)
- Local Government (NAICS 93)

## Jobs in L.A. Basin

**17,180**  
in 2016

## Total Openings

**2,990**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 2,990 Total Openings (5-yr)
- 1,680 Net Job Change
- 1,310 5-yr Replacements

### Community Colleges Supply:

- 577 Awards
- 3 Programs
- 18 Colleges

### Technology:

- Analytical or scientific software
  - *Construction Master Pro;*
  - *Elite Software Inpoint*
- Computer-aided design (CAD) software
  - *One Mile Up Panel Planner; SmartDraw*
- Database user interface and query software
  - *Insight Direct ServiceCEO; Resolve Systems Service Management*
- Spreadsheet software
- Word processing software
  - *Socrates Contractor's Library*

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 89** Plan layout and installation of electrical wiring, equipment, or fixtures, based on job specifications and local codes.
- 87** Connect wires to circuit breakers, transformers, or other components.
- 86** Test electrical systems or continuity of circuits in electrical wiring, equipment, or fixtures, using testing devices, such as ohmmeters, voltmeters, or oscilloscopes, to ensure compatibility and safety of system.
- 85** Use a variety of tools or equipment, such as power construction equipment, measuring devices, power tools, and testing equipment, such as oscilloscopes, ammeters, or test lamps.
- 85** Inspect electrical systems, equipment, or components to identify hazards, defects, or the need for adjustment or repair, and to ensure compliance with codes.
- 83** Prepare sketches or follow blueprints to determine the location of wiring or equipment and to ensure conformance to building and safety codes.



## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

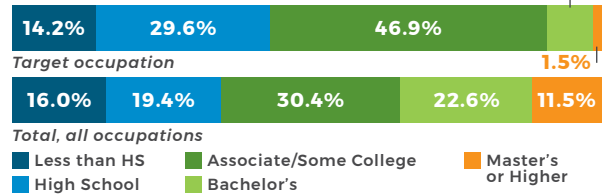
- Most workers have the educational attainment of some college or an associate degree.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- A larger share of workers are Hispanic in this occupation compared to the regional average.
- The workforce is predominantly male, accounting for 99 percent of all workers.

## Related Occupations

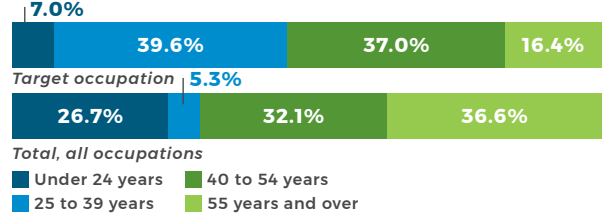
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 47-4021** Elevator installers and repairers (940 workers),
- **SOC 49-2022** Telecommunications equipment installers and repairers (12,280 workers),
- **SOC 49-2094** Electric repairers, commercial and industrial (2,230 workers), and
- **SOC 49-9071** Maintenance and repair workers (47,180 workers).

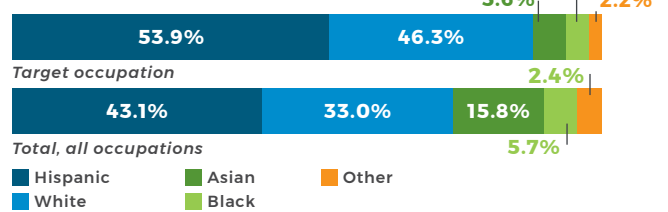
### EDUCATIONAL ATTAINMENT 2016



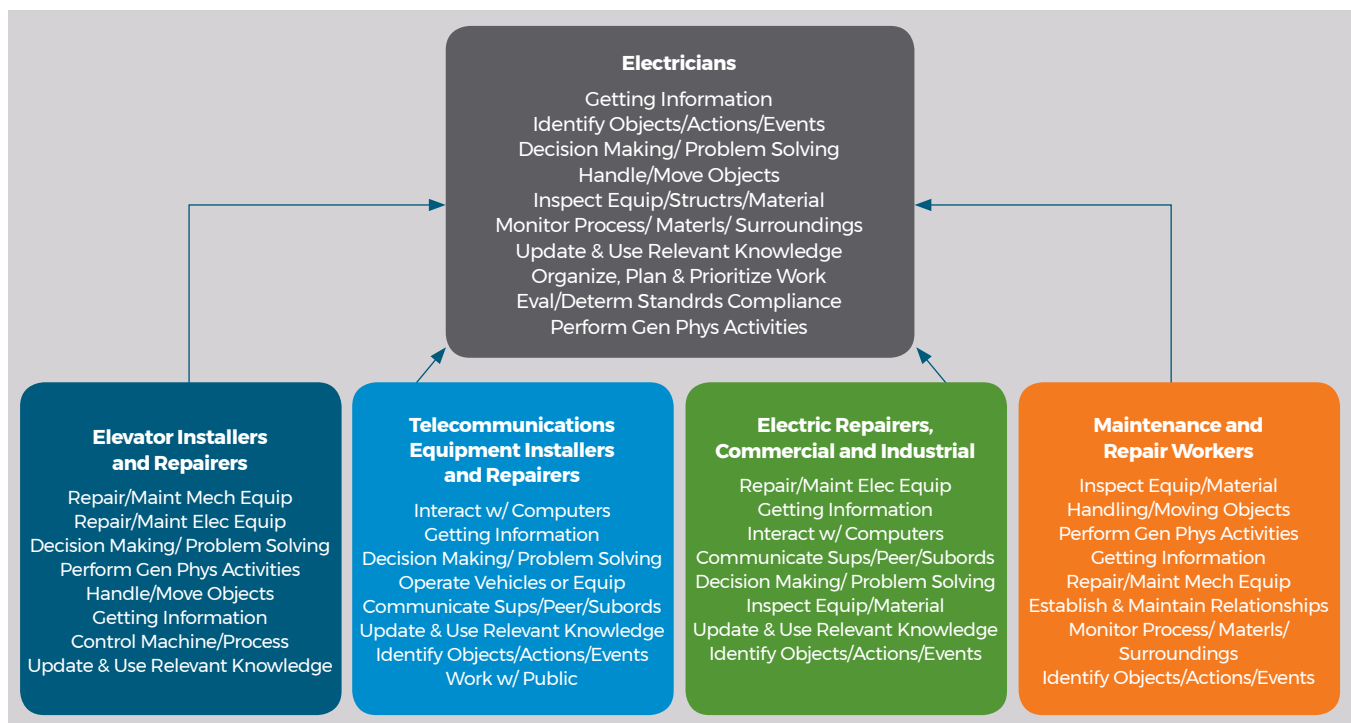
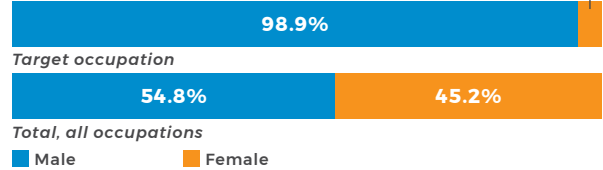
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016



Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

# Aircraft Mechanics and Service Technicians (SOC 49-3011)

Aircraft mechanics and service technicians are identified as a middle-skill occupation. They diagnose, adjust, repair, or overhaul aircraft engines and assemblies, such as hydraulic and pneumatic systems. Includes helicopter and aircraft engine specialists.

Jobs in L.A. Basin <b>5,250</b> in 2016	Total Openings <b>650</b> 2016 to 2021
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## At A Glance

### Projected Openings 2021:

- 650 Total Openings (5-yr)
- 20 Net Job Change
- 630 5-yr Replacements

### Community Colleges Supply:

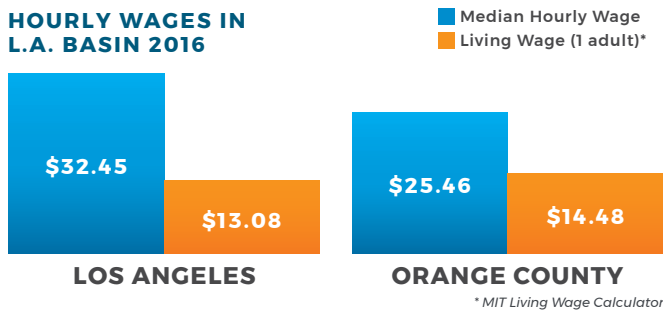
- 217 Awards
- 3 Programs
- 4 Colleges

### Technology:

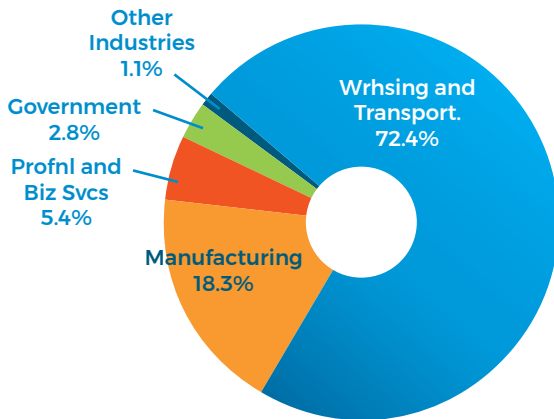
- Analytical or scientific software
  - CaseBank SpotLight; CynapSys Virtual DER; Engine analysis software
- Database user interface and query software
  - Pentagon 2000SQL; Sacramento Sky Ranch Mechanic's Toolbox
- Facilities management software
  - Access Software AIRPAX
- Information retrieval or search software
  - Computerized aircraft log manager CALM
- Spreadsheet software

Sources: BLS OES, O\*NET, LAEDC

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



### Industry Distribution:

Aircraft mechanics and service technicians are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Warehousing and transportation hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of aircraft maintenance directors, technicians and mechanics in the L.A. Basin are:

- Support Activities for Transportation (NAICS 488)
- Air Transportation (NAICS 481)
- Transportation Equipment (NAICS 336)

## Core Tasks and Importance:

- 89** Examine and inspect aircraft components, including landing gear, hydraulic systems, and deicers to locate cracks, breaks, leaks, or other problems.
- 87** Conduct routine and special inspections as required by regulations.
- 87** Inspect completed work to certify that maintenance meets standards and that aircraft are ready for operation.
- 87** Read and interpret maintenance manuals, service bulletins, and other specifications to determine the feasibility and method of repairing or replacing malfunctioning or damaged components.
- 87** Maintain repair logs, documenting all preventive and corrective aircraft maintenance.
- 86** Modify aircraft structures, space vehicles, systems, or components, following drawings, schematics, charts, engineering orders, and technical publications.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

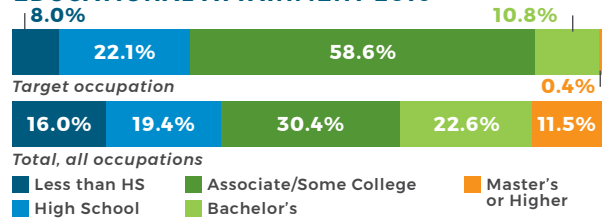
- Most workers have the educational attainment of some college or an associate degree, accounting for 59 percent of all workers.
- A larger share of workers are ages 25-54 years in this occupation compared to the regional average.
- The workforce in this occupation is predominantly Hispanic or white.
- The workforce is predominantly male, accounting for 95 percent of all workers.

## Related Occupations

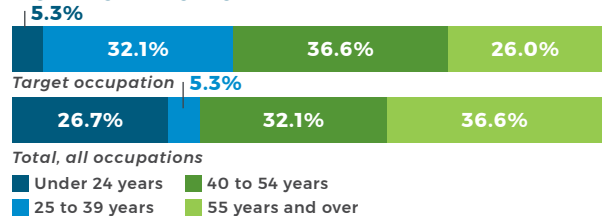
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 49-9071** Maintenance and repair workers (6,430 workers),
- **SOC 49-9041** Industrial machinery mechanics (3,750 workers),
- **SOC 17-3029** Engineering technicians (2,540 workers), and
- **SOC 17-3027** Mechanical engineering technicians (1,690 workers).

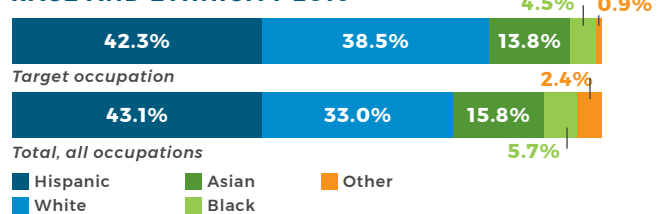
### EDUCATIONAL ATTAINMENT 2016



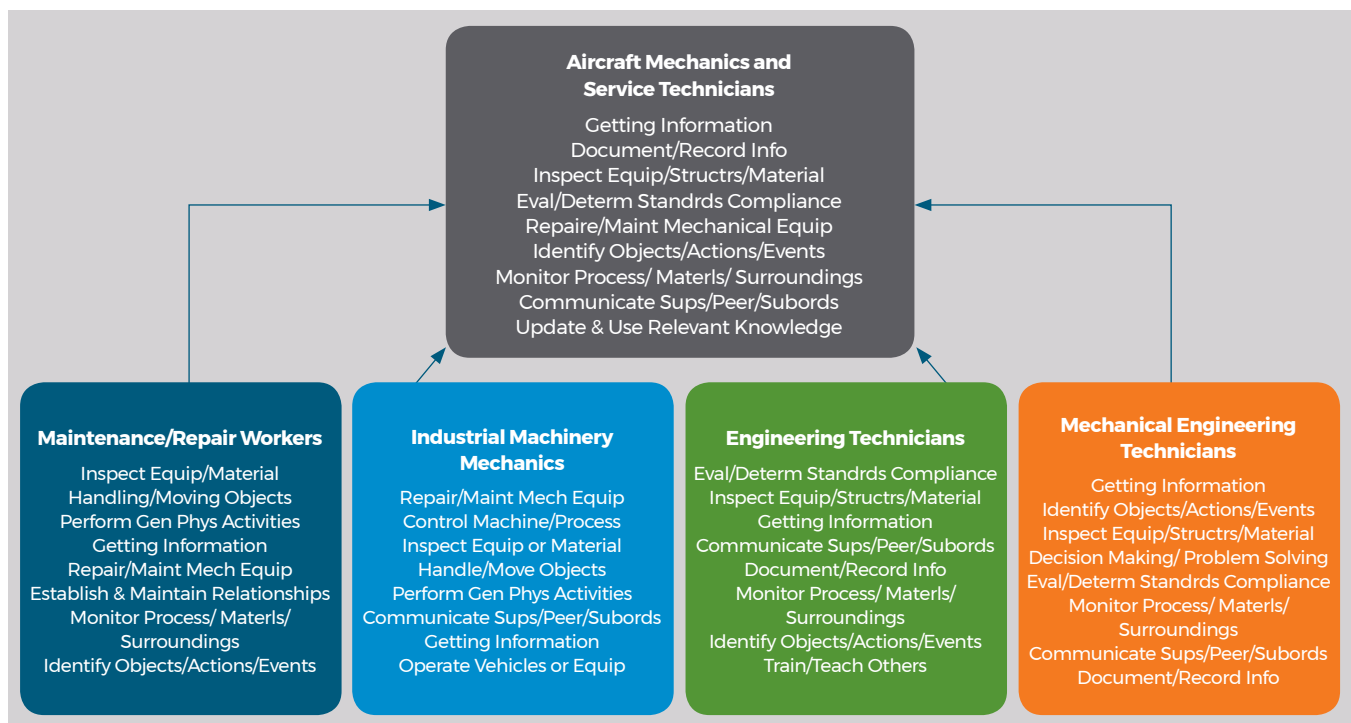
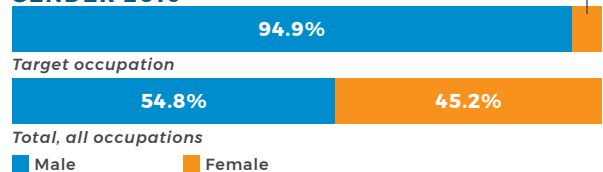
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

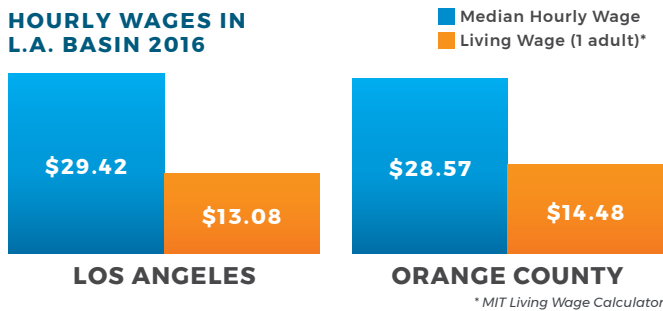


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

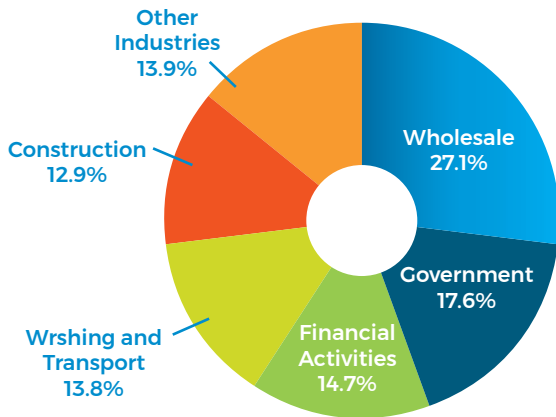
# Mobile Heavy Equipment Mechanics, Except Engines (SOC 49-3042)

Mobile heavy equipment mechanics, except engines are identified as a middle-skill occupation. They 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.

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



## Industry Distribution:

Mobile heavy equipment mechanics, except engines are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Merchant wholesalers hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of construction equipment mechanics, field mechanics and technicians in the L.A. Basin are:

- Merchant Wholesalers, Durable Goods (NAICS 423)
- Rental and Leasing Services (NAICS 532)
- Local Government (NAICS 93)

## Jobs in L.A. Basin

**3,800**  
in 2016

## Total Openings

**880**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 880 Total Openings (5-yr)
- 430 Net Job Change
- 450 5-yr Replacements

### Community Colleges Supply:

- 8 Awards
- 1 Program
- 3 Colleges

### Technology:

- Database user interface and query software
- Facilities management software
  - *Maintenance management software*
- Office suite software
- Spreadsheet software

Sources: BLS OES, O\*NET, LAEDC

## Core Tasks and Importance:

- 86** Repair and replace damaged or worn parts.
- 86** Test mechanical products and equipment after repair or assembly to ensure proper performance and compliance with manufacturers' specifications.
- 84** Operate and inspect machines or heavy equipment to diagnose defects.
- 82** Read and understand operating manuals, blueprints, and technical drawings.
- 81** Dismantle and reassemble heavy equipment using hoists and hand tools.
- 80** Overhaul and test machines or equipment to ensure operating efficiency.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

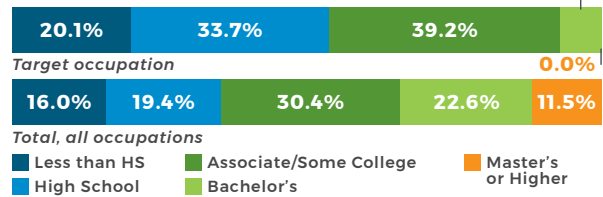
- A smaller share of workers have an educational attainment of a bachelor's degree or higher in this occupation compared to the regional average.
- A larger share of workers are ages 25 to 39 years in this occupation compared to the regional average.
- The workforce in this occupation is predominantly Hispanic, accounting for 61 percent of all workers.
- The workforce is predominantly male, accounting for 99.5 percent of all workers.

## Related Occupations

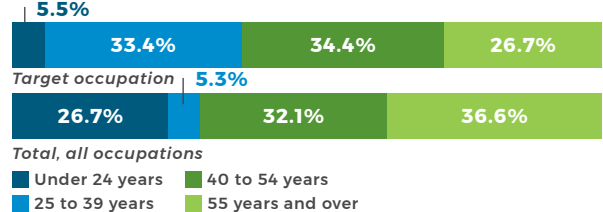
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 49-2092** Electric motor, power tool and related repairers (700 workers),
- **SOC 49-3041** Farm equipment and mechanics and service technicians (240 workers),
- **SOC 49-3031** Bus and truck mechanics and diesel engine specialists (5,800 workers), and
- **SOC 49-9071** Maintenance and repair workers (47,180 workers).

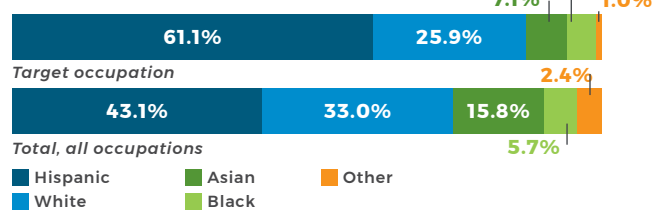
### EDUCATIONAL ATTAINMENT 2016



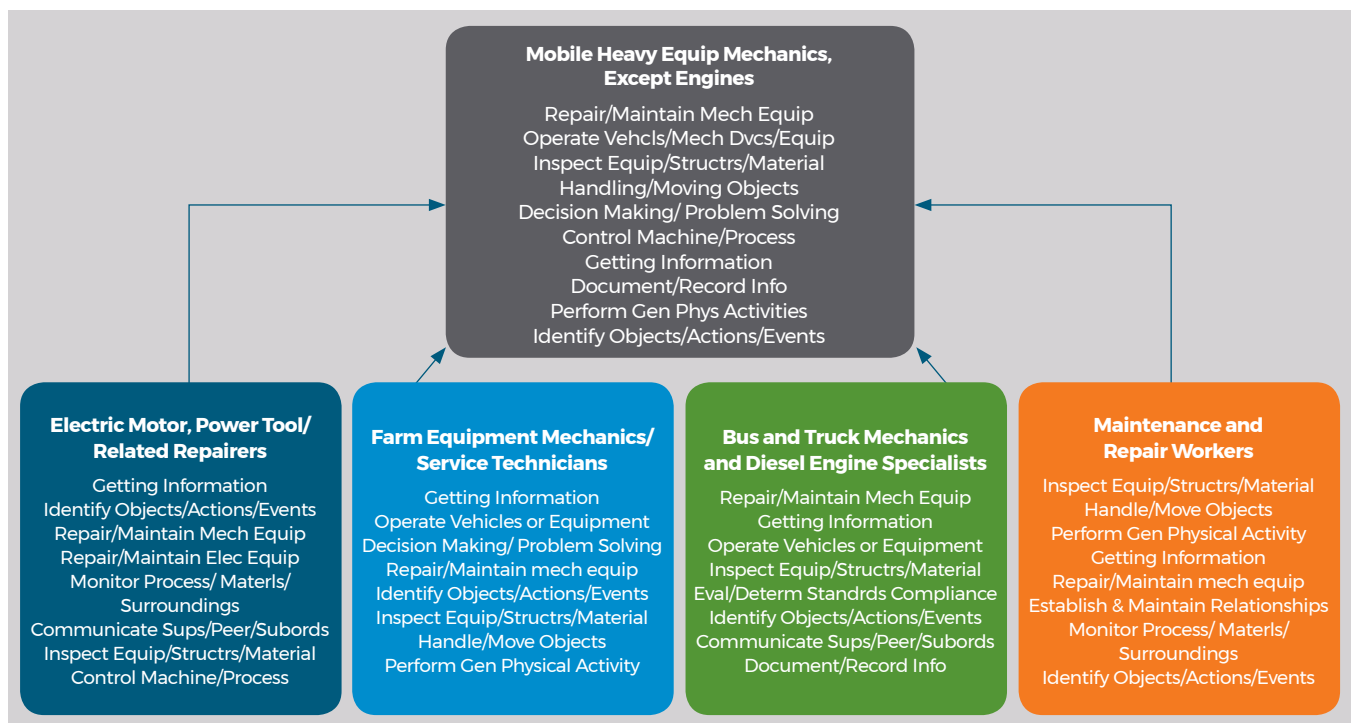
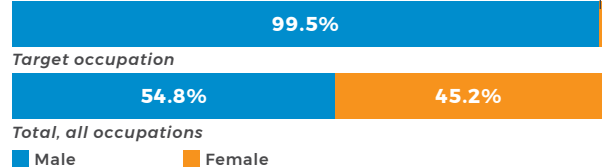
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

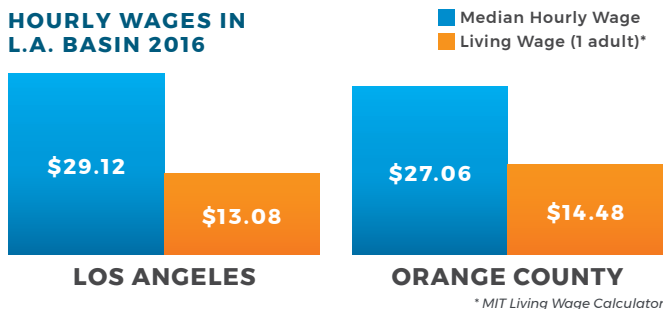


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

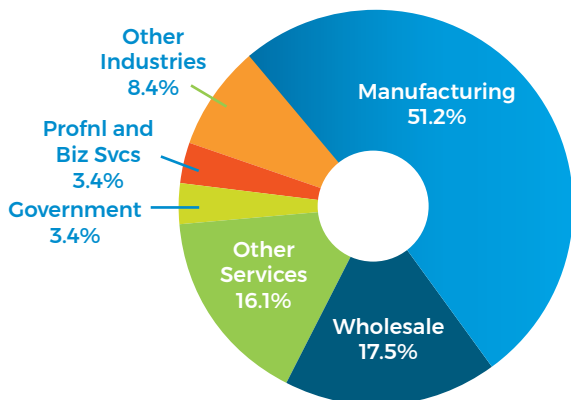
# Industrial Machinery Mechanics (SOC 49-9041)

Industrial machinery mechanics are identified as a middle-skill occupation. They repair, install, adjust, or maintain industrial production and processing machinery or refinery and pipeline distribution systems.

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



## Industry Distribution:

Industrial machinery mechanics are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Manufacturing hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of fixers, industrial mechanics, machine adjusters and mechanics in the L.A. Basin are:

- Merchant Wholesalers, Durable Goods (NAICS 423)
- Repair and Maintenance (NAICS 811)
- Food Product (NAICS 311)

## Jobs in L.A. Basin

**7,810**  
in 2016

## Total Openings

**1,670**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 1,670 Total Openings (5-yr)
- 670 Net Job Change
- 1,010 5-yr Replacements

### Community Colleges Supply:

- 49 Awards
- 2 Programs
- 12 Colleges

### Technology:

- Computer-aided manufacturing (CAM) software
  - *Extranet machine tools suite*
- Enterprise resource planning (ERP) software
  - *SAP*
- Facilities management software
  - *Maintenance management software*
- Industrial control software
  - *BIT Corp ProMACS PLC; KEYENCE PLC Ladder Logic*
- Spreadsheet software

Sources: BLS OES, O\*NET, LAEDC

## Core Tasks and Importance:

- 86** Repair or maintain the operating condition of industrial production or processing machinery or equipment.
- 86** Repair or replace broken or malfunctioning components of machinery or equipment.
- 86** Disassemble machinery or equipment to remove parts and make repairs.
- 86** Observe and test the operation of machinery or equipment to diagnose malfunctions, using voltmeters or other testing devices.
- 86** Reassemble equipment after completion of inspections, testing, or repairs.
- 86** Clean, lubricate, or adjust parts, equipment, or machinery.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

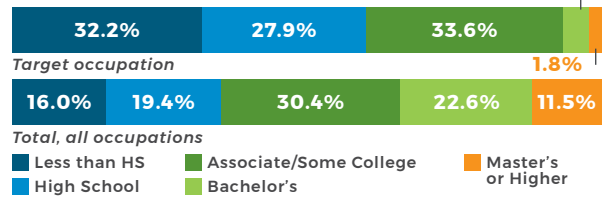
- Most workers have the educational attainment of high school or less.
- A smaller share of workers are under 24 years in this occupation compared to the regional average.
- The workforce in this occupation is predominantly Hispanic, accounting for 66 percent of all workers.
- The workforce is predominantly male, accounting for 95 percent of all workers.

## Related Occupations

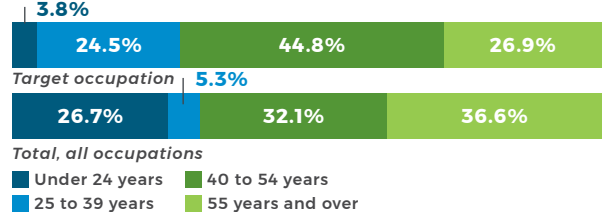
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 49-9043** Machinery maintenance workers (2,330 workers),
- **SOC 49-9071** General maintenance and repair workers (47,180 workers),
- **SOC 49-2094** Commercial and industrial electric equipment repairers (2,230 workers), and
- **SOC 51-4041** Machinists (16,450 workers).

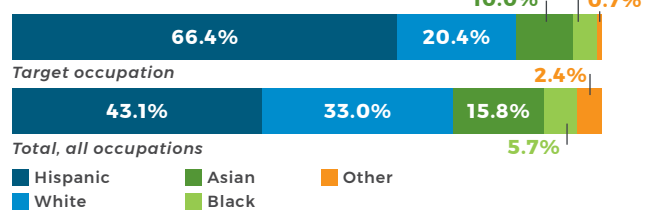
### EDUCATIONAL ATTAINMENT 2016



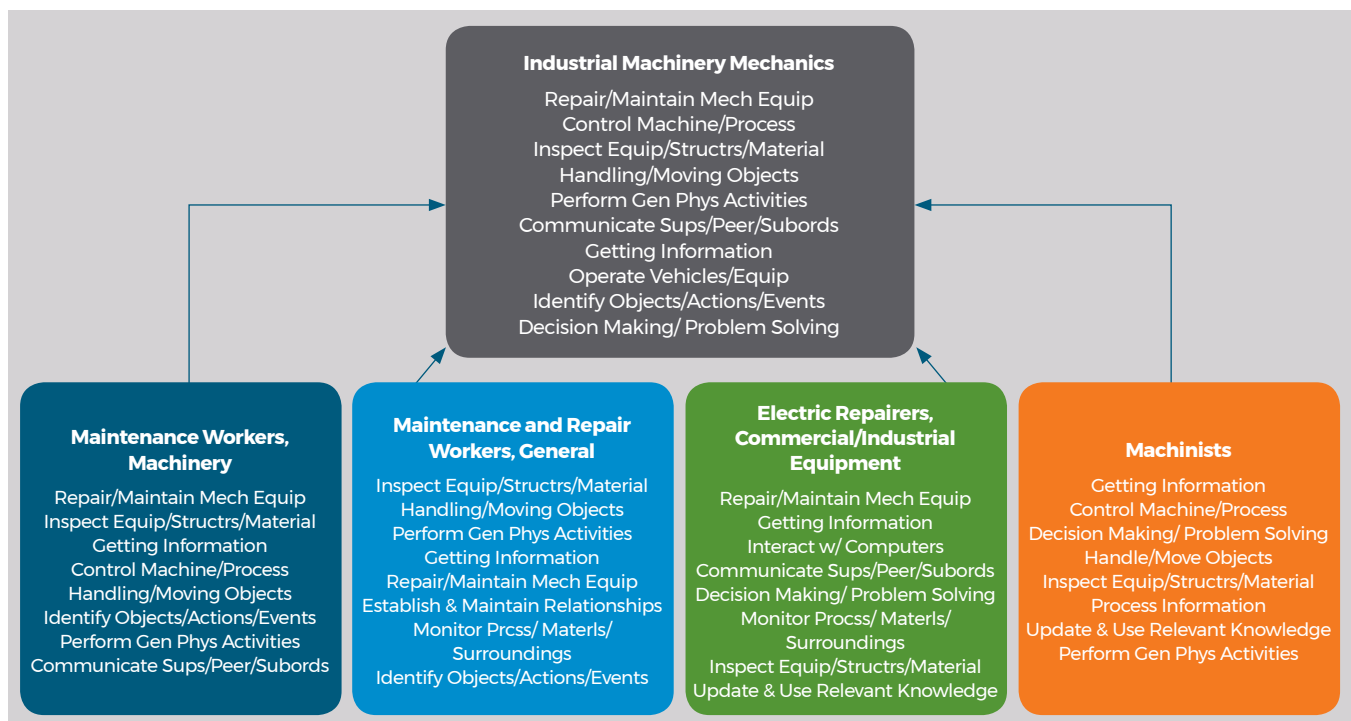
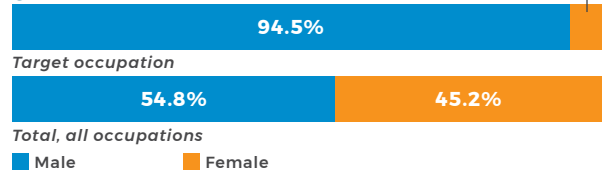
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

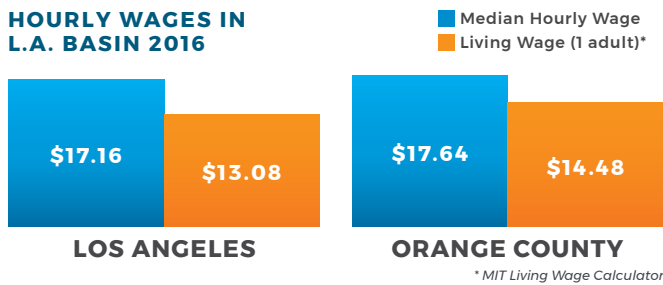


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

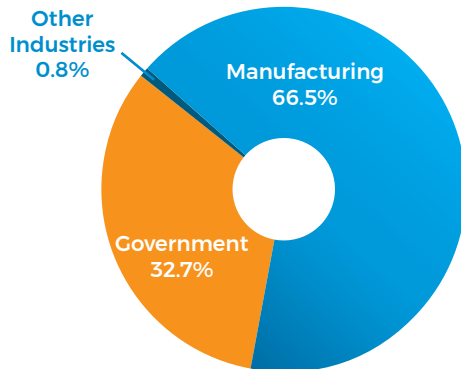
# Computer-Controlled Machine Tool Operators, Metal and Plastic (SOC 51-4011)

Computer-Controlled Machine Tool Operators are identified as a middle-skill occupation. They operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic work pieces.

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



### Industry Distribution:

Computer-controlled machine tool operators are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Manufacturing hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of brake press operators, Computer Numerical Control (CNC) Lathe Operator and CNC machinists in the L.A. Basin are:

- Fabricated Metal Product (NAICS 332)
- Transportation Equipment (NAICS 336)
- Computer and Electronic Product (NAICS 334)

## Jobs in L.A. Basin

**6,610**  
in 2016

## Total Openings

**1,490**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 1,490 Total Openings (5-yr)
- 490 Net Job Change
- 1,000 5-yr Replacements

### Community Colleges Supply:

- 292 Awards
- 2 Programs
- 15 Colleges

### Technology:

- Analytical or scientific software
  - CNC Consulting Machinists' Calculator; Kentech Trig Calculator
- Computer-aided design (CAD) software
  - Autodesk Auto CAD; Dassault Systems SOLIDWORKS; KCD
- Computer-aided manufacturing (CAM) software
  - TCadCam Unigraphics; CNC Mastercam; SmartCAM
- Project management software
- Spreadsheet software

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 90** Measure dimensions of finished workpieces to ensure conformance to specifications, using precision measuring instruments, templates, and fixtures.
- 87** Mount, install, align, and secure tools, attachments, fixtures, and workpieces on machines, using hand tools and precision measuring instruments.
- 86** Stop machines to remove finished workpieces or to change tooling, setup, or workpiece placement, according to required machining sequences.
- 86** Transfer commands from servers to computer numerical control (CNC) modules, using computer network links.
- 85** Check to ensure that workpieces are properly lubricated and cooled during machine operation.
- 85** Set up and operate computer-controlled machines or robots to perform one or more machine functions on metal or plastic workpieces.



## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

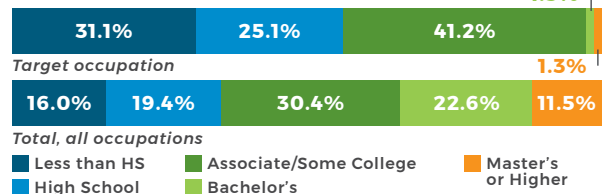
- A larger share of workers have the educational attainment of some college or an associate degree in this occupation compared to the regional average.
- Most workers in this occupation are 40 to 54 years old, accounting for 47 percent of all workers.
- The workforce in this occupation is predominantly Hispanic, accounting for 52 percent of all workers.
- The workforce is predominantly male, accounting for 97 percent of all workers.

## Related Occupations

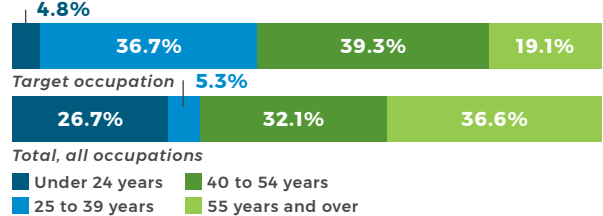
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 51-4081** Multiple machine tool setters, operators, and tenders, metal and plastic (2,880 workers),
- **SOC 51-4191** Heat treating equipment setters, operators, and tenders, metal and plastic (930 workers),
- **SOC 51-4033** Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic (4,340 workers), and
- **SOC 51-7041** Sawing machine setters, operators, and tenders, wood (1,010 workers).

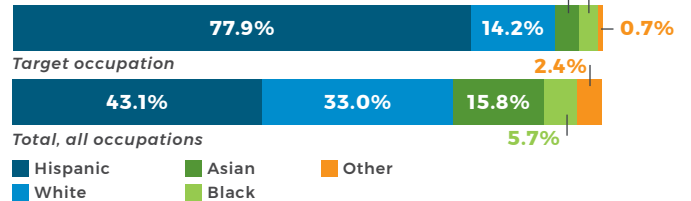
### EDUCATIONAL ATTAINMENT 2016



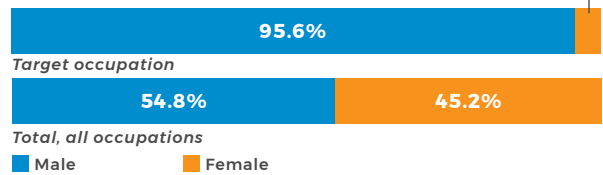
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

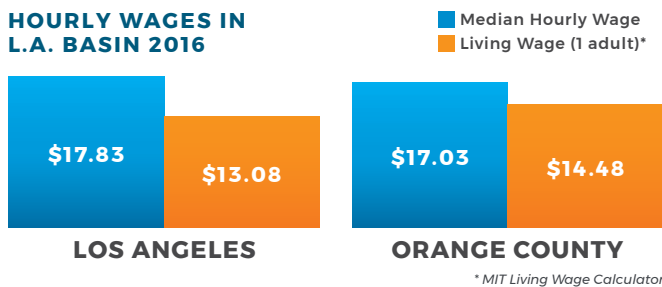


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

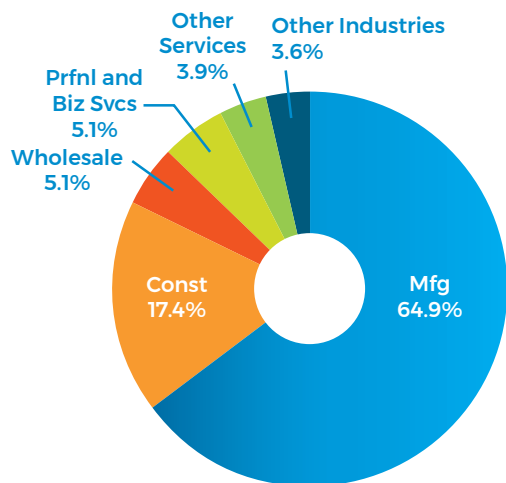
# Welders, Cutters, Solderers & Brazers (SOC 51-4121)

Welders, cutters, solderers and brazers are identified as a middle-skill occupation. They 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.

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



## Industry Distribution:

Welders, cutters, solderers and brazers are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Manufacturing hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of welders, cutters, solderers and brazers in the L.A. Basin are:

- Fabricated Metal Product Mfg (NAICS 332)
- Transportation Equipment Mfg (NAICS 336)
- Specialty Trade Contractors (NAICS 238)

## Jobs in L.A. Basin

**9,608**  
in 2016

## Total Openings

**2,170**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 2,170 Total Openings (5-yr)
- 790 Net Job Change
- 1,370 5-yr Replacements

### Community Colleges Supply:

- 207 Awards
- 1 Program
- 12 Colleges

### Technology:

- Analytical or scientific software
  - Scientific Software Group Filter Drain FD
- Calendar and scheduling software
  - OmniFleet Equipment Maintenance Management
- Computer-aided design (CAD) software
  - EZ Pipe
- Database user interface and query software

Sources: BLS OES, O\*NET, LAEDC

## Core Tasks and Importance:

- 90** Weld components in flat, vertical, or overhead positions.
- 89** Operate safety equipment and use safe work habits.
- 87** Layout, position, align, and secure parts and assemblies prior to assembly, using straightedges, combination squares, calipers, and rulers.
- 85** Examine workpieces for defects and measure workpieces with straightedges or templates to ensure conformance with specifications.
- 79** Recognize, set up, and operate hand and power tools common to the welding trade, such as shielded metal arc and gas metal arc welding equipment.

## Middle Skill Relevance

Welders, cutters, solderers and brazers can learn the required skills in a variety of ways, including on-the-job training, apprenticeships and career education training programs. A professional certification, Certified Welder (CW), will increase access to positions associated with the higher wages in this occupation.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

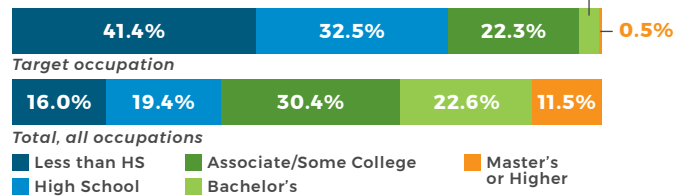
- While the entry-level education is high school, most workers have the educational attainment of less than high school.
- A smaller share of workers are ages 55 years and over in this occupation compared to the regional average.
- The workforce in this occupation is predominantly Hispanic, accounting for 80 percent of all workers.
- The workforce is predominantly male, accounting for 96 percent of all workers.

## Related Occupations

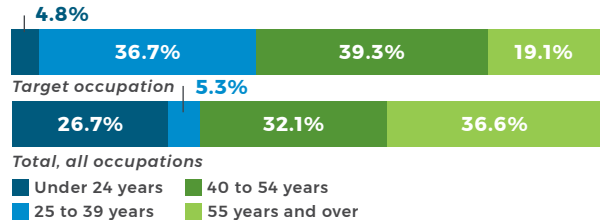
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 51-4031** Cutting, punching and press machine setters, operators and tenders, metal and plastic (6,430 workers),
- **SOC 51-4034** Lathe and turning machine tool setters, operators and tenders, metal and plastic (2,211 workers),
- **SOC 51-4072** Molding, coremaking and casting machine setters, operators and tenders (3,745 workers), and
- **SOC 51-4122** Welding, soldering and brazing machine setters, operators and tenders (1,496 workers).

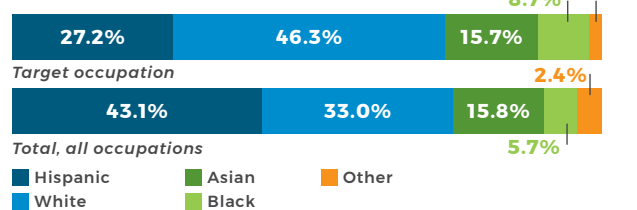
### EDUCATIONAL ATTAINMENT 2016



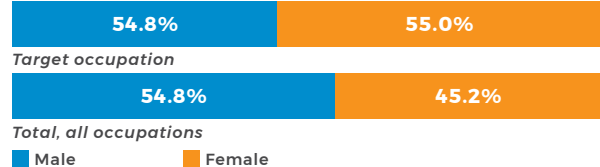
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016

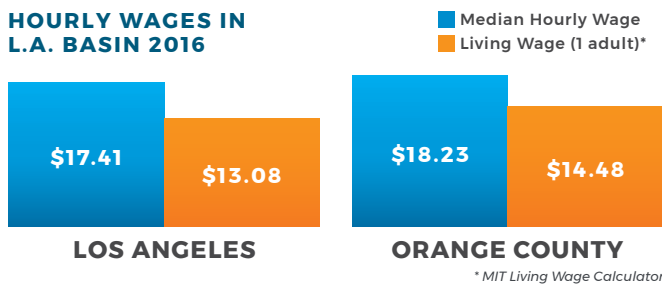


Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

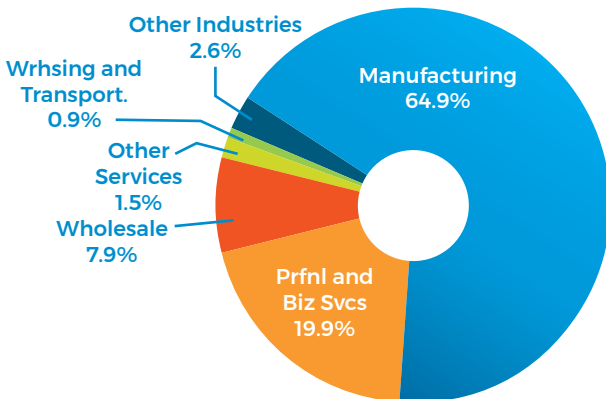
# Inspectors, Testers, Sorters, Samplers and Weighers (SOC 51-9061)

Inspectors, Testers, Sorters, Samplers and Weighers are identified as a middle-skill occupation. They 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.

## HOURLY WAGES IN L.A. BASIN 2016



## INDUSTRY DISTRIBUTION



### Industry Distribution:

Inspectors, testers, sorters, samplers and weighers are hired across a number of different industries. These industries are where individuals who have acquired the necessary training and skills may seek employment opportunities post-program. Manufacturing hires the most workers in this occupation in the L.A. Basin. The three industry subsectors who employ the largest number of inspectors, pickers, quality assurance auditors and quality technicians in the L.A. Basin are:

- Fabricated Metal Product (NAICS 332)
- Computer and Electronic Product (NAICS 334)
- Administrative and Support Services (NAICS 561)

Jobs in L.A. Basin  
**22,380**  
in 2016

Total Openings  
**3,840**  
2016 to 2021

## At A Glance

### Projected Openings 2021:

- 3,840 Total Openings (5-yr)
- 1,030 Net Job Change
- 2,810 5-yr Replacements

### Community Colleges Supply:

- 111 Awards
- 3 Programs
- 13 Colleges

### Technology:

- Analytical or scientific software
  - Design of experiments DOE software; Minitab; Tolerance analysis software
- Computer-aided design (CAD) software
  - Autodesk AutoCAD; Dassault Systemes CATIA
- Database user interface and query software
  - Data entry software; FileMaker Pro; Microsoft Access
- Electronic mail software
- Industrial control software
  - Coordinate measuring machine software; Cybermetrics GAGETrak

Sources: BLS OES, O'NET, LAEDC

## Core Tasks and Importance:

- 91** Inspect, test, or measure materials, products, installations, or work for conformance to specifications.
- 88** Measure dimensions of products to verify conformance to specifications, using measuring instruments such as rulers, calipers, gauges, or micrometers.
- 88** Read blueprints, data, manuals, or other materials to determine specifications, inspection and testing procedures, adjustment methods, certification processes, formulas, or measuring instruments required.
- 86** Record inspection or test data, such as weights, temperatures, grades, or moisture content, and quantities inspected or graded.
- 86** Mark items with details such as grade or acceptance-rejection status.
- 84** Notify supervisors or other personnel of production problems.

## Worker Characteristics

The demographics of the workforce provide an additional layer of information to further highlight who is employed in this occupation in the L.A. Basin:

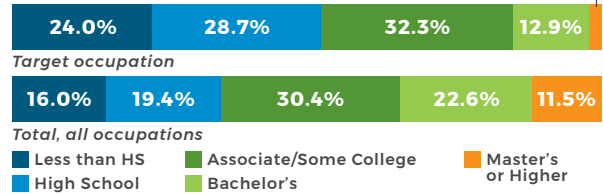
- A larger share of workers have the educational attainment of high school or less in this occupation compared to the regional average.
- Most workers in this occupation are ages 25 to 54 years, accounting for 70 percent of all workers.
- The workforce in this occupation is predominantly Hispanic, accounting for 54 percent of all workers.
- The workforce is predominantly male, accounting for 62 percent of all workers.

## Related Occupations

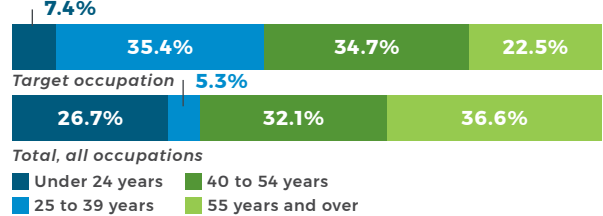
Individuals with similar skill sets that are transferable with retraining or additional training being offered:

- **SOC 51-4031** Shipping, receiving and traffic clerks (38,380 workers),
- **SOC 51-2092** Team assemblers (34,710 workers),
- **SOC 51-4031** Cutting, punching and press machine setters, operators and tenders, metal and plastic (6,430 workers), and
- **SOC 53-7063** Machine feeders and offbearers (2,290 workers).

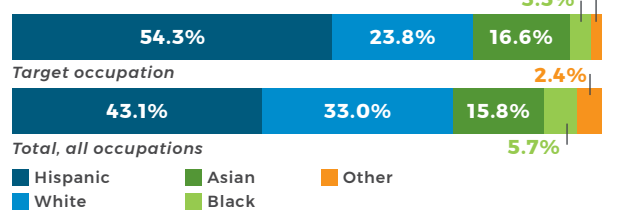
### EDUCATIONAL ATTAINMENT 2016



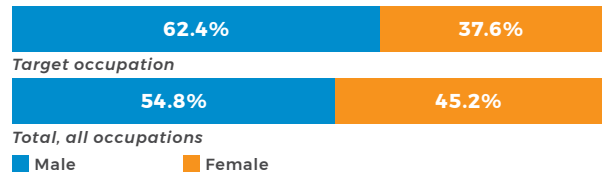
### AGE DISTRIBUTION 2016



### RACE AND ETHNICITY 2016



### GENDER 2016



Sources: U.S. Census Bureau ACS PUMS, O\*NET, LAEDC

## 8 Middle-skill Occupations

In the sections that follow, the nine occupational clusters representing the 20 target occupations are examined in more detail:

- Management
- Computer and Mathematical
- Arts, Design, Entertainment, Sports and Media
- Health Care Practitioners
- Health Care Support
- Office and Administrative Support
- Construction and Extraction
- Installation, Maintenance and Repair
- Production

Within each occupational cluster, one to four occupations were selected for closer examination that offer promising career prospects for community college students (Exhibit 8-1).

The 20 occupations identified by this study are middle-skill occupations with strong employment projections and the potential for facilitating economic mobility (Exhibit 8-2).

Middle-skill jobs are particularly relevant to community colleges because they typically require some college coursework, but less than a bachelor's degree.

It is estimated that half of all jobs in the nation are middle skill.<sup>4</sup> However, there have been mounting concerns in recent years that a shortage of skilled workers to fill middle-skill jobs could hamper the nation's future economic growth.<sup>5</sup>

### Regional Community College Supply

TOTAL NUMBER OF STUDENTS:

775,956

NUMBER OF CAREER EDUCATION STUDENTS:

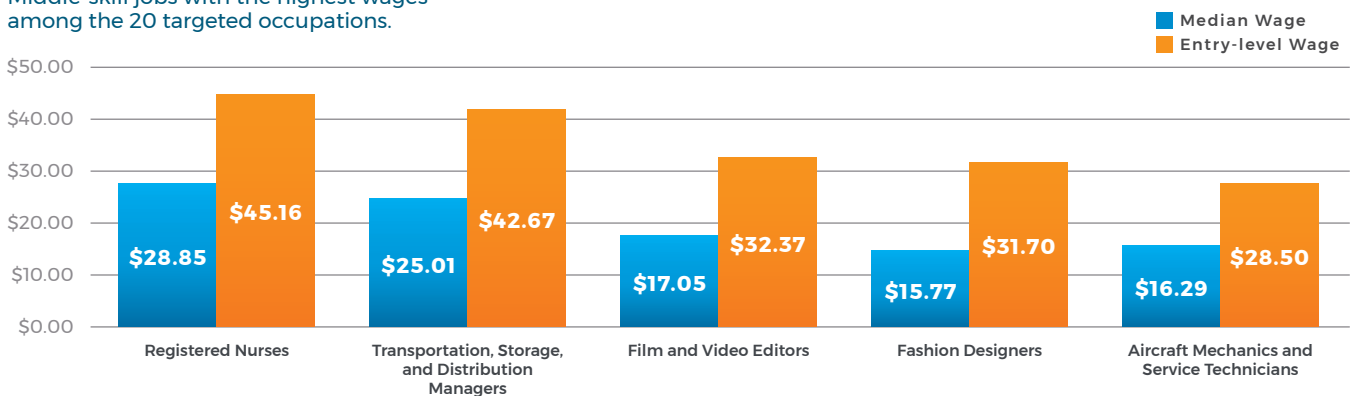
523,331

200+

NUMBER OF CAREER EDUCATION PROGRAMS

#### EXHIBIT 8-1

Middle-skill jobs with the highest wages among the 20 targeted occupations.



<sup>4</sup>The future of the U.S. Workforce: Middle skills jobs and the growing importance of postsecondary education." 2012. Achieve. <http://www.achieve.org/files/MiddleSkillsJobs.pdf>

As a result, employers and educational providers have been directing more attention toward the training of middle-skill workers. Middle-skill jobs can be highly technical and have great potential to lift individuals out of poverty, offering strong wages and requiring only a few years of educational preparation. Some of the selected occupations have a typical entry-level education of bachelor's degree according to the Bureau of Labor Statistics, but still qualify as middle skill. This is because at least 33 percent of the occupation's current workers have completed some college coursework or an associate degree as their highest level of education.

Other occupations included in the analysis may not require college coursework, but are still considered middle skill because they may require more than 12 months of on-the-job training or an apprenticeship.

### Looming Supply Gap

During the 2014-15 academic year, nearly 776,000 students enrolled in one or more community college courses in the Los Angeles Basin.

Of those students, 523,331 students, about 67 percent, enrolled in career education courses.

Regionally, students can choose from more than 200 career education programs offered by 19 community colleges in Los Angeles County and nine community colleges in Orange County.

In the region there will be **approximately 67,450 job openings over the next five years** for the 20 occupations highlighted in this report.

However, there appears to be a looming gap in the supply of skilled workers to enter these jobs.

According to the latest data available, from the academic year 2014-15, there were fewer than 27,000 career education award earners in the Los Angeles Basin. And nearly 7,800 awards were conferred in programs training for the 20 target occupations.

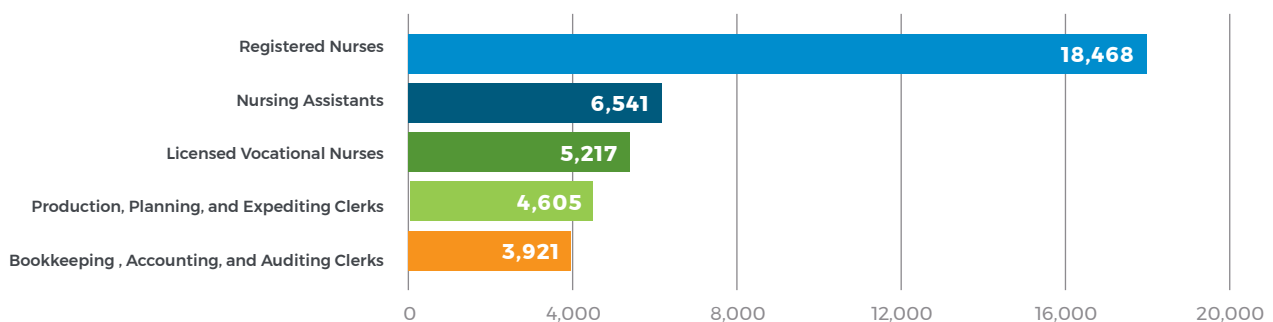
**If this trend continues, 42 percent of the demand in the region will not be met over the next five years.**

Since community colleges play a leading and vital role in training students to enter these target occupations, it is incumbent that more attention be given toward meeting forecasted employer demand. Closing the supply gap is critical to the growth and prosperity of the economy in the Los Angeles Basin.

The following sections further examine each occupational cluster and provide detailed information about the current workforce and available training.

#### EXHIBIT 8-2

Of the 20 occupations studied, middle-skill jobs with the most job openings (new + replacement) through 2021.



<sup>5</sup> Modestino, Alicia Sasser. "The importance of middle-skill jobs." Vol. 33, Issue 1. Fall 2016. Issues in Science and Technology. <http://issues.org/33-1/the-importance-of-middle-skill-jobs/>

# Student Demographic Portrait

In the Los Angeles Basin, community college students are predominantly young, with many under the age of 19. Moreover, a very high percentage of students study business administration, the most popular career education program in the region.

Overall, the award completion demographics in both counties seem to mirror the overall demographics of the region.

In general, there are more male community college students than female students in Los Angeles County, but a higher proportion of career education award earners are women.

Program choices vary by gender. Male students in Los Angeles County have the highest completion rates in business administration, administration of justice and automotive technology. Female students have high completion rates in child development/early care and education, registered nursing and business administration.

Hispanic students account for the largest proportion of award holders in Los Angeles County. In fact, most Hispanic completions in 2014-15 were child development/early care and education, followed by administration of justice.

Analysis of the more than 200 community college career education (CE) programs training for the 20 priority occupations, revealed the following:

- **Management**

Women comprise the majority of business management award earners in both Los Angeles and Orange counties, 59 percent and 51 percent, respectively.

- **Logistics**

The majority, 72 percent, of logistics and materials transportation award earners in Los Angeles County were Hispanic, while the majority, 75 percent, of award earners in Orange County were African-American.

- **Entertainment**

In Los Angeles County, commercial art and film production award completers are primarily male, 81 percent and 100 percent, respectively.

- **Fashion**

Fashion and fashion design award earners are predominately female in Los Angeles and Orange counties, 100 percent and 84 percent, respectively.

- **Health Care**

Approximately 80 percent of registered nursing award earners in both counties are female; and over half, 51 percent, of registered nursing award holders in Los Angeles County are between the ages of 20 and 29.

- **Installation, Maintenance & Repair**

Award earners in both counties are exclusively male. And the majority of award earners are Hispanic, comprising 62 percent in Los Angeles County and 58 percent in Orange County.

- **Construction & Extraction**

Nearly 60 percent of construction-and-extraction award earners in Los Angeles County are under the age of 25. Orange County's award earners are older in comparison, with 77 percent of award recipients ages 25 to 34.

Los Angeles	Orange County
✓ Higher proportion of female award earners for CE programs (58 percent female)	✓ Higher proportion of male award earners for CE programs (51 percent male)
✓ Higher proportion of Hispanic CE award earners (57 percent), followed by white (17 percent)	✓ Higher proportion of white CE award earners (39 percent), followed by Hispanic (35 percent)
✓ Highest percentage of CE award earners are 19 years old or younger (34 percent), followed by ages 20-24 years (26 percent)	✓ Highest percentage of CE award earners are 19 years old or younger (24 percent), followed closely by ages 20-24 years (23 percent)
✓ Highest percentage of students earn awards in business administration (10 percent), followed by child development/early care and education (9 percent)	✓ Highest percentage of students earn awards in business administration (17 percent), followed by accounting (8 percent)



# Talent Supply and Demand

In this section, we examine employer demand for middle-skill occupations in relation to the supply of talent from related community college programs. However, supply-and-demand matching do not result in an absolute value for unmet or oversupplied labor market need due to the fact that a single community college program can train students to enter more than one occupation. In fact, most community college programs train students to enter an array of occupations related to a specific area. However, analysis of program completion data can serve as a somewhat broad indicator of whether an adequate number of students are being prepared to enter high-growth occupations.

(For the complete list of community college associate degrees and certificates awarded in programs related to the 20 target occupations, refer to Appendix Exhibit A-1.)

## Management

### Overview

Management occupations are critical to many industries, from logistics to aerospace and advanced manufacturing. They play a central role in ensuring the prosperity and fulfillment of economic goals for many different types of businesses and firms.

Occupations within the management cluster are characterized by their role in planning, directing or coordinating operational activities. Managers, and supervisors alike, may be responsible for scheduling, strategic planning and training employees.

They often oversee financial activities, such as budgeting, and they must make certain that activities are carried out in accordance with organizational policies.

### Job to Watch

In the Los Angeles Basin, the occupation of transportation, storage and distribution managers is important for industries providing transportation, warehousing and storage of goods.

## MANAGEMENT SCORECARD

### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Transportation, Storage and Distribution Managers	6,211	266	\$47.37

### Supply

CC Programs	2015-16 Awards
Business Management	995
Logistics and Materials Transportation	217
Aviation and Airport Management	31
Aviation and Airport Management and Services	15
<b>TOTAL</b>	<b>1,258</b>

This occupation is valuable for operations providing scenic and sightseeing transportation, and businesses offering support activities related to various modes of transportation—air, rail, water, roads and pipelines.

In 2016, the region employed 6,211 transportation, storage and distribution managers. It is projected there will be 1,329 job openings over the next five years, or the equivalent of 266 annual openings.

A compelling aspect of the transportation, storage and distribution managers occupation is its high wage. Workers in this occupation can expect to earn on average \$47/hour, or more than \$98,000/year.

### Student Supply

There are four programs offered in the Los Angeles Basin that prepare students for the target management occupation. Collectively, these programs conferred 1,258 awards in the 2015-16 academic year.

In the 2014-15 academic year (the most recent data available), only one award in business management was conferred by one program at a technical/proprietary college in the region.

## Computer & Mathematical

### Overview

Occupations in the computer and mathematical cluster are responsible for collecting data, analyzing computer systems and networks, and designing software to help businesses with their day-to-day operations.

Workers in this cluster design websites or provide technical assistance to computer users. They may create computer programs, or plan and design computer systems that integrate computer hardware, software and communication technologies.

Community college programs related to this cluster teach students about information storage and processing, as well as computer support. Curriculum may include networking design (installation, maintenance and troubleshooting), website development and managing computer systems and networks.

### Job to Watch

There are two occupations of regional importance within the computer and mathematical occupational cluster:

- Web developers, and
- Computer user support specialists.

In 2016, the region employed 32,172 workers in these occupations. Between the two, computer user support specialists comprised 73 percent of employment in 2016.

With an average wage of \$33.28/hour, web developers can expect to earn around \$69,000 annually. Computer user support specialists earn slightly less, \$27.68/hour, which translates to around \$57,500/year. However, there are two times as many annual openings for computer support specialists than web developers in the Los Angeles Basin.

This number is substantial and most likely due to the differences in education requirements for the two occupations. Generally, less education and training is required for computer user support specialists compared to web developers.

Another factor for the significant difference in jobs is that overall employment of web developers may not be accurately represented in the dataset because this occupation tends to be self-employed as independent contractors. For example, in 2016 there were nearly 2,200 self-employed workers in the region.

### COMPUTER & MATHEMATICAL SCORECARD

#### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Computer User Support Specialists	23,497	776	\$27.68
Web Developers	8,675	356	\$33.28

#### Supply

CC Programs	2015-16 Awards
Computer Networking	171
Computer Infrastructure and Support	122
Computer Information Systems	101
Website Design and Development	37
Computer Support	36
World Wide Web Administration	15
<b>TOTAL</b>	<b>482</b>

### Student Supply

Six programs offered by community colleges in the Los Angeles Basin were identified that prepare students for the occupations mentioned above. In total, 482 awards were conferred by these programs in the 2015-16 academic year. This number falls far below the projected job openings for web developers and computer user support specialists.

In the 2014-15 academic year, 173 awards also were conferred by technical/proprietary colleges in the following programs:

- Computer Networking (78 awards);
- Computer Information Systems (40);
- Computer Infrastructure and Support (1);
- Website Design and Development (34);
- Computer Support (13); and
- World Wide Web Administration (7).

# Arts, Design, Entertainment, Sports & Media

## Overview

Given that the Los Angeles Basin is widely considered the creative capital of the nation, it's no surprise that the arts, design, entertainment, sports and media cluster was identified as a priority area by this study. Work responsibilities in this cluster primarily revolve around creating original artwork, editing moving images on film or video, and operating audio and video equipment.

Employers in the region include motion picture and sound recording industries, broadcasting companies, the performing arts and spectator sports.

Community college programs related to this cluster teach students artistic techniques that can be applied to commercial and technical projects. Learning how to use computer software programs with consumer, commercial and industrial applications is integral to many educational programs.

## Job to Watch

Four occupations within the cluster were selected for closer analysis:

- Graphic designers,
- Film and video editors,
- Audio and video equipment technicians, and
- Fashion designers.

In 2016, the region employed 41,215 workers in these four occupations, which are projected to generate over 6,100 new jobs over the next five years, translating to 1,200 job openings per year.

The graphic designers occupation has the greatest employment in the region and the most annual openings, 482 per year, followed by audio and video equipment technicians, 375 openings per year.

Occupations in this group earn hourly wages between \$25.16 and \$47.20, with film and video editors earning the highest average wage.

Of these four occupations, audio and video equipment technicians require the least education (a postsecondary certificate), whereas the other three typically require a bachelor's degree. However, approximately 30 percent of the workforce in each of the three occupations holds a community college degree or certificate, qualifying these occupations as middle-skill jobs.

## ARTS, DESIGN, ENTERTAINMENT, SPORTS & MEDIA SCORECARD

### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Graphic Designers	12,651	482	\$25.16
Film and Video Editors	12,588	214	\$47.20
Audio and Video Equipment Technicians	10,707	376	\$26.57
Fashion Designers	5,270	152	\$36.77

### Supply

CC Programs	2015-16 Awards
Television (including combined TV/Film/Video)	208
Film Production	174
Graphic Art and Design	169
Fashion Design	165
Radio and Television	86
Commercial Art	70
Computer Graphics and Digital Imagery	67
Digital Media	36
Fashion	34
<b>TOTAL</b>	<b>1,009</b>

## Student Supply

Nine community college programs preparing students for the four occupations conferred more than 1,000 awards in the 2015-16 academic year.

In addition, technical/proprietary colleges conferred 112 awards through the following programs:

- Graphic Art and Design (51 awards);
- Fashion Design (20);
- Film Production (32); and
- Radio and Television (19).

## Health Care Practitioners

### Overview

The health care practitioner cluster is expected to undergo rapid growth both statewide and regionally in coming years. This is attributed to the aging baby boomer generation which will place greater demands on regional health systems and an aging workforce, which will have an increase in retirements in health care occupations.

Health care practitioners care for their patients in a range of environments, from hospitals and nursing homes to clinics, private homes and group homes.

Community college programs train students how to assess patient health problems and needs, maintain records and develop care plans for patients.

Community college programs prepare students for licensure by either the California Board of Registered Nursing or the state’s Board of Vocational Nursing and Psychiatric Technicians.

### Job to Watch

Most occupations within this cluster require a bachelor’s degree or higher. However, two occupations are considered middle skill, with a significantly higher proportion of workers having completed community college training.

The two occupations projected to undergo robust growth and offer strong wages are:

- Registered nurses, and
- Licensed vocational nurses.

In 2016, the region employed 130,919 workers as registered nurses and licensed vocational nurses. These two occupations are projected to have 23,685 job openings over the next five years, or 4,700 job openings per year.

There will be far more openings for registered nurses, nearly 3,694 each year, compared to licensed vocational nurses, around 1,043 each year.

Of the two occupations, registered nurses require more training and specialization, which translates to higher compensation—an average wage of \$44.98/hour.

The average wage of registered nurses is nearly twice that of licensed vocational nurses, \$24.43/hour. While registered nurses can earn around \$93,000/year, licensed vocational nurses earn closer to \$50,000/year. Still, this occupation offers a strong wage compared to many other careers.

### HEALTH CARE PRACTITIONERS SCORECARD

#### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Registered Nurses	102,749	3,694	\$44.98
Licensed Vocational Nurses	28,170	1,043	\$24.43

#### Supply

CC Programs	2015-16 Awards
Registered Nursing	1,943
Licensed Vocational Nursing	115
<b>TOTAL</b>	<b>2,058</b>

### Student Supply

Community college programs preparing students for the two nursing occupations in the region conferred slightly more than 2,000 awards in the 2015-16 academic year.

Only 115 of those awards were for licensed vocational nursing programs, whereas this occupation is projected to have 1,043 annual openings.

It should be noted in the 2014-15 academic year, technical/proprietary college programs conferred more than 1,000 awards related to the two occupations:

- Registered Nursing (167 awards); and
- Licensed Vocational Nursing (952).

With more than 4,700 job openings expected each year for registered nurses and licensed vocational nurses combined, and with only about 3,000 awards conferred per year, there may be a supply gap for these professions.

## Health Care Support

### Overview

Health care support occupations provide administrative and clinical assistance at clinics, hospitals and other institutions.

Workers generally complete a postsecondary certificate that allows them to provide basic nursing care under the direction of a health care practitioner, as well as perform office and laboratory duties.

Students interested in a career as a nursing assistant can enroll in a certified nurse assistant program offered by a community college where they will be trained to conduct routine nursing services.

These services typically involve the care of patients in hospitals or long-term care facilities.

Health care support occupations are supervised by nursing or medical staff. Workers must pass a nurse assistant certification examination and background check to be employed in health care support occupations.

Health care support workers must be well versed in the technology necessary to keep up with the fast-paced and ever-changing health care industry.

### Job to Watch

In this cluster, the nursing assistants occupation is important for the region.

In 2016, the region employed 42,073 health care support workers as nursing assistants.

Moreover, it is projected that there will be more than 6,500 job openings for this occupation over the next five years. That equates to more than 1,300 job openings each year.

The average wage for this occupation, \$14.95/hour, is considerably lower than that of registered nurses or licensed vocational nurses.

In general, a nursing assistant receiving an average wage in the region can expect to earn around \$31,000 per year.

## HEALTH CARE SUPPORT SCORECARD

### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Nursing Assistants	42,073	1,308	\$44.98

### Supply

CC Programs	2015-16 Awards
Certified Nurse Assistant	16

### Student Supply

In the 2015-16 academic year, community colleges only conferred 16 certified nurse assistant awards in the region.

In the 2014-15 academic year, representing the latest available data, the total number of associate degrees and certificates from technical/proprietary schools for certified nurse assistants was 134 in the region.

Still, this number falls below the more than 1,300 projected annual openings that are expected for nursing assistants in the region.

## Office & Administrative Support

### Overview

Office and administrative support workers have a significant role in the advancement of the business services industry, specifically in the areas of accounting and other financial services.

These occupations perform a wide range of activities. For example, workers in office and administrative occupations may be tasked with preparing, transcribing, systematizing and preserving written communications and records.

They may also gather and distribute information and maintain stores of materials. Operating telephone switchboards and coordinating the flow of work and materials within or between departments are other skills associated with this occupational cluster.

The ability to systemize information is critical to this field of study.

Community colleges train students to verify accuracy of data by applying accounting, internal reporting and decision-making principles. Students also learn about many aspects of the day-to-day operations of businesses and financial establishments.

### Job to Watch

Three occupations critical to the Los Angeles Basin's economic landscape within the office and administrative support occupational cluster were identified:

- Bookkeeping, accounting and auditing clerks;
- Production, planning and expediting clerks; and
- Payroll and timekeeping clerks.

In 2016, the region employed 108,834 workers in these four occupations, which are projected to have 10,428 openings over the next five years, or nearly 2,100 job openings per year.

Out of the three occupations, 70 percent of the jobs in 2016 were for bookkeeping, accounting and auditing clerks.

This occupation also typically requires the most education. Yet, it has the lowest average wage, \$21.80/hour, around \$45,300 per year.

The occupation of production, planning and expediting clerks pays a higher wage, \$23.21/hour, about the equivalent of \$48,300 per year. This occupation will have 921 annual openings in the region.

### OFFICE & ADMINISTRATIVE SUPPORT SCORECARD

#### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Bookkeeping, Accounting and Auditing Clerks	76,508	784	\$44.98
Production, Planning and Expediting Clerks	23,106	921	\$23.21
Payroll and Timekeeping Clerks	9,220	380	\$21.95

#### Supply

CC Programs	2015-16 Awards
Accounting	1,193
Logistics and Materials Transportation	217
<b>TOTAL</b>	<b>1,410</b>

### Student Supply

Community college programs related to this occupational cluster conferred about 1,400 awards in the 2015-16 academic year.

Accounting programs conferred by far the most awards, 1,193, compared to logistics and materials transportation, 217.

Technical/proprietary colleges conferred 26 awards in accounting in the region in the 2014-15 academic year.

# Construction & Extraction

## Overview

Occupations in the construction and extraction cluster are characterized by their role in building and maintaining buildings.

Workers may drive, maneuver or control the heavy machinery used in the construction of buildings, as well as work with electrical wiring, equipment and fixtures.

A critical field of expertise within construction and extraction is related to electrical systems.

At the community college level, programs related to this area prepare students to install, maintain and repair electrical systems in buildings.

Students learn about residential, commercial and industrial electric power wiring, as well as motors, controls and electrical-distribution panels.

## Job to Watch

An occupation identified as being particularly critical to the construction and extraction workforce in the Los Angeles Basin is electricians.

In 2016, the region employed 17,178 workers in this occupation, and it is projected that there will be nearly 600 annual openings for electricians between 2016 and 2020.

This occupation pays a solid average wage, \$27.65/hour, which translates to around \$57,500 per year.

## CONSTRUCTION & EXTRACTION SCORECARD

### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Electricians	17,178	597	\$27.65

### Supply

CC Programs	2015-16 Awards
Electronics and Electric Technology	361
Electrical	191
Electrical Systems Power Transmission	27
<b>TOTAL</b>	<b>579</b>

## Student Supply

There are several types of community college programs that train electricians in the region.

These programs conferred a total of 579 awards in the 2015-16 academic year in the region.

Electronics and electric technology programs conferred the most awards, 361, followed by electrical programs, 191 awards.

The smallest number of awards, only 25, were earned from electrical systems and power transmission programs in the region.

The same programs are offered by technical and proprietary schools in the region. In the 2014-15 academic year, technical/proprietary college programs awarding associate degrees and certificates in the region were:

- Electrical (176 awards);
- Electronics and Electric Technology (65); and
- Electrical Systems and Power Transmission (27).

## Installation, Maintenance & Repair

### Overview

Occupations in the installation, maintenance and repair cluster conduct a wide range of activities. These jobs are typically characterized by the type of equipment they use.

Some workers specialize in aircraft repair and maintenance, while others focus on heavy and mobile equipment, or industrial machinery.

At the community college level, programs related to installation, maintenance and repair instruct students in the:

- Repair and maintenance of diesel engines;
- Construction, maintenance and operation of mechanical, hydraulic, pneumatic and electrical equipment and related systems; and
- Engineering principles and technical skills for the manufacturing of products and related industrial processes.

### Job to Watch

In 2016, the region employed 16,865 workers in three occupations particularly relevant to the installation, repair and maintenance cluster.

These three occupations are:

- Industrial machinery mechanics,
- Aircraft mechanics and service technicians, and
- Mobile heavy equipment mechanics (except engines).

Across these three occupations, 3,200 job openings are projected over the next five years, with over 600 job openings per year. Approximately half of the job openings will be for industrial machinery mechanics. These three occupations pay \$26.50-\$29.90/hour.

Of the three occupations, industrial machinery mechanics typically requires a high school diploma, yet nearly half of the workforce has completed some community college training.

### INSTALLATION, MAINTENANCE & REPAIR SCORECARD

#### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Industrial Machinery Mechanics	7,809	335	\$26.50
Aircraft Mechanics and Service Technicians	5,252	130	\$28.05
Mobile Heavy Equipment Mechanics, Except Engines	3,804	176	\$29.90

#### Supply

CC Programs	2015-16 Awards
Industrial Systems Technology and Maintenance	102
Aviation Powerplant Mechanics	90
Aviation Airframe Mechanics	84
Manufacturing and Industrial Technology	49
Aeronautical and Aviation Technology	43
Heavy Equipment Maintenance	8
<b>TOTAL</b>	<b>376</b>

### Student Supply

There are six types of community college programs in the region that train for the three occupations. The most student completions in the 2015-16 academic year were in industrial systems technology and maintenance, 102 awards, followed by aviation powerplant mechanics, 90 awards. Aviation airframe mechanics conferred 84 awards.

Two programs related to the three occupations were offered by technical/proprietary colleges in the 2014-15 academic year in the region. Degrees and certificates were conferred by the following programs:

- Aeronautical and Aviation Technology (223 awards); and
- Aviation Powerplant Mechanics (2).



# Production

## Overview

Occupations related to production create new products either directly from raw materials or components.

Although these jobs are usually in a factory, plant or mill, they can also be in a home.

In the Los Angeles Basin, production occupations have a significant role in the biomedical industry, through establishments engaged in the production of medical equipment and supplies.

Workers who work in production may operate computer-controlled machines or robots. They may also inspect, test, sort, sample or weigh materials or processed, fabricated or assembled products.

Community colleges teach students about the fabrication, assembly and repair of parts and components or systems on machines.

They also train students to develop or manufacture systems or products used in various industries.

## Job to Watch

The production cluster contains three occupations that particularly warrant attention in the region:

- Inspectors, testers, sorters, samplers and weighers;
- Welders, cutters, solderers and brazers; and
- Computer-controlled machine tool operators (metal and plastic).

In 2016, the region employed 38,605 workers in these three occupations, which are projected to have nearly 7,500 job openings over the next five years. This equates to approximately 1,500 job openings per year.

The highest average wage is earned by inspectors, testers, sorters, samplers and weighers, \$20.27/hour, which translates to about \$42,000 per year. This occupation is also expected to have the most annual openings of the three.

## PRODUCTION SCORECARD

### Demand

Occupation	2016 Jobs	Annual Openings	Avg. Hourly Wage
Inspectors, Testers, Sorters, Samplers and Weighers	22,383	768	\$20.27
Welders, Cutters, Solderers and Brazers	9,608	433	\$18.91
Computer-Controlled Machine Tool Operators, Metal and Plastic	6,614	298	\$17.87

### Supply

CC Programs	2015-16 Awards
Machining and Machine Tools	243
Welding Technology	207
Manufacturing and industrial Technology	49
Biotechnology and Biomedical Technology	40
Laboratory Science Technology	22
<b>TOTAL</b>	<b>561</b>

## Student Supply

There are five programs offered by community colleges in the region related to these three occupations.

By far, machining and machine tools programs conferred the most awards in the 2015-16 academic year, 243, followed by welding technology, 207.

In comparison, only two related programs are offered in the region by technical/proprietary colleges.

In the 2014-15 academic year, programs at technical/proprietary colleges related to the three production occupations were:

- Biotechnology & Biomedical Technology (61 awards); and
- Machining and Machine Tools (3).

## AI Methodology

### Industry Forecast

An economic forecast is created to project employment by industry over the next five years using statistical analysis of historical data paired with the most recent qualitative information impacting a set of 151 industries in the Los Angeles Basin. The industries configured for this forecast are defined through the North American Industry Classification System (NAICS) and comprised of industries that are categorized as 2-digit, 3-digit, and 4-digit industries through the NAICS hierarchical classification system. One of the key inputs to the regional forecast is the projected population growth in both Los Angeles and Orange Counties, provided by the California Department of Finance. State and national trends of production, production methods, consumer behavior, construction, and property values are a few of the inputs to the economic forecast model as they correspond to each industry.

### Occupations

Occupations are commonly classified using the Standard Occupational Classification (SOC) system, developed by the Bureau of Labor Statistics. This system classifies all workers into one of 840 detailed occupations with similar job duties, skills, education and training. These detailed occupations are not generally industry-specific but are common to many industries. For example, retail salespersons are employed in a full spectrum of industries.

The economic forecast used for employment by industry is used to guide a projection of net new jobs for each occupation and are calculated by applying the industry occupational composition to the detailed industry employment forecast, and occupational forecasts are aggregated across industries.

The Census Bureau estimates replacement needs by industry and occupation through detailed surveys of employers and households. These take into account industry changes, the age of the current workforce within each industry and occupation, and the nature of the career path. These estimates are an important component of occupational job openings and workforce development needs, since the retirement and promotion of individuals leave openings for newer entrants and those moving up the career ladder to assume.

Total openings are the sum of projected five-year replacement needs and positive net new jobs forecast over the period.

Occupations selected for this report have a typical entry level of education that can be obtained at a California Community College—some college coursework, a postsecondary nondegree award, or an associate degree. Also included were occupations with a typical entry level education of bachelor's degree or less, but at least 33 percent of the current workers in the occupation had some college coursework or an associate degree. Occupations with typical on-the-job training greater than 12 months or requiring an apprenticeship are also addressed in this report.

### Supply

Community college and other two-year education institutions provide the education and training relevant to middle-skill occupations. Matching the occupations with relevant training programs provides the information for the supply-and-demand analysis. The number of awards conferred by community colleges is reflective of the most recent year of data available, 2015-16 academic year. Award data for other two-year education institutions represents the 2014-2015 academic year. Due to data and timing limitations, training gap forecasts are an approximation of unmet labor market demand and not an absolute oversupply or undersupply of available talent. In addition, there is not a one-to-one relationship among education and training programs and occupations, i.e., some programs train to multiple occupations. Consequently, awards for some education and training programs are presented in multiple occupational groups.

### Target Industries and Occupations

Target industries are selected using a variety of metrics including: middle-skill job share; the projected change in middle-skill jobs from 2016 to 2021 (number and rate); the five-year job replacement rate; the 2016 location quotient; the change in location quotient from 2011 to 2016; the 2016 annual average wage relative to all industries; and value added per worker.

Target occupations are selected in a two-step process; first, by isolating all occupations identified as middle-skill (those that generally require some significant education and training beyond high school but less than a bachelor's degree) from each target industry, and second, by using a variety of metrics to choose the target occupations including: 2016 employment; projected net job change; replacement rate; number of projected replacement jobs from 2016 to 2021; number of projected total job openings from 2016 to 2021; and annual median wages.

## A2 Detailed Tables

### EXHIBIT A-1 PROGRAM NAME

Program Name	Awards (2015-2016)	Program Name	Awards (2015-2016)
<b>Biotechnology and Biomedical Technology</b>	<b>40</b>	<b>Radio and Television</b>	<b>86</b>
Associate Degree	7	Associate Degree	32
Certificate 18 to < 30 semester units	15	Certificate 18 to < 30 semester units	23
Certificate 30 to < 60 semester units	16	Certificate 30 to < 60 semester units	27
Certificate 6 to < 18 semester units	2	Certificate 6 to < 18 semester units	4
<b>Accounting</b>	<b>1,193</b>	Credit Award < 6 semester units	0
Associate Degree	321	<b>Television (including combined TV/Film/Video)</b>	<b>208</b>
Certificate 12 to < 18 units	1	Associate Degree	67
Certificate 18 to < 30 semester units	315	Associate for Transfer Degree	10
Certificate 30 to < 60 semester units	140	Certificate 18 to < 30 semester units	26
Certificate 6 to < 18 semester units	283	Certificate 30 to < 60 semester units	27
Certificate 60+ semester units	0	Certificate 6 to < 18 semester units	78
Credit Award < 6 semester units	133	<b>Film Production</b>	<b>174</b>
<b>Business Management</b>	<b>995</b>	Associate Degree	50
Associate Degree	642	Certificate 18 to < 30 semester units	32
Certificate 12 to < 18 units	1	Certificate 30 to < 60 semester units	83
Certificate 18 to < 30 semester units	220	Certificate 6 to < 18 semester units	9
Certificate 30 to < 60 semester units	18	<b>Digital Media</b>	<b>36</b>
Certificate 6 to < 18 semester units	96	Associate Degree	13
Noncredit award from 192 to < 288 hours	18	Certificate 18 to < 30 semester units	12
<b>Logistics and Materials Transportation</b>	<b>217</b>	Certificate 30 to < 60 semester units	3
Associate Degree	103	Certificate 6 to < 18 semester units	8
Certificate 18 to < 30 semester units	20		
Certificate 30 to < 60 semester units	4		
Certificate 6 to < 18 semester units	90		

**EXHIBIT A-1**  
 PROGRAM NAME (cont.)

Program Name	Awards (2015-2016)	Program Name	Awards (2015-2016)
<b>Website Design and Development</b>	<b>37</b>	<b>Computer Networking</b>	<b>171</b>
Associate Degree	9	Associate Degree	38
Certificate 12 to < 18 units	2	Certificate 12 to < 18 units	28
Certificate 18 to < 30 semester units	11	Certificate 18 to < 30 semester units	20
Certificate 30 to < 60 semester units	1	Certificate 30 to < 60 semester units	30
Certificate 6 to < 18 semester units	5	Certificate 6 to < 18 semester units	55
Noncredit award from 480 to < 960 hours	9	<b>Computer Support</b>	<b>36</b>
<b>Computer Graphics and Digital Imagery</b>	<b>67</b>	Associate Degree	7
Associate Degree	21	Certificate 12 to < 18 units	12
Certificate 18 to < 30 semester units	25	Certificate 18 to < 30 semester units	9
Certificate 30 to < 60 semester units	20	Certificate 30 to < 60 semester units	0
Certificate 6 to < 18 semester units	1	Certificate 6 to < 18 semester units	8
<b>Computer Information Systems</b>	<b>101</b>	<b>World Wide Web Administration</b>	<b>15</b>
Associate Degree	68	Associate Degree	5
Certificate 12 to < 18 units	0	Certificate 12 to < 18 units	6
Certificate 18 to < 30 semester units	12	Certificate 18 to < 30 semester units	2
Certificate 30 to < 60 semester units	21	Certificate 30 to < 60 semester units	2
Certificate 6 to < 18 semester units	0	Certificate 6 to < 18 semester units	0
<b>Computer Infrastructure and Support</b>	<b>122</b>	<b>Electronics and Electric Technology</b>	<b>361</b>
Associate Degree	76	Associate Degree	197
Certificate 18 to < 30 semester units	39	Certificate 18 to < 30 semester units	55
Certificate 6 to < 18 semester units	7	Certificate 30 to < 60 semester units	59
		Certificate 6 to < 18 semester units	42
		Credit Award < 6 semester units	0
		Noncredit award from 288 to < 480 hours	8
		Noncredit award from 480 to < 960 hours	0

**EXHIBIT A-1**  
PROGRAM NAME (cont.)

Program Name	Awards (2015-2016)	Program Name	Awards (2015-2016)
<b>Electrical Systems and Power Transmission</b>	<b>25</b>	Certificate 6 to < 18 semester units	5
Associate Degree	0	Noncredit award from 192 to < 288 hours	16
Certificate 18 to < 30 semester units	25	<b>Laboratory Science Technology</b>	<b>22</b>
<b>Industrial Systems Technology and Maintenance</b>	<b>102</b>	Associate Degree	8
Associate Degree	5	Certificate 30 to < 60 semester units	14
Certificate 18 to < 30 semester units	97	<b>Manufacturing and Industrial Technology</b>	<b>49</b>
Certificate 30 to < 60 semester units	0	Associate Degree	24
<b>Heavy Equipment Maintenance</b>	<b>8</b>	Certificate 18 to < 30 semester units	12
Associate Degree	3	Certificate 30 to < 60 semester units	5
Certificate 18 to < 30 semester units	3	Certificate 6 to < 18 semester units	8
Certificate 30 to < 60 semester units	2	<b>Machining and Machine Tools</b>	<b>243</b>
Certificate 6 to < 18 semester units	0	Associate Degree	53
<b>Aeronautical and Aviation Technology</b>	<b>43</b>	Certificate 18 to < 30 semester units	70
Associate Degree	17	Certificate 30 to < 60 semester units	118
Certificate 30 to < 60 semester units	0	Certificate 6 to < 18 semester units	2
Certificate 60+ semester units	26	Certificate 60+ semester units	0
<b>Aviation Airframe Mechanics</b>	<b>84</b>	Credit Award < 6 semester units	0
Associate Degree	1	<b>Welding Technology</b>	<b>207</b>
Certificate 30 to < 60 semester units	83	Associate Degree	52
<b>Aviation Powerplant Mechanics</b>	<b>90</b>	Certificate 12 to < 18 units	5
Associate Degree	2	Certificate 18 to < 30 semester units	87
Certificate 30 to < 60 semester units	88	Certificate 30 to < 60 semester units	29
<b>Electrical</b>	<b>191</b>	Certificate 6 to < 18 semester units	34
Associate Degree	34	Certificate 60+ semester units	0
Certificate 18 to < 30 semester units	7		
Certificate 30 to < 60 semester units	129		

**EXHIBIT A-1**  
 PROGRAM NAME (cont.)

Program Name	Awards (2015-2016)	Program Name	Awards (2015-2016)
<b>Industrial Quality Control</b>	<b>0</b>	<b>Fashion</b>	<b>34</b>
Certificate 18 to < 30 semester units	0	Associate Degree	12
<b>Commercial Art</b>	<b>70</b>	Certificate 18 to < 30 semester units	10
Associate Degree	23	Certificate 30 to < 60 semester units	12
Certificate 18 to < 30 semester units	0	<b>Fashion Design</b>	<b>165</b>
Certificate 30 to < 60 semester units	47	Associate Degree	59
<b>Graphic Art and Design</b>	<b>169</b>	Certificate 18 to < 30 semester units	17
Associate Degree	83	Certificate 30 to < 60 semester units	87
Certificate 18 to < 30 semester units	27	Certificate 6 to < 18 semester units	2
Certificate 30 to < 60 semester units	31	<b>Aviation and Airport Management and Services</b>	<b>15</b>
Certificate 6 to < 18 semester units	28	Associate Degree	3
<b>Registered Nursing</b>	<b>1,943</b>	Certificate 18 to < 30 semester units	0
Associate Degree	1,623	Certificate 30 to < 60 semester units	12
Certificate 30 to < 60 semester units	139	<b>Aviation and Airport Management</b>	<b>31</b>
Certificate 60+ semester units	181	Associate Degree	15
Credit Award < 6 semester units	0	Certificate 18 to < 30 semester units	7
<b>Licensed Vocational Nursing</b>	<b>115</b>	Certificate 30 to < 60 semester units	0
Associate Degree	28	Certificate 6 to < 18 semester units	9
Certificate 30 to < 60 semester units	87		
<b>Certified Nurse Assistant</b>	<b>16</b>		
Certificate 6 to < 18 semester units	0		
Noncredit award from 48 to < 96 hours	16		

## Acknowledgements

### **Los Angeles/Orange County Regional Consortium CEO Council members**

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