

PENNSYLVANIA'S STATE SYSTEM OF HIGHER EDUCATION



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UNIVERSITY

Millersville
University



SlipperyRock
University

WCU
WEST CHESTER
UNIVERSITY

Shippensburg University's **SUPPLY/ DEMAND GAP ANALYSIS**

A report for Pennsylvania's
State System of Higher Education

2016



Pennsylvania's
STATE SYSTEM
of Higher Education

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GLOSSARY OF TERMS

The following descriptions provide a point of reference to understand terminology as well as the types of data and analysis undertaken in this study, reflecting historic and contemporary narratives.

Fastest Growing: A term used to describe the relative growth (percent change) of an industry or occupation in a given time period. Fastest growing industries and occupations in this study are identified by the highest relative change in jobs between 2014 and 2024.

High Demand: A term used to describe the demand for workers in a given occupation. High demand occupations are identified as having the highest number of new and replacement jobs projected between 2014 and 2024.

Industry Change: A measure of the change in employment within an industry, used to identify whether an industry is growing or declining, as well as the rate of change. Projected changes lay out expectations of growth/decline for specific industries.

Job Postings: The number of unique (de-duplicated) online postings for a job in a given occupation.

Location Quotient: A comparative statistic used to calculate the relative employment concentration of a given industry or occupation against the average employment of the industry in a larger geography (for example, countrywide). Industries with a higher location quotient (usually greater than 1.2) indicate that the region has a comparative advantage or specialization in the production of that good or service or has a high degree of specialization within its workforce.

New and Replacement Jobs: A demand-side estimate of the number of job openings in an occupation that result from new job growth as well as replacement demand. Replacement demand comprises occupation job leavers based on separations, retirement, and death.

Occupation Jobs: A measure of employment within an occupation category, used to identify which occupations have been growing or declining, as well as the rate of change. Projected changes lay out expectations of growth/decline for specific occupation categories.

Sub-regions: Geographic areas within Pennsylvania defined for more focused workforce and education gap analyses. Sub-regions were determined primarily on Partnerships for Regional Economic Performance (PREP) boundaries. PREP is Pennsylvania's network of business assistance partners, designed to help companies start, grow, and prosper. Please refer to Appendix A for mapping of the Sub-regions and PREP boundaries.

ACRONYMS USED

ACS: American Community Survey

BLS: Bureau of Labor Statistics

CIP: Classification of Instructional Programs

DOE: United States Department of Education

DOL: United States Department of Labor

EMSI: Economic Modeling Specialists International

CEW: Center on Education and the Workforce (Georgetown University)

IPEDS: Integrated Postsecondary Education Data System

LAUS: Local Area Unemployment Statistics

LEHD: Longitudinal Employment and Housing Dynamics

NAICS: North American Industry Classification System

NCES: National Center for Education Statistics

OES: Occupational Employment Statistics

O*NET: Occupational Network

PUMS: Public Use Microdata Sample

QCEW: Quarterly Census of Employment and Wages

SOC: Standard Occupational Classification

1. INTRODUCTION

Pennsylvania’s State System of Higher Education (State System) comprises 14 universities, four branch campuses, multiple regional centers and the McKeever Environmental Learning Center.¹ The universities are located in rural, suburban, and small-town settings around Pennsylvania. The State System’s two educational hubs (with locations in Harrisburg—the Dixon University Center, and Philadelphia—State System @ Center City) offer academic programs through a consortium of public and private colleges and universities.

Per Act 188 of 1982, the State System’s mission “is the provision of instruction for undergraduate and graduate students to and beyond the master’s degree in the liberal arts and sciences, and in the applied fields, including the teaching profession.” In doing so, the State System’s purpose is “to provide high quality education at the lowest possible cost to students.”² Analysis and understanding of the economy and workforce the State System supports, as well as the alignment between education programs and talent needs, further advances the State System’s mission and philosophy. This is the goal of the State System’s Supply/Demand Gap Analysis Project. It enables effective and targeted strategies and decision-making, grounded in data-driven evidence. Through two earlier reports—‘Pennsylvania’s Workforce Characteristics Report’³ and ‘Degrees of Value: College Majors and the Pennsylvania State System’s Contribution to the Workforce’⁴—foundation was laid for the State System’s Supply/Demand Gap Analysis Project. This supply/demand gap analysis report establishes the framework to ‘crosswalk’ education programs with relevant occupations. This crosswalk establishes the relationship between the workforce

1 One of the State System’s entities, System-wide Functions and Services, is primarily located at the Dixon University Center in Harrisburg and includes: System-wide shared administrative services; System leadership functions of the Chancellor and Board of Governors; some System-wide initiatives and grants managed on behalf of the universities; and the academic, student, and facilities support for the multi-university sites in Harrisburg and Philadelphia.

2 The State System’s Economic and Employment Impact on the Commonwealth of Pennsylvania—released April 15, 2015.

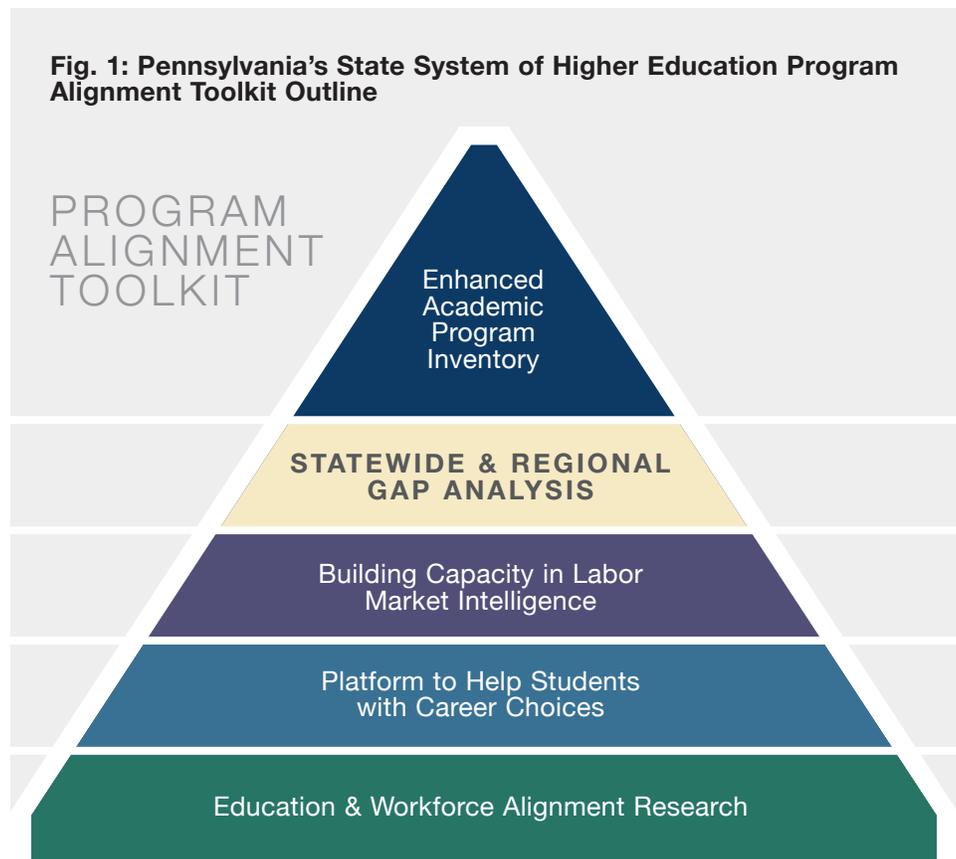
3 Pennsylvania’s Workforce Characteristics Report—a collaboration between the Pennsylvania State System of Higher Education and Oxford Economics with input from Georgetown University’s Center on Education and the Workforce, provides detailed demand-side projections for occupations within Pennsylvania, as well as other labor market intelligence for skilled occupations.

4 *Degrees of Value: College Majors and the Pennsylvania State System’s Contribution to the Workforce* is an education and workforce analysis of the Commonwealth with a particular emphasis on the State System’s Universities’ output produced by Georgetown University’s Center on Education and the Workforce.

employed in specific occupations and the degrees that those workers earned. The goal of this report is to understand this relationship in the context of Pennsylvania’s projected skilled workforce needs and education output.

This study and the broader set of deliverables under the State System’s Supply/Demand Gap Analysis Project will assist universities and education planners by providing an infrastructure of resources for internal planning, as well as external engagement. Understanding key gaps and surpluses within Pennsylvania helps to better align policy and strategic direction in order to continue supporting the talent needs of the Commonwealth.

The results of the State System’s Supply/Demand Gap Analysis project will become part the State System’s Program Alignment Toolkit (see Fig. 1 below)—an infrastructure of resources that are being created to assist the State System’s universities to increase their individual and collective impact on Pennsylvania’s economy. The Program Alignment Toolkit complements the existing Business Intelligence Environment the State System has created to support data driven decision-making. This environment includes forward-thinking, data-rich projects such as the Financial Risk Dashboard, the Data Warehouse project, and the upcoming Student Success Dashboard.



ABOUT PENNSYLVANIA STATE SYSTEM OF HIGHER EDUCATION

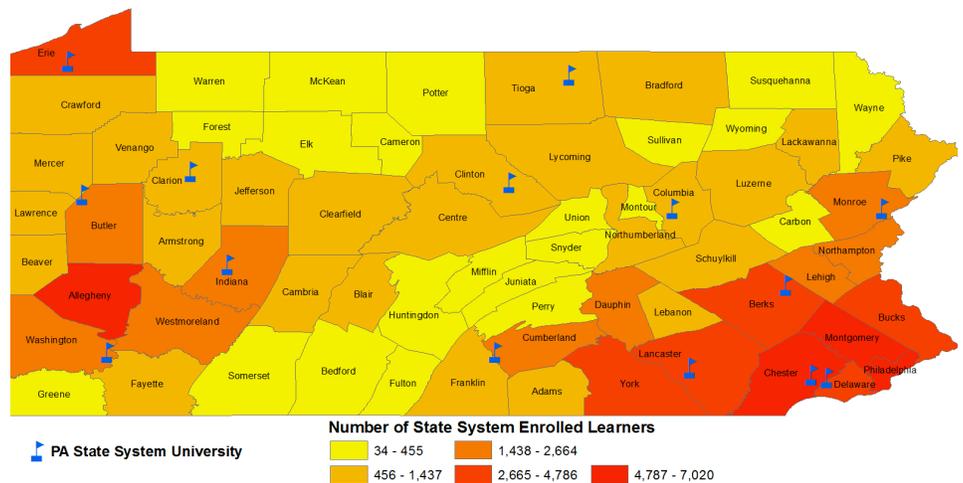
Pennsylvania's State System of Higher Education was established by statute on July 1, 1983, although the 14 universities that comprise the State System have a much longer history dating back to the 19th century.

Today, the State System serves over 110,000 students, with learners coming from every county in Pennsylvania, making it among the largest providers of higher education in Pennsylvania and the United States. It also employs more than 12,000 faculty and staff, making it one of the largest employers in the Commonwealth. Nearly 88% of students enrolled in the State System are from Pennsylvania and the vast majority of students remain after graduation—about 80%.*

The State System generates more than \$6.7 billion in annual economic activity within Pennsylvania. This economic value in turn supports approximately 62,000 jobs through the State System's direct employment, operational expenditures with vendors and suppliers across Pennsylvania, and spending of those who are employed as a result of the State System's operations.

* Pennsylvania's State System of Higher Education – Student Data Fact Center
 ** The State System's Economic and Employment Impact on the Commonwealth of Pennsylvania – Released April 15, 2015

Fig. 2: State System Learner Enrollment by County – Fall 2014



Source: Pennsylvania State System of Higher Education

1.1 Goal of the Supply/Demand Gap Analysis Report

This Supply/Demand Gap Analysis Report is specific to Shippensburg University's (SU) workforce region. It builds on information provided in an earlier State System report entitled Shippensburg University's Workforce Characteristics Technical Report. In the Workforce Characteristics Report, SU's workforce region was defined to include the following counties: Adams, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Perry, and York. The report also contains a set of economic, workforce, demographic, and socio-economic information to contextualize the Supply/Demand Gap Analysis.

The Supply/Demand Gap Analysis Report provides a data-driven perspective of employer demand (growing occupations across the region) and postsecondary education supply (degree production by program and level). The report will assist the State System universities with strategic engagement, program development and evaluation, student engagement, and marketing. The Supply/Demand Gap Analysis Report contains research specific to SU's workforce region in the following areas:

- Industry sector and occupation job changes and projections for new and replacement job demand to 2024;
- Size of education production by broad degree category;
- Links between occupations and education programs; and
- Analysis of gaps at the occupational level (presenting a structure to review occupations that have excess employer demand as well as those that have surplus).

While the State System's Gap Analysis project is critical to understanding the connections between education programs and occupations, it is important to note a few caveats to this Supply/Demand Gap Analysis Report:

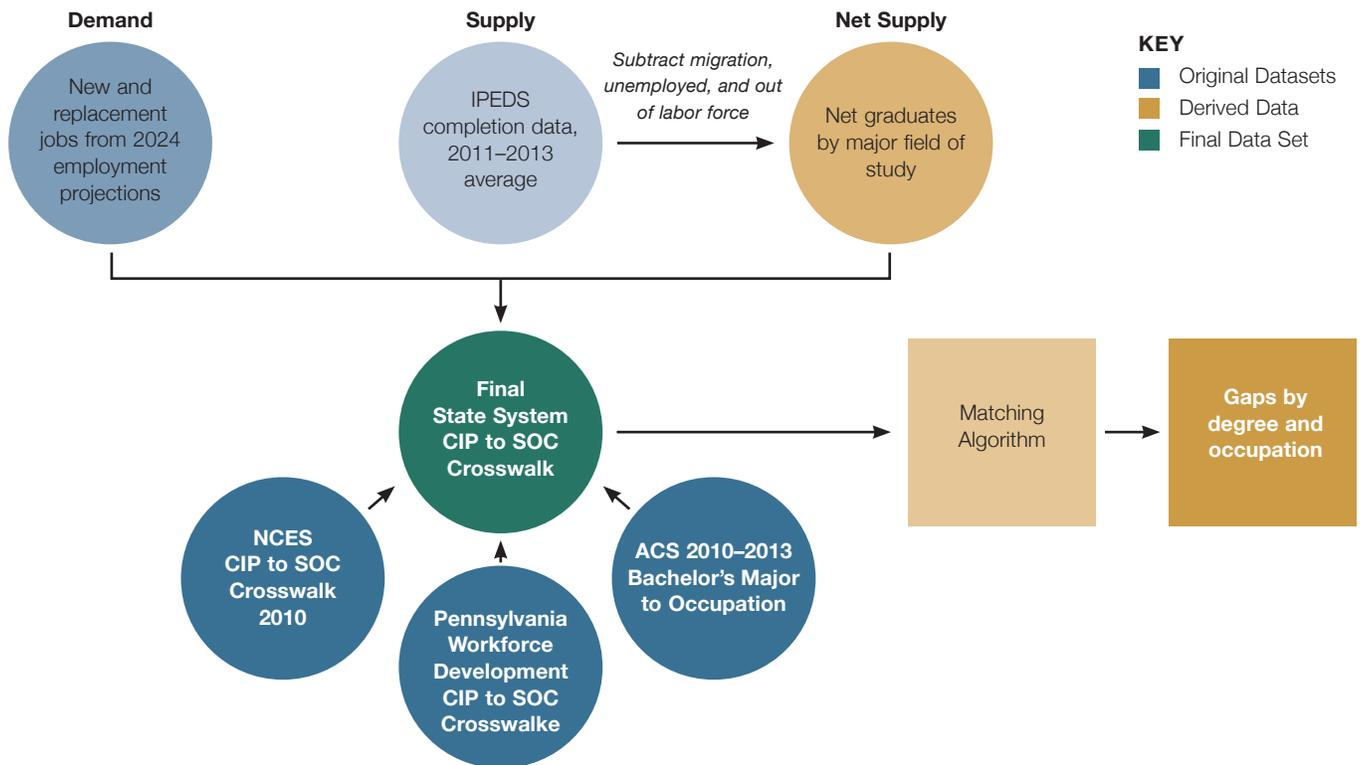
- When considering making adjustments to programs in degree areas related to occupations displaying gaps, further research should be considered to confirm the extent of alignment needed to arrive at equilibrium with the labor market.
- Government data that captures labor market demand lags real-time employer demand as well higher education industry trends. As such, the gap analysis findings may lag these market changes.
- This analysis only focuses on program output as a supply pool (i.e. new graduates). However, regional workforces comprise additional

ABOUT GAP ANALYSIS

A gap analysis comparing educational supply and occupational demand serves as a critical first step in efforts to align education programs with the workforce needs of Pennsylvania employers. A gap analysis provides a data-driven perspective of demand and supply, which can be connected to a larger process of program evaluation and strategic planning, engagement with employers, and student career guidance. The analysis itself is not the solution, but can lend credible insight to guide decision-making at the strategic level.

Fig. 3 provides a high-level flow chart of the process to calculate gaps/surpluses. A methodological description of the supply/demand gap modeling process can be found in Appendix E.

Fig. 3: Overview of the gap analysis methodology for the State System



Source: Oxford Economics

pools of supply—specifically: employed workers, skilled unemployed workers, and skilled underemployed workers. When evaluating gaps, this analysis focuses on new and replacement demand, as opposed to job churn. This helps to mitigate some of the issues involving the employed workforce.

1.2 Structure of the Gap Analysis Report

This Supply/Demand Gap Analysis report for SU's workforce region is organized as follows:

- Section 1** Introduction and background information.
- Section 2** Overview of changes in SU's workforce region industry sectors from a historic and projected point of view, as well as fast growing and most competitive industries.
- Section 3** Overview of changes in SU's workforce region occupations including additional detail on skilled occupations as well as high demand occupations, the fastest growing occupations, and occupations that are highly concentrated in SU's workforce region.
- Section 4** Evaluation of output of education programs at the associate's, bachelor's, and graduate level, as well as the State System's contribution to the total output of bachelor's degrees.
- Section 5** Comparison of demand for skilled occupations against supply of relevant education program completions.
- Section 6** Conclusion and areas of future research.
- Section 7** Additional information on the Gap Analysis project and contributing organizations.
- Section 8** List of key data sources used in the report.

While the main body of this report provides a high level summary, the Appendices provide an abundance of information for those seeking additional detail.

Appendix A provides a map of the state sub-region boundaries along with economic development and workforce boundaries as defined by PREP and WIA.

Appendix B provides a description of O*NET Job Zone codes.

Appendix C provides further detail about strong, limited and weak connections between education programs and occupations.

Appendix D provides detailed industry employment and projections to 2024.

Appendix E provides a crosswalk and gap analysis methodology.

Appendix F provides gap analysis results for over 500 occupations.

Appendix G provides the crosswalk of programs to occupations.

2. INDUSTRY PROFILE OF SHIPPENSBURG UNIVERSITY'S WORKFORCE REGION

Industry growth is a key driver of demand for occupations and talent. Hence, understanding the structure of SU's workforce region industry sectors offers valuable insights into career opportunities that exist. As the State System implements strategies to increase the economic competitiveness of its workforce and ultimately the economic competitiveness of the state, it is important to understand the connection between occupations and industry jobs. The state's workforce changes and labor demand are presented in multiple ways in this section including:

- Major (2-digit) industries;
- Largest 4-digit industries in 2014;
- Largest growth 4-digit industries from 2014 to 2024;
- Fastest growing 4-digit industries from 2014 to 2024; and
- Industries (4-digit) with high location quotient (or concentration) in 2014.

This section explores the current strengths in the economy of SU's workforce region by industry and examines trends that may affect industry structure in the coming years. A table of all 4-digit North American Industrial Classification System (NAICS) sector employment and projections for the region can be found in Appendix D.

The following sub-section begins the analysis by examining major industry groups in SU's workforce region in 2010 and 2014 as well as projected growth to 2024.

2.1 Major Industry Groups

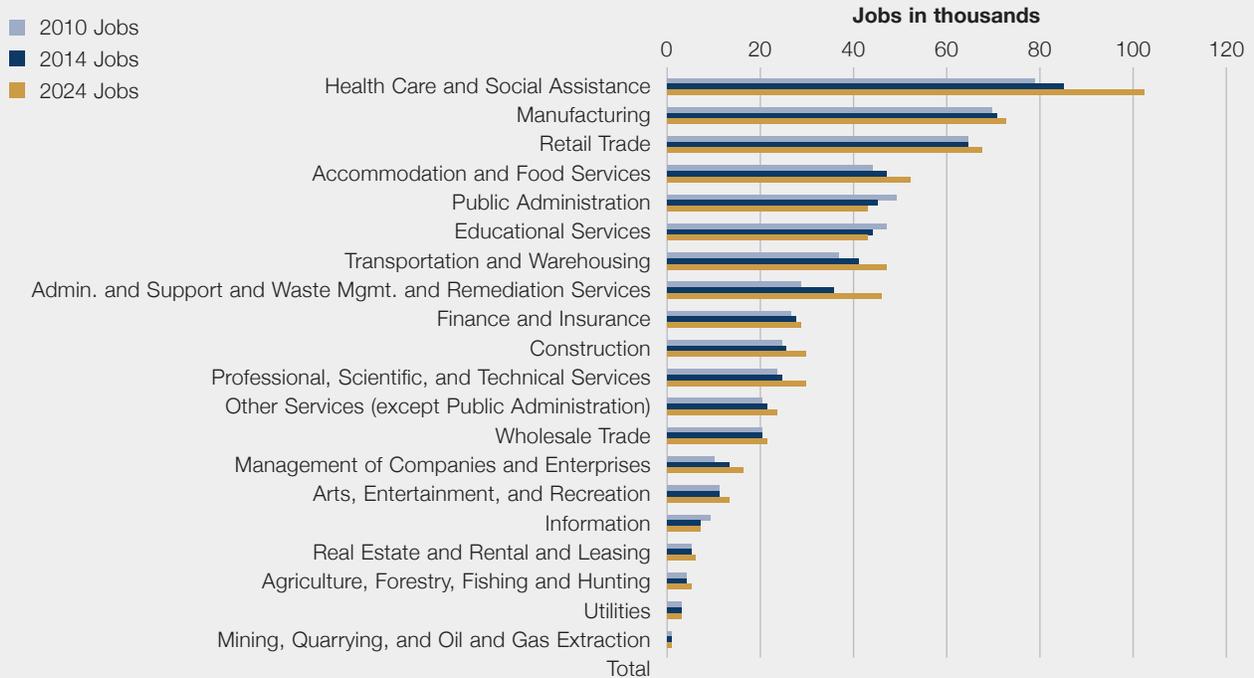
In 2014 the largest 2-digit industries in SU's workforce region include education and health services, trade, transportation and utilities, and manufacturing. As can be seen in Fig. 4, healthcare and social assistance account for the most jobs (about 86,000 jobs), followed by manufacturing, retail trade, accommodation and food services, and public administration.

Furthermore, each of these industry sectors, except public administration, added a significant number of new jobs between 2010 and 2014, reflecting both economic recovery from the recession, as well as continued sector growth. Projections indicate that healthcare and social assistance will add an additional 17,100 new jobs in the region between 2014 and 2024 (20% growth). Administrative and support and waste management and remediation services is projected to add 10,500 new jobs (29% growth)—which will require talent in various disciplines to support this growth.

Substantial economic transformation is taking place across several sectors. While many sectors have experienced moderate or strong growth over the past several years, noted exceptions of job decline include government, education and information. The causes of these reductions may differ. For example, reductions in government employment could reflect changes in legislative priorities and budgets, while reductions in information are largely due to the decline in newspaper and book publishers. This, however, is offset by substantial growth in other sectors discussed earlier.

Fig. 4 depicts the number of jobs in 2010, 2014 and projections out to 2024 for each of the broad industry sectors.

Fig. 4: Employment by Major Industry, 2010, 2014, and 2024



Source: BLS (QCEW); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

2.2 Largest 4-Digit Industries

The largest 4-digit industries in SU's workforce region are identified by the volume of 2014 employment. Industry sectors that employ the most workers are critical foundations to a regional economy. In SU's workforce region, the ten largest 4-digit industry classifications employed 31% of total jobs in 2014 (188,900 jobs out of 603,700 total jobs in the region). The largest industries include restaurants, elementary and secondary schools, and general medical and surgical hospitals. Fig. 5 displays the region's ten largest 4-digit industry sectors in 2014 and projections to 2024.

Fig. 5: Shippensburg University's Workforce Region Largest 4-Digit Industries and Projections, 2014-2024

| Industry Title | 2014 Jobs | 2024 Jobs | New Jobs 2014-2024 | % Change 2014-2024 |
|---|----------------|----------------|-----------------------|-----------------------|
| Restaurants and Other Eating Places | 35,453 | 39,810 | 4,357 | 12.3% |
| Elementary and Secondary Schools | 30,861 | 29,160 | -1,701 | -5.5% |
| General Medical and Surgical Hospitals | 23,166 | 24,775 | 1,609 | 6.9% |
| Employment Services | 19,105 | 25,567 | 6,462 | 33.8% |
| Executive, Legislative, and Other General Government Support | 17,467 | 16,314 | -1,153 | -6.6% |
| Warehousing and Storage | 14,632 | 17,790 | 3,158 | 21.6% |
| Management of Companies and Enterprises | 13,179 | 16,189 | 3,010 | 22.8% |
| Grocery Stores | 12,773 | 13,616 | 843 | 6.6% |
| Insurance Carriers | 11,128 | 10,239 | -889 | -8.0% |
| General Freight Trucking | 11,121 | 13,057 | 1,936 | 17.4% |
| Total, 10 Largest | 188,885 | 206,517 | 17,632 | 9.3% |

Source: BLS (QCEW); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

2.3 Largest Growth 4-Digit Industries

The largest sectors are not necessarily generating the most new jobs in SU's workforce region. Projections indicate that the top ten largest growth industries in the region will add almost 30,700 new jobs between 2014 and 2024. Some industries in the top ten largest growth list employ several occupations that require university-level skill specializations. For example,

- **Management of companies and enterprises** requires numerous accountants and auditors, operation managers, financial managers, marketing specialists and human resource specialists. Projections indicate that management of companies and enterprises is slated to grow by 3,000 new jobs between 2014 and 2024.
- **Employment services** require numerous human resource professionals, business operations specialists, and information and record clerks. Projections indicate that management of companies and enterprises is slated to grow by 6,500 new jobs between 2014 and 2024.

Industry sectors that are projected to add significant numbers of new jobs to SU’s workforce region over the next ten years will provide opportunities to establish stronger business collaboration and course alignment to these sectors. Furthermore, State System universities currently offer a range of degree programs in business and computer fields that align well to opportunities within these high-growth sectors. Fig. 6 below displays the ten largest growth industries projected to 2024.

Fig. 6: Shippensburg University’s Workforce Region Top 10 Largest Growth Sectors and Projections, 2014-2024

| Industry Title | 2014 Jobs | 2024 Jobs | New Jobs 2014-2024 | % Change 2014-2024 |
|--|----------------|----------------|--------------------|--------------------|
| Employment Services | 19,105 | 25,567 | 6,463 | 33.8% |
| Restaurants and Other Eating Places | 35,453 | 39,810 | 4,358 | 12.3% |
| Individual and Family Services | 9,700 | 13,630 | 3,930 | 40.5% |
| Warehousing and Storage | 14,632 | 17,790 | 3,158 | 21.6% |
| Management of Companies and Enterprises | 13,179 | 16,189 | 3,010 | 22.8% |
| Computer Systems Design and Related Services | 5,540 | 7,842 | 2,302 | 41.6% |
| Offices of Physicians | 10,710 | 12,763 | 2,053 | 19.2% |
| General Freight Trucking | 11,121 | 13,057 | 1,936 | 17.4% |
| Services to Buildings and Dwellings | 7,100 | 8,918 | 1,818 | 25.6% |
| Offices of Other Health Practitioners | 4,277 | 5,995 | 1,718 | 40.2% |
| Total, 10 Largest Growth | 130,817 | 161,561 | 30,746 | 23.5% |

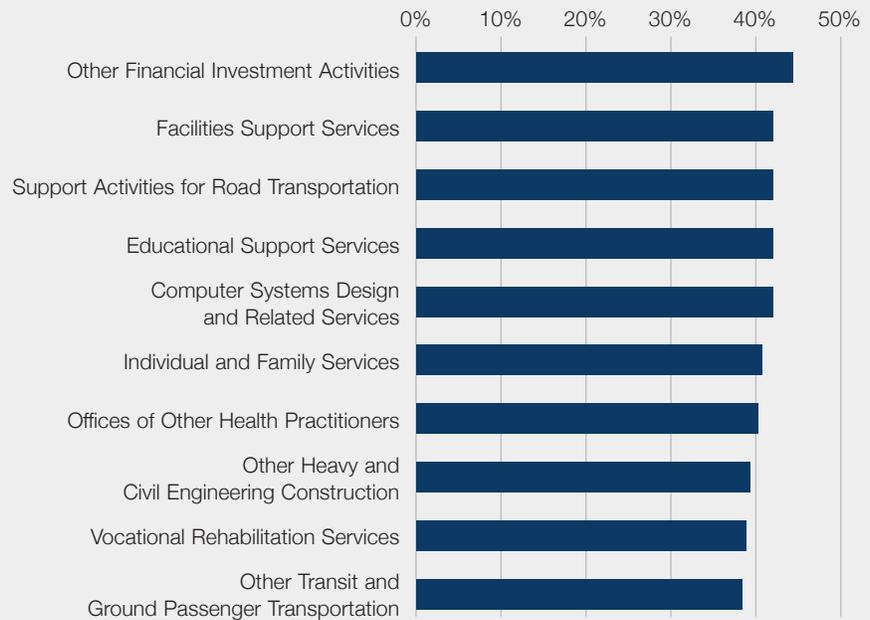
Source: BLS (QCEW); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

2.4 Fastest Growing 4-Digit Industries

The fastest growing 4-digit industries are identified by the highest relative change (percent change) projected to occur between 2014 and 2024. The fastest growing industries represent emerging sectors within SU's workforce region that may present opportunities for collaboration and support from postsecondary education and training institutions. Given the aging population in the U.S. and Pennsylvania, the health care sector is driving demand for workers. The fastest growing industries in SU's workforce region include individual and family services and offices of other health practitioners as well as other financial investment activities and facilities support services.

Fig. 7 depicts the fastest growing industries in SU's workforce region and the projected growth from 2014 to 2024 and Fig. 8 displays the employment in the fastest growing industries, projected job growth, and 10-year new and replacement jobs.

Fig. 7: Shippensburg University's Workforce Region Fastest Growing 4-Digit Industries and Projections, 2014-2024



Source: BLS (QCEW); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

Fig. 8: Shippensburg University’s Workforce Region Fastest Growing 4-Digit Industries and Projections, 2014-2024

| Industry Title | 2014 Jobs | 2024 Jobs | New Jobs 2014-2024 | % Change 2014-2024 |
|---|---------------|---------------|--------------------|--------------------|
| Other Financial Investment Activities | 746 | 1,074 | 328 | 44.0% |
| Facilities Support Services | 390 | 553 | 163 | 41.8% |
| Support Activities for Road Transportation | 803 | 1,138 | 335 | 41.7% |
| Educational Support Services | 350 | 496 | 146 | 41.7% |
| Computer Systems Design and Related Services | 5,540 | 7,842 | 2,302 | 41.6% |
| Individual and Family Services | 9,700 | 13,630 | 3,930 | 40.5% |
| Offices of Other Health Practitioners | 4,277 | 5,995 | 1,718 | 40.2% |
| Other Heavy and Civil Engineering Construction | 146 | 203 | 57 | 39.0% |
| Vocational Rehabilitation Services | 1,019 | 1,413 | 394 | 38.7% |
| Other Transit and Ground Passenger Transportation | 284 | 392 | 108 | 38.0% |
| Total, 10 Fastest Growing | 23,255 | 32,736 | 9,481 | 40.8% |

Source: BLS (QCEW); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

2.5 Concentration of Industries

Certain industries in SU’s workforce region have a greater concentration within the region as compared to the nation. A location quotient (LQ) for an industry provides perspective on statewide concentration in industry classifications. When evaluated jointly with the industry employment data, one gains a sense of the industry sectors that might benefit from efforts to align educational opportunities with economic development (i.e. industries that State System universities may consider engaging in larger conversations about aligning employer and educational needs).

Location quotients equal to 1 indicate that the area’s industry concentration is equal to the national concentration of the same industry. Industries with higher location quotients (usually greater than 1.2) indicate that a region has a concentration in the production of that good or service, relative to the rest of the nation. A value of 1.5 indicates that industry employment within the region is 1.5 times more concentrated than the U.S. average. A location quotient below 1 indicates that industry employment within the region is less concentrated compared to the U.S. average. Note: High employment industries do not necessarily result in large location quotients, as this is a relative statistic.

The location quotient chart provides three key pieces of information. The vertical axis indicates the location quotient value. The horizontal axis indicates whether the industry sector is projected to grow or decline over the next 10 years. The size of the bubble indicates the size of employment in the industry.

Industries with high LQ's that are adding new jobs suggest that the comparative regional advantage may be creating further job growth. When viewed together, large employment industries (large bubbles) that have high concentrations (high LQs) and add new jobs (high growth), are significant driving forces for regional growth and advancement.

Industry sectors that are highly concentrated in SU's workforce region include: other investment pools and funds, other transportation equipment manufacturing, sugar and confectionary product manufacturing, and leather and hide tanning and finishing.

Fig. 9 displays the most concentrated industries (as measured by LQ) for SU's workforce region at the 4-digit NAICS level in 2014. The figure reflects the comparative advantage SU's workforce region enjoys in various manufacturing sectors (both advanced and non-advanced). Warehousing and storage also shows high levels of concentration, highlighting those sectors that support the strong manufacturing base.

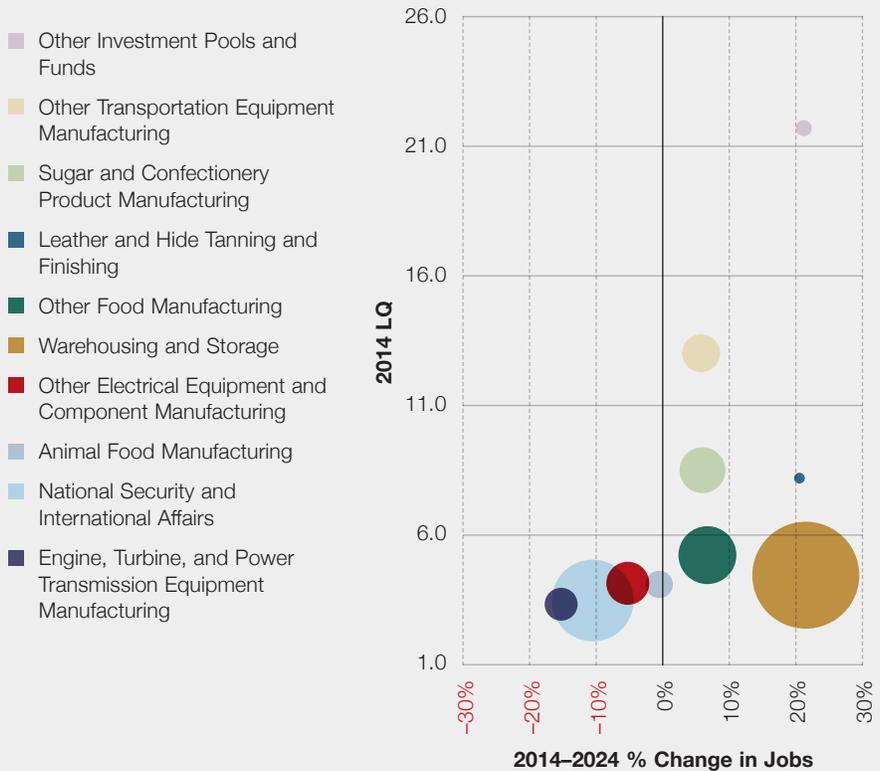
The next section provides information on occupational employment and describes the types of jobs people hold in SU's workforce region.

How to read a Location Quotient chart

The location quotient (LQ) bubble chart provides three key sources of information: level of concentration, as indicated by the LQ value, the % change in the variable measured—industries and occupations in this report—and the number of jobs employed. The LQ value is located on the vertical chart. As described above, values above the 1 on the vertical axis indicate higher levels of concentration compared to the national average. Bubbles that are situated above zero on the horizontal axis indicate positive job growth. Finally, larger bubbles indicate that the employment within the measured indicate larger levels of employment.

If one were to divide the bubble chart into sections, bubbles with LQ's greater than 1 located in the upper right hand section indicate highly concentrated industries that are projected to grow, whereas bubbles with LQ's greater than 1 in the left side indicate highly concentrated industries that are projected to decline. Similarly, LQ's less than one but on the right side, indicate job growth, but with a low concentration of employment, relative to the US average. Finally, LQ's less than one and on the left side indicate a low level of employment concentration with projected job loss.

Fig. 9: Shippensburg University's Workforce Region Most Concentrated 4-Digit Industries and Projected Growth, 2014-2024



Source: BLS (QCEW); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

Fig. 10: Shippensburg University's Workforce Region Most Concentrated 4-Digit Industries and Projected Growth, 2014-2024

| Industry Title | 2014 LQ | 2014 Jobs | % Change 2014-2024 |
|---|---------|-----------|--------------------|
| Other Investment Pools and Funds | 21.7 | 338 | 21.5% |
| Other Transportation Equipment Manufacturing | 13.0 | 1,855 | 5.8% |
| Sugar and Confectionery Product Manufacturing | 8.5 | 2,613 | 6.0% |
| Leather and Hide Tanning and Finishing | 8.2 | 161 | 20.6% |
| Other Food Manufacturing | 5.2 | 4,301 | 6.7% |
| Warehousing and Storage | 4.4 | 14,632 | 21.6% |
| Other Electrical Equipment and Component Manufacturing | 4.1 | 2,314 | -5.0% |
| Animal Food Manufacturing | 4.1 | 979 | -0.5% |
| National Security and International Affairs | 3.4 | 8,621 | -10.3% |
| Engine, Turbine, and Power Transmission Equipment Manufacturing | 3.3 | 1,461 | -15.1% |

Source: BLS (QCEW); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

3. OCCUPATIONAL PROFILE OF SHIPPENSBURG UNIVERSITY'S WORKFORCE REGION

Examining occupational employment data reveals the importance of skills, experience and knowledge of workers. It showcases the types of jobs in which SU's workforce region workforce is currently employed and projected to be employed by 2024. When evaluating occupation employment and demand, it is important to note that an occupation can be found in many different industry sectors. For example, every major industry sector employs accountants and auditors to maintain books, payroll, and ensure reporting compliance. This analysis compiles occupational employment across all industry sectors and reports the total number of jobs, median annual wages, and demand (10-year new and replacement jobs) for each occupation classification. The analysis also considers the educational attainment level that is typically required to gain employment in an occupation.

The region's workforce changes and labor demand are presented in multiple ways in this section including:

- Major occupation groups (2-digit SOC);
- Skilled occupations;
- Largest detailed occupations (6-digit SOC) in 2014;
- Occupations (6-digit SOC) with high location quotient (or concentration) in 2014; and
- Occupations aligning to educational attainment at the associate degree level as well as the bachelor's and graduate degree level, specifically:
 - Top high demand occupations (6-digit SOC) from 2014 to 2024, and
 - Fastest growing occupations (6-digit SOC) from 2014 to 2024.

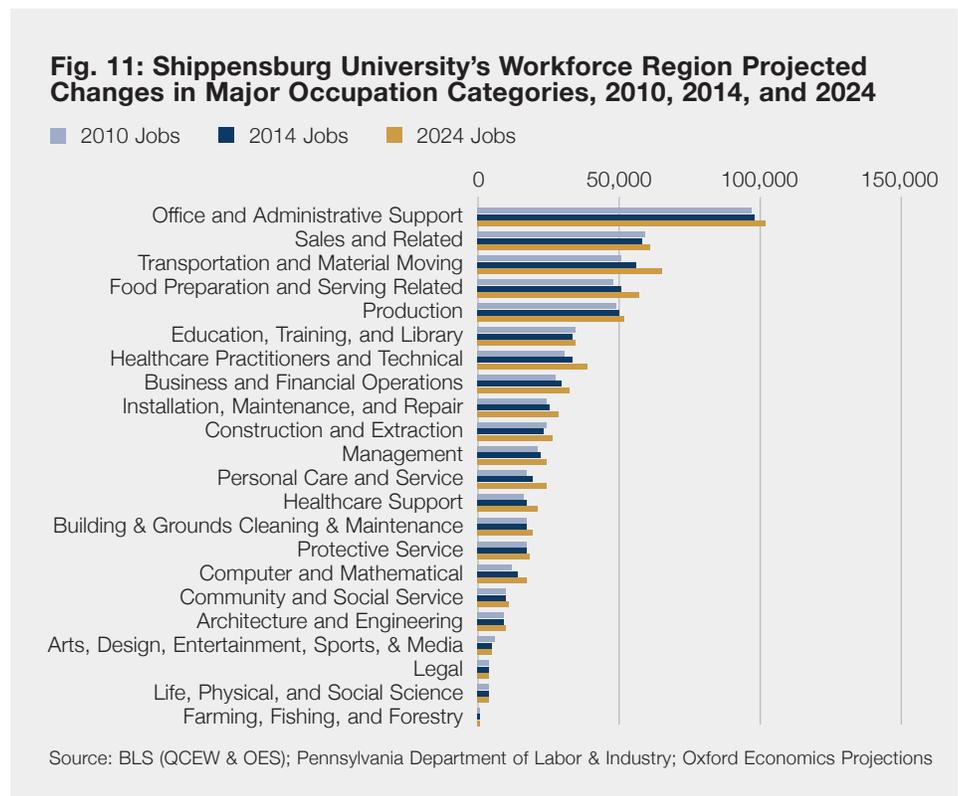
The following sub-section begins the analysis by examining major occupation groups in SU's workforce region in 2014 and projected growth to 2024.

3.1 Major Occupation Groups

In SU’s workforce region, several occupation categories are projected to grow over the next 10 years, from 2014 to 2024, as well as require a significant level of replacement labor.⁵ Certain major occupation categories—at the 2-digit Standard Occupation Classification (SOC) level—have experienced substantial growth in recent years and are expected to continue to lead the pack to 2024. Between 2010 and 2014 SU’s workforce region experienced growth in several occupation categories, which are typically aligned with postsecondary education. These include:

- Healthcare practitioners and technical occupations;
- Business and financial operations occupations; and
- Computer and mathematical occupations.

Furthermore, these three occupation categories are projected to add 12,700 new jobs between 2014 and 2024 and will account for nearly one third of the total projected occupation job growth in SU’s workforce region.



5 This estimate accounts for the need to replace workers who leave an occupation permanently due to retirement, death, or a change in occupation.

Identifying Skilled Occupations

For this analysis a “skilled” occupation is defined as an occupation in O*NET Job Zones* Three, Four or Five. The O*NET program is the nation’s primary source of occupational information. Central to the project is the O*NET database, containing information on hundreds of standardized and occupation-specific descriptors. The database, which is available to the public at no cost, is continually updated by surveying a broad range of workers from each occupation.** Most occupations in Job Zone Three require training in vocational schools, related on-the-job experience, or an associate’s degree. Most occupations in Job Zone Four require a four-year bachelor’s degree, but some do not. Most occupations in Job Zone Five require graduate school. For example, they may require a master’s degree, and some require a Ph.D., M.D., or J.D. (law degree).

For a more detailed description of O*NET Job Zones and training requirements see Appendix B.

* <https://www.onetonline.org/help/online/zones>

** <http://www.onetcenter.org/overview.html>

3.2 Skilled Occupations Overview

SU’s workforce region had 603,700 jobs in 2014, a number which is projected to grow to 662,600 in 2024—an increase of about 58,900 jobs or a 9.8 percent change. It is important to note that the share of SU’s workforce region jobs that will require some postsecondary education will increase from 2014 to 2024, showing the employer demand for skilled workers will continue to grow. The growth in jobs that require some level of postsecondary education in 2024 is projected to be 9.9 percent as compared to 9.6 percent for those that do not require postsecondary education. These are defined as skilled jobs or skilled occupations in the State System’s Gap Analysis Project using terminology from the O*NET program.

Fig. 12 shows the number of jobs in SU’s workforce region by skilled occupations (Job Zones 3-5) and low skilled occupations (Job Zones 1-2) in 2014 as well as projected growth to 2024 for each set of occupations.

Fig. 12: Shippensburg University’s Workforce Region Projected Job Growth by Job Zone, 2014-2024

| | 2014 | 2024 | % Change 2014-2024 | Share 2014 | Share 2024 |
|--|----------------|----------------|--------------------|-------------|-------------|
| SU workforce region, Total Jobs | 603,701 | 662,613 | 9.8% | 100% | 100% |
| Job Zones 1-2 (Low Skilled) | 318,567 | 349,189 | 9.6% | 53% | 53% |
| Job Zones 3-5 (Skilled) | 285,134 | 313,424 | 9.9% | 47% | 47% |

Source: BLS (QCEW); Pennsylvania Department of Labor & Industry, O*NET; Oxford Economics Projections

3.3 Largest Occupations

Top occupations in the state are driven by industry composition. Medical centers employ a cadre of health professionals, while enterprise management companies employ a range of business professionals. Given the dominating presence of health care and social assistance, accommodation and food services, retail trade and manufacturing establishments in SU’s workforce region, top occupations include: retail salespersons, laborers and material movers, cashiers, food preparation and serving workers, and office clerks. Fig. 13 highlights the top occupations in the state, 10-year job growth projections, and new and replacement jobs.⁶ The Job Zone is also included to indicate skill level for each occupation.⁷

6 New and replacement job change takes into account demand for occupations based on: industry growth (new jobs), occupation productivity, workforce ageing (retirements and deaths), migration and other factors that would contribute to new and replacement job openings.

7 Job Zone One and Two represent low-skilled occupations and Job Zone Three, Four and Five represent skilled occupations.

Fig. 13: Largest Occupations in Shippensburg University’s Workforce Region and Projected Growth, 2014-2024

| Occupation Title | Job Zone | 2014 | 2024 | % Change 2014-2024 | 10-year New and Replacement Jobs |
|---|----------|--------|--------|--------------------|----------------------------------|
| Retail Salespersons | 2 | 19,444 | 20,952 | 7.8% | 8,567 |
| Laborers and Freight, Stock, and Material Movers, Hand | 2 | 16,168 | 20,317 | 25.7% | 9,975 |
| Cashiers | 1 | 15,819 | 15,193 | -4.0% | 6,813 |
| Combined Food Preparation and Serving Workers, Including Fast Food | 1 | 14,046 | 16,447 | 17.1% | 8,435 |
| Office Clerks, General | 2 | 13,605 | 13,480 | -0.9% | 3,008 |
| Heavy and Tractor-Trailer Truck Drivers | 2 | 12,251 | 14,570 | 18.9% | 4,898 |
| Registered Nurses | 3 | 11,800 | 13,658 | 15.7% | 4,248 |
| Customer Service Representatives | 2 | 11,397 | 12,985 | 13.9% | 5,031 |
| Secretaries and Administrative Assistants, Except Legal, Medical, and Executive | 3 | 10,965 | 12,480 | 13.8% | 2,940 |
| Waiters and Waitresses | 1 | 10,386 | 11,925 | 14.8% | 7,035 |
| Stock Clerks and Order Fillers | 2 | 9,108 | 9,424 | 3.5% | 3,498 |
| Janitors and Cleaners, Except Maids and Housekeeping Cleaners | 2 | 8,928 | 9,660 | 8.2% | 2,779 |
| Bookkeeping, Accounting, and Auditing Clerks | 3 | 6,930 | 7,656 | 10.5% | 1,411 |
| Nursing Assistants | 2 | 6,916 | 7,850 | 13.5% | 2,330 |
| General and Operations Managers | 4 | 6,869 | 7,989 | 16.3% | 2,343 |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

3.4 Concentration of Occupations

Growth in areas of comparative advantage provides career opportunities that reflect statewide workforce concentration. Just as industry location quotient analysis is used to determine industry concentration, occupation location quotient analysis is used to evaluate specializations that exist within SU’s workforce, which may indicate the presence of key occupation clusters. A classic example of one such cluster would be Silicon Valley’s large concentration of IT and computer programming occupations. The presence of occupation concentration (especially skilled occupations) indicates areas of opportunity for postsecondary institutions to support workforce needs for occupations that have strong employment advantages within the region.

Location quotients equal to 1 indicate that the area’s occupation concentration is equal to the national concentration of the same occupation. Occupations with higher location quotients (usually greater than 1.2) indicate that a region

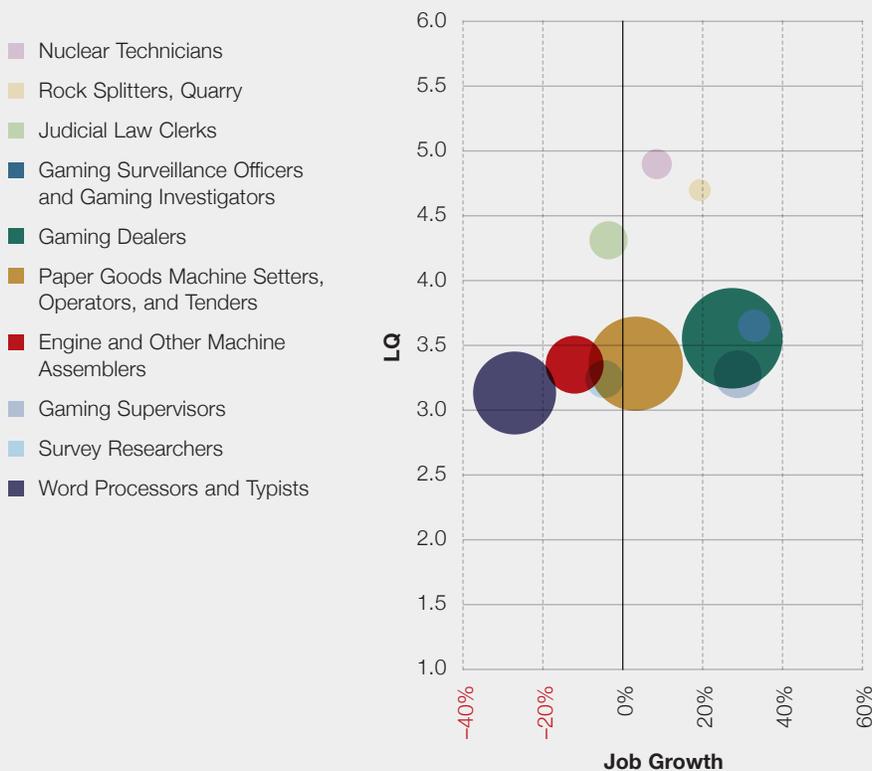
has a concentration or comparative advantage in the occupation, relative to the rest of the nation. A value of 1.5 indicates that occupation employment within the region is 1.5 times more concentrated compared to the U.S. average. A location quotient below 1 indicates that occupation employment within the region is less concentrated compared to the U.S. average. Note: High employment occupations do not necessarily result in large location quotients, as this is a comparative statistic.

The location quotient chart provides three key pieces of information. The vertical axis indicates the location quotient value. A value of 1.5 indicates that employment within the region is 1.5 times more concentrated compared to the average region in the U.S. The horizontal axis indicates whether the occupation is projected to grow or decline over the next 10 years. Occupations with high LQ's that are adding new jobs suggest that the comparative regional advantage may be creating further employment opportunities. The size of the bubble indicates the number of jobs within the occupations. When viewed together skilled occupations with large employment (large bubbles) that have comparative advantages (high LQs) and are adding new jobs (high growth), are likely critical areas of regional workforce needs and warrant closer evaluation of program availability and completion to support statewide workforce demand.

Occupations that are highly concentrated in SU's workforce region include: nuclear technicians; rock splitters, quarry; judicial law clerks; and gaming surveillance officers and gaming investigators.

Fig. 14 illustrates the LQ, projected job change and employment size of the top 10 most concentrated occupations (as measured by LQ) in SU's workforce region in 2014. Fig. 15 below provides detailed data on the occupations, including LQ, 2014 jobs, projected 2024 jobs and projected percent change in jobs.

Fig. 14: Shippensburg University's Workforce Region Most Concentrated Occupations and Projected Growth, 2014-2024



Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

Fig. 15: Shippensburg University's Workforce Region Most Concentrated Occupations and Projected Growth, 2014-2024

| Occupation Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|---|---------|-----------|-----------|--------------------|
| Nuclear Technicians | 4.9 | 140 | 151 | 8.2% |
| Rock Splitters, Quarry | 4.7 | 76 | 91 | 19.0% |
| Judicial Law Clerks | 4.3 | 225 | 216 | -3.9% |
| Gaming Surveillance Officers and Gaming Investigators | 3.7 | 164 | 217 | 32.8% |
| Gaming Dealers | 3.6 | 1,531 | 1,949 | 27.3% |
| Paper Goods Machine Setters, Operators, and Tenders | 3.4 | 1,386 | 1,430 | 3.2% |
| Engine and Other Machine Assemblers | 3.4 | 574 | 507 | -11.6% |
| Gaming Supervisors | 3.3 | 353 | 454 | 28.6% |
| Survey Researchers | 3.2 | 223 | 212 | -5.1% |
| Word Processors and Typists | 3.1 | 1,138 | 825 | -27.5% |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

3.5 Occupations Aligning to Associate's Degrees

SU's workforce region employment projections to 2024 conducted by the State System's Gap Analysis project indicate significant growth in many occupations that align with postsecondary education. Occupations that generally align to associate's degree programs are categorized as Job Zone Three.

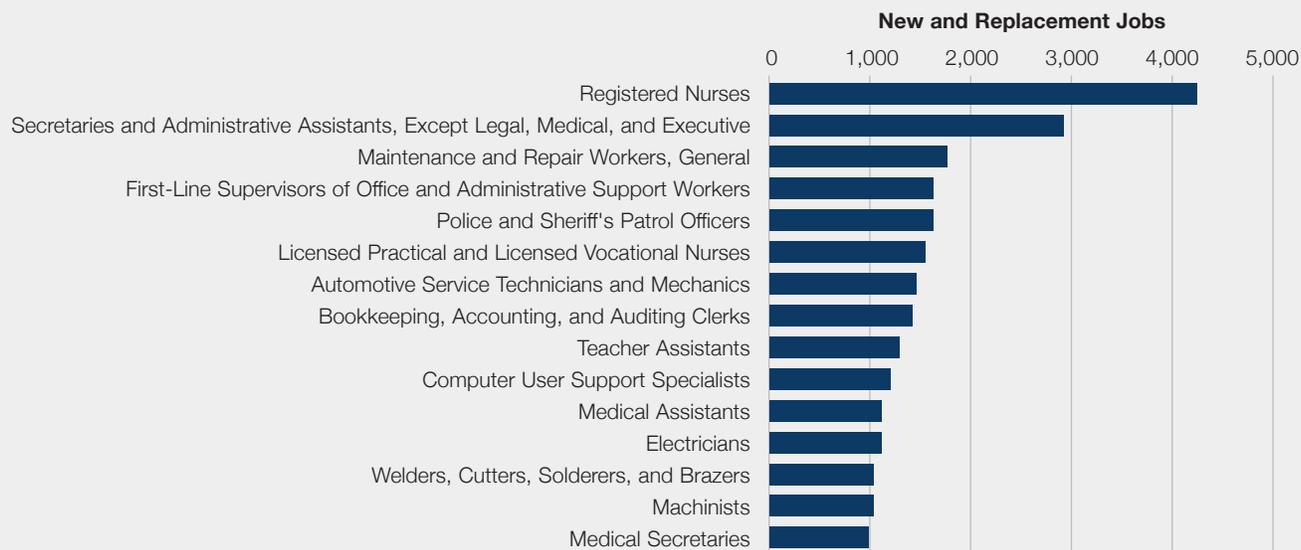
There are over 200 Job Zone Three occupations. Looking ahead, many Job Zone Three occupations show significant growth and demand. In SU's workforce region, projections indicate 10.3 percent growth in Job Zone Three jobs between 2014 and 2024. Job demand is further emphasized through both new job growth and replacement job openings as workers in the profession retire, relocate, or change jobs. The projected new and replacement demand for Job Zone Three occupations is 51,200 between 2014 and 2024.

3.5.1 Top High Demand Occupations Aligning to Associate's Degrees

High demand occupations are identified as having the largest projected new and replacement demand between 2014 and 2024. The top high demand occupations in the region are largely driven by industry demand for skilled workers and typically the largest occupations in the region. However, career changes and the demographic characteristics of those who are currently employed—specifically age—also influence replacement demand. Occupations that employ an older demographic, specifically those aged 55 and older, will face increasing pressure to replace workers as older workers approach retirement age.

High demand occupations aligned to associate's degrees include: registered nurses, maintenance and repair workers, and secretaries and administrative assistants. Fig. 16 and Fig. 17 highlight SU's workforce region top high demand occupations aligning to associate's degrees, projected job growth, and 10-year new and replacement jobs.

Fig. 16: Top High Demand Occupations Aligning to Associate's Degrees in Shippensburg University's Workforce Region, 2014-2024



Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

Fig. 17: Employment Projections for Top High Demand Occupations Aligning to Associate's Degrees in Shippensburg University's Workforce Region, 2014-2024

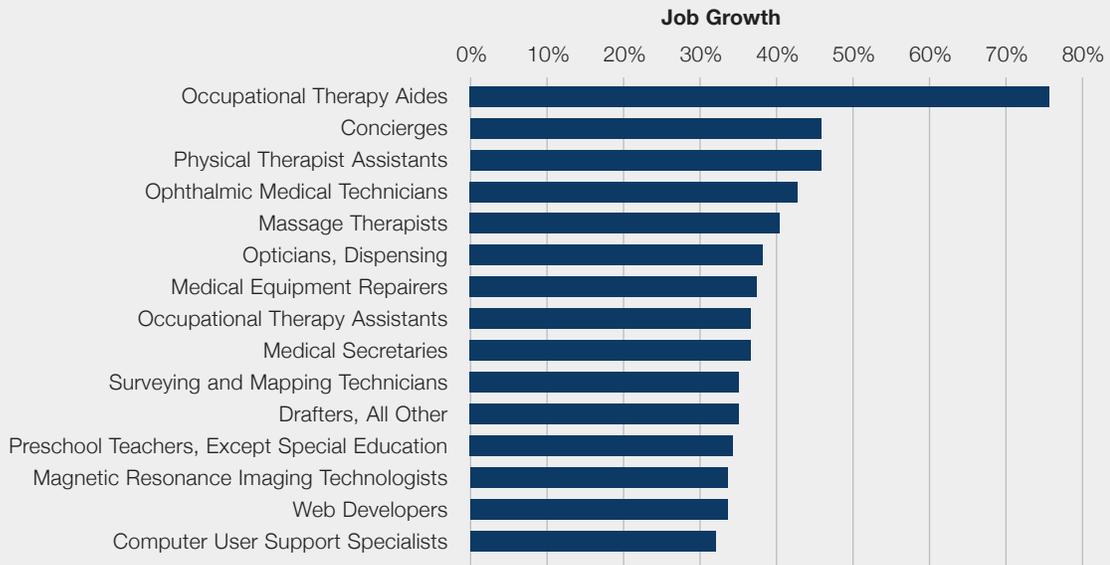
| Occupation Title | 2014 Jobs | 2024 Jobs | % Change 2014-2024 | 10-year New and Replacement Jobs |
|---|-----------|-----------|--------------------|----------------------------------|
| Registered Nurses | 11,800 | 13,658 | 15.7% | 4,248 |
| Secretaries and Administrative Assistants, Except Legal, Medical, and Executive | 10,965 | 12,480 | 13.8% | 2,940 |
| Maintenance and Repair Workers, General | 6,415 | 6,750 | 5.2% | 1,748 |
| First-Line Supervisors of Office and Administrative Support Workers | 5,555 | 5,853 | 5.4% | 1,628 |
| Police and Sheriff's Patrol Officers | 5,181 | 4,945 | -4.6% | 1,623 |
| Licensed Practical and Licensed Vocational Nurses | 3,414 | 4,075 | 19.4% | 1,563 |
| Automotive Service Technicians and Mechanics | 3,747 | 4,137 | 10.4% | 1,479 |
| Bookkeeping, Accounting, and Auditing Clerks | 6,930 | 7,656 | 10.5% | 1,411 |
| Teacher Assistants | 4,704 | 4,832 | 2.7% | 1,297 |
| Computer User Support Specialists | 2,426 | 3,212 | 32.4% | 1,221 |
| Medical Assistants | 2,254 | 2,936 | 30.3% | 1,134 |
| Electricians | 2,437 | 2,882 | 18.3% | 1,109 |
| Welders, Cutters, Solderers, and Brazers | 2,045 | 2,401 | 17.4% | 1,021 |
| Machinists | 2,476 | 2,763 | 11.6% | 1,016 |
| Medical Secretaries | 2,059 | 2,813 | 36.6% | 994 |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

3.5.2 Fastest Growing Occupations Aligning to Associate's Degrees

The fastest growing occupations are identified by the highest relative change (percent change) projected to occur between 2014 and 2024. In SU's workforce region, the fastest growing occupations are largely driven by industry growth and demand. Growing industries reflect the needs of the broader economy. Given the aging population in the U.S. and Pennsylvania, the health care sector is driving demand for workers. The fastest growing occupations aligning to associate's degrees include: occupational therapy aides, concierges, physical therapy assistants, ophthalmic medical technicians, and massage therapists. Fig. 18 and Fig. 19 highlight the fastest growing occupations in the region that align to associate's degrees, projected job growth, and 10-year new and replacement jobs.

Fig. 18: Fastest Growing Occupations Aligning to Associate's Degrees in Shippensburg University's Workforce Region, 2014-2024



Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

Fig. 19: Employment Projections for Fastest Growing Occupations Aligning to Associate's Degrees in Shippensburg University's Workforce Region, 2014-2024

| Occupation Title | 2014 | 2024 | % Change 2014-2024 | 10-year New and Replacement Jobs |
|--|-------------|-------------|---------------------------|---|
| Occupational Therapy Aides | 54 | 95 | 75.9% | 56 |
| Concierges | 71 | 104 | 46.5% | 52 |
| Physical Therapist Assistants | 437 | 640 | 46.5% | 322 |
| Ophthalmic Medical Technicians | 110 | 157 | 42.7% | 61 |
| Massage Therapists | 220 | 309 | 40.5% | 111 |
| Opticians, Dispensing | 293 | 406 | 38.6% | 213 |
| Medical Equipment Repairers | 361 | 498 | 38.0% | 264 |
| Occupational Therapy Assistants | 229 | 314 | 37.1% | 155 |
| Medical Secretaries | 2,059 | 2,813 | 36.6% | 994 |
| Surveying and Mapping Technicians | 149 | 202 | 35.6% | 85 |
| Drafters, All Other | 20 | 27 | 35.0% | 10 |
| Preschool Teachers, Except Special Education | 1,409 | 1,897 | 34.6% | 893 |
| Magnetic Resonance Imaging Technologists | 123 | 165 | 34.1% | 62 |
| Web Developers | 352 | 471 | 33.8% | 177 |
| Computer User Support Specialists | 2,426 | 3,212 | 32.4% | 1,221 |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

3.6 Occupations Aligning to Bachelor's and Graduate Degrees

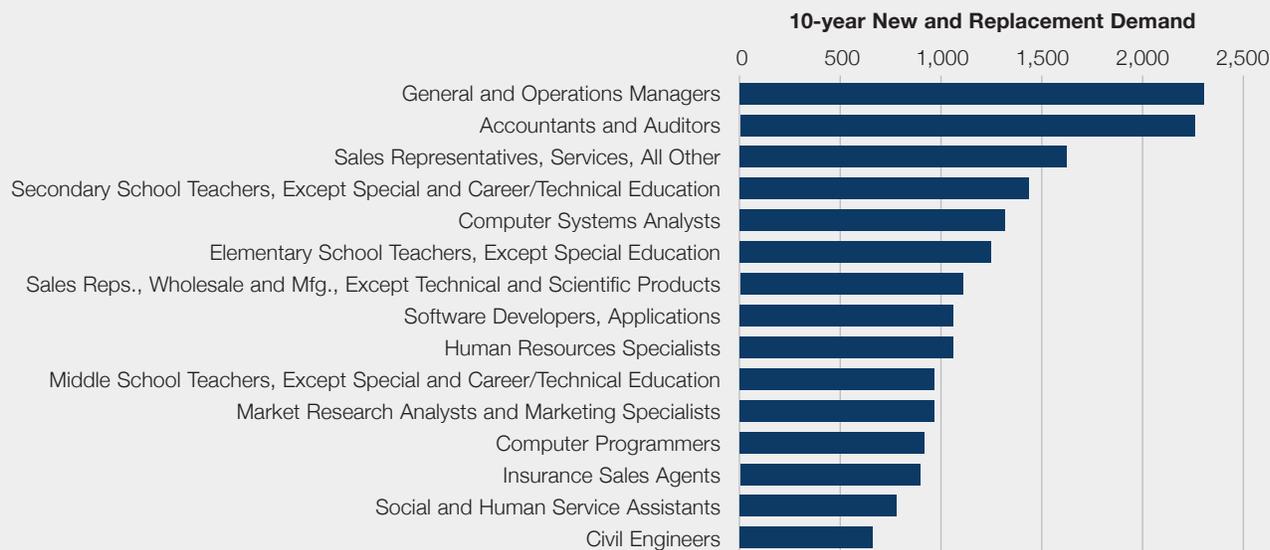
Job Zones Four and Five describe occupations that typically require a bachelor's degree or graduate degree. There are over 250 Job Zone Four and Five occupation classifications. In SU's workforce region, the employment projections indicate that occupations typically requiring a bachelor's degree or higher will grow 9.5 percent between 2014 and 2024. This growth will result in total demand for new and replacement job openings of nearly 45,800 over the same time period.

3.6.1 Top High Demand Occupations Aligning to Bachelor's and Graduate Degrees

High demand occupations are identified as having the largest projected new and replacement demand between 2014 and 2024. The top high demand occupations in the region are largely driven by industry demand for skilled workers and typically the largest occupations in the region. However, career changes and the demographic characteristics of those who are currently employed—specifically age—also influence replacement demand. Occupations that employ an older demographic, specifically those aged 55 and older, will face increasing pressure to replace workers as older workers approach retirement age.

High demand occupations aligning to bachelor's and graduate degree level education include: general and operations managers, accountants and auditors, sales representatives, secondary and elementary school teachers, and computer systems analysts. Fig. 20 and Fig. 21 highlight the top high demand occupations in the region aligning to bachelor's and graduate degrees, projected job growth, and 10-year new and replacement jobs.

Fig. 20: Top High Demand Occupations Aligning to Bachelor's and Graduate Degrees in Shippensburg University's Workforce Region, 2014-2024



Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

Fig. 21: Employment Projections for Top High Demand Occupations Aligning to Bachelor's and Graduate Degrees in Shippensburg University's Workforce Region, 2014-2024

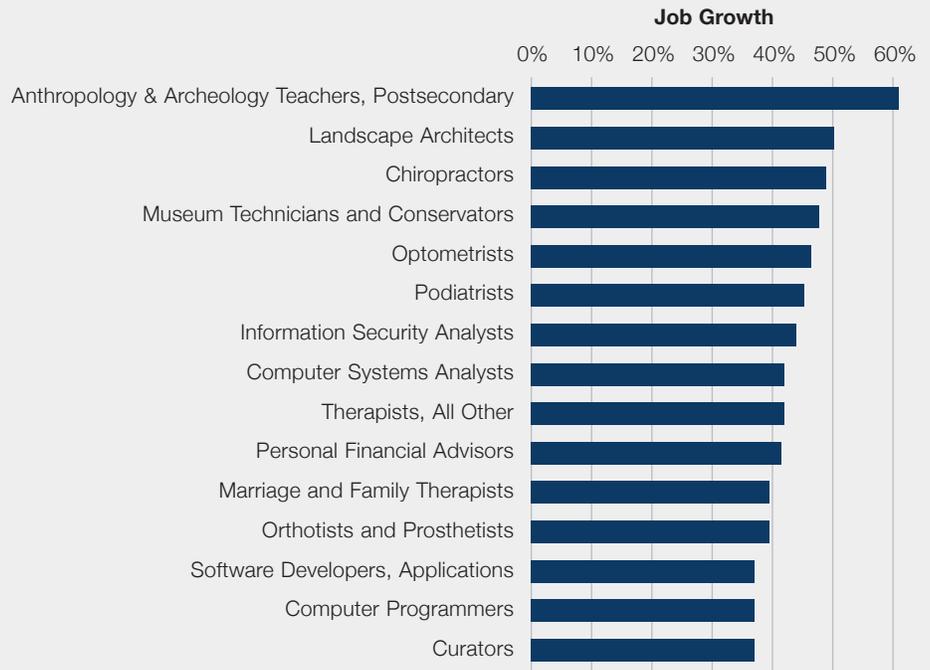
| Occupation Title | 2014 Jobs | 2024 Jobs | % Change 2014-2024 | 10-year New and Replacement Jobs |
|--|-----------|-----------|--------------------|----------------------------------|
| General and Operations Managers | 6,869 | 7,989 | 16.3% | 2,343 |
| Accountants and Auditors | 5,164 | 5,744 | 11.2% | 2,299 |
| Sales Representatives, Services, All Other | 2,836 | 3,685 | 29.9% | 1,663 |
| Secondary School Teachers, Except Special and Career/Technical Education | 5,519 | 5,102 | -7.6% | 1,463 |
| Computer Systems Analysts | 2,235 | 3,176 | 42.1% | 1,336 |
| Elementary School Teachers, Except Special Education | 5,957 | 5,739 | -3.7% | 1,280 |
| Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products | 6,286 | 5,962 | -5.2% | 1,137 |
| Software Developers, Applications | 2,112 | 2,894 | 37.0% | 1,083 |
| Human Resources Specialists | 2,296 | 2,881 | 25.5% | 1,076 |
| Middle School Teachers, Except Special and Career/Technical Education | 2,696 | 3,012 | 11.7% | 993 |
| Market Research Analysts and Marketing Specialists | 2,049 | 2,706 | 32.1% | 985 |
| Computer Programmers | 1,330 | 1,822 | 37.0% | 927 |
| Insurance Sales Agents | 2,379 | 2,560 | 7.6% | 902 |
| Social and Human Service Assistants | 1,960 | 2,174 | 10.9% | 798 |
| Civil Engineers | 1,328 | 1,625 | 22.4% | 660 |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

3.6.2 Fastest Growing Occupations Aligning to Bachelor's and Graduate Degrees

The fastest growing occupations are identified by the highest relative change (percent change) projected to occur between 2014 and 2024. In SU's workforce region, the fastest growing occupations aligning to bachelor's and graduate degrees include: postsecondary anthropology and archeology teachers, landscape architects, chiropractors, museum technicians and conservators, and optometrists. Fig. 22 and Fig. 23 highlight SU's workforce region fastest growing occupations aligning to bachelor's and graduate degrees, projected job growth, and 10-year new and replacement jobs.

Fig. 22: Fastest Growing Occupations Aligning to Bachelor's and Graduate Degrees in Shippensburg University's Workforce Region, 2014-2024



Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

The next section provides a high-level overview of SU's workforce region education program output by broad degree category.

Fig. 23: Employment Projections for Fastest Growing Occupations Aligning to Bachelor's and Graduate Degrees Shippensburg University's Workforce Region, 2014-2024

| Occupation Title | 2014 | 2024 | % Change 2014-2024 | 10-year New and Replacement Jobs |
|---|-------------|-------------|---------------------------|---|
| Anthropology and Archeology Teachers, Postsecondary | 23 | 37 | 60.9% | 17 |
| Landscape Architects | 78 | 117 | 50.0% | 63 |
| Chiropractors | 134 | 199 | 48.5% | 95 |
| Museum Technicians and Conservators | 53 | 78 | 47.2% | 39 |
| Optometrists | 136 | 199 | 46.3% | 108 |
| Podiatrists | 53 | 77 | 45.3% | 45 |
| Information Security Analysts | 257 | 370 | 44.0% | 153 |
| Computer Systems Analysts | 2,235 | 3,176 | 42.1% | 1,336 |
| Therapists, All Other | 36 | 51 | 41.7% | 19 |
| Personal Financial Advisors | 440 | 621 | 41.1% | 263 |
| Marriage and Family Therapists | 106 | 148 | 39.6% | 66 |
| Orthotists and Prosthetists | 33 | 46 | 39.4% | 16 |
| Software Developers, Applications | 2,112 | 2,894 | 37.0% | 1,083 |
| Computer Programmers | 1,330 | 1,822 | 37.0% | 927 |
| Curators | 46 | 63 | 37.0% | 29 |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

4. POSTSECONDARY PROGRAM COMPLETIONS IN SHIPPENSBURG UNIVERSITY'S WORKFORCE REGION

Shippensburg University's workforce region is home to many different postsecondary institutions, offering a range of degree programs. As reported by the National Center for Education Statistics (NCES), there are approximately 30 higher education institutions in the region that awarded an associate's degree or higher between 2011 and 2013.⁸ These institutions graduated, on average, 10,300 students annually from 2011 to 2013 with an associate's degree or higher.⁹ The top major fields of study include education; health professions and related programs; and business, management, marketing, and related support services. Pennsylvania's State System of Higher Education is a large contributor to bachelor's and graduate degree completions. Shippensburg University produces approximately 25% of the total bachelor's degrees and above in the region.¹⁰

4.1 Associate's Degree Completions

SU's workforce region is home to approximately 16 different institutions that offer a range of associate's degree programs.¹¹ From 2011 to 2013, these institutions in SU's workforce region awarded, on average, 3,400 associate's degrees annually. The top three program areas in the region's associate degree production include:

- Health professions and related programs,
- Business, management, marketing, and related support services, and
- Computer and information sciences and support services.

8 This number includes the location of a physical campus/structure with learner enrolment as reported to NCES. Institutions with extension campuses that report enrollment at their main campus may not be captured within this list.

9 This number is the 3-year average completions from 2011 to 2013 as reported to NCES.

10 This number is based on the 3-year average completions from 2011 to 2013 as reported to NCES.

11 This number includes the location of a physical campus/structure as reported to NCES. Institutions with extension campuses that report to their main campus may not be captured within this list.

Of the 3,400 average annual completions of associate's degrees, these three program areas accounted for 55% of completions in the region.

4.1.1 Shippensburg University's Associate's Degree Completions

From 2011 to 2013, Shippensburg University did not award an associate's degree.

Fig. 24 highlights the top 10 program areas for associate's completions in SU's workforce region.

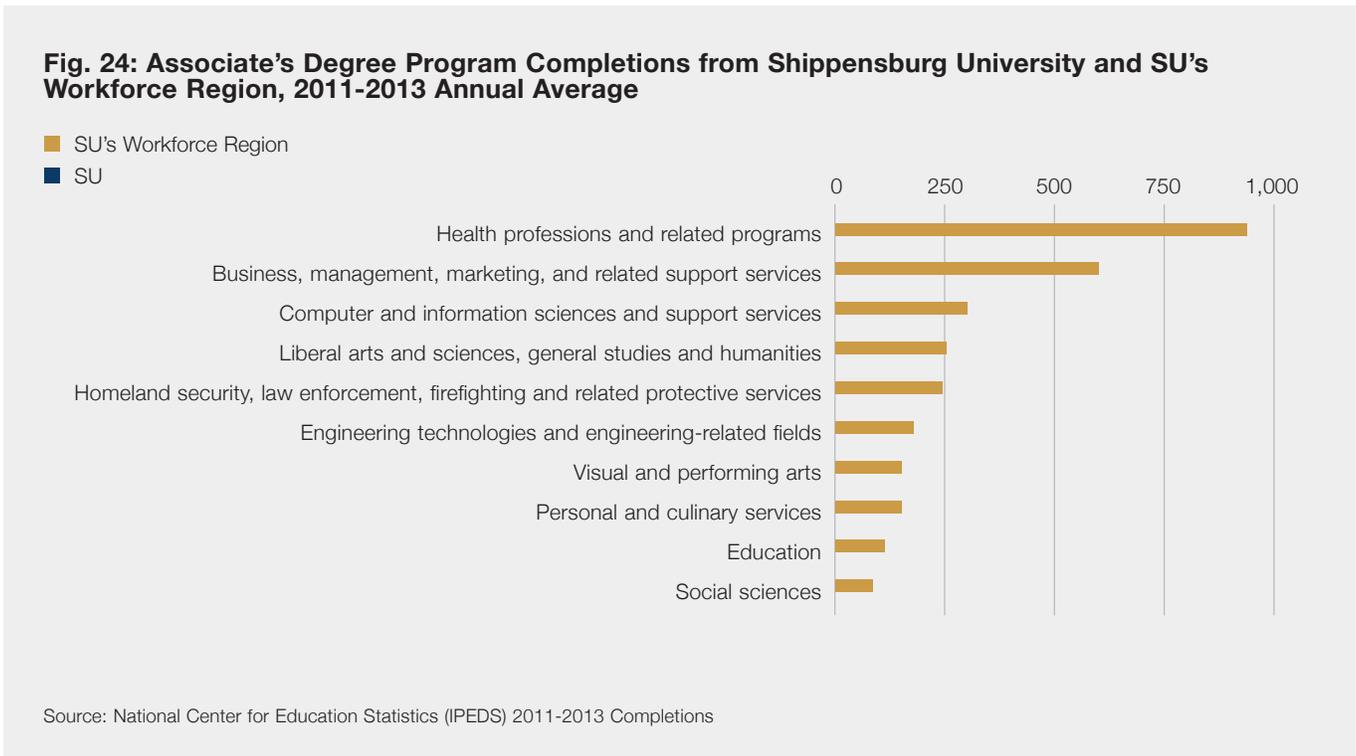


Fig. 25 on the next page provides the total number of associate's degrees awarded in SU's workforce region by major field of study as well as the total number of associate's degrees awarded by Shippensburg University.

Fig. 25: Associate's Degree Total Program Completions from Shippensburg University and SU's Workforce Region, 2011-2013 Annual Average

| Major Category | SU's Workforce Region 3-year Average Associate Completions | Share of Total SU's Workforce Region Associate Completions | SU 3-year Average Associate Completions | Share of Total SU Associate Completions |
|--|--|--|---|---|
| Total | 3,351 | 100.0% | 0 | NA |
| Health professions and related programs | 941 | 28.1% | 0 | NA |
| Business, management, marketing, and related support services | 601 | 17.9% | 0 | NA |
| Computer and information sciences and support services | 297 | 8.9% | 0 | NA |
| Liberal arts and sciences, general studies and humanities | 250 | 7.5% | 0 | NA |
| Homeland security, law enforcement, firefighting and related protective services | 247 | 7.4% | 0 | NA |
| Engineering technologies and engineering-related fields | 181 | 5.4% | 0 | NA |
| Visual and performing arts | 155 | 4.6% | 0 | NA |
| Personal and culinary services | 152 | 4.5% | 0 | NA |
| Education | 109 | 3.3% | 0 | NA |
| Social sciences | 87 | 2.6% | 0 | NA |
| Legal professions and studies | 83 | 2.5% | 0 | NA |
| Public administration and social service professions | 51 | 1.5% | 0 | NA |
| Mechanic and repair technologies/technicians | 47 | 1.4% | 0 | NA |
| Psychology | 25 | 0.7% | 0 | NA |
| Biological and biomedical sciences | 21 | 0.6% | 0 | NA |
| Family and consumer sciences/human sciences | 20 | 0.6% | 0 | NA |
| Construction trades | 19 | 0.6% | 0 | NA |
| Natural resources and conservation | 17 | 0.5% | 0 | NA |
| Parks, recreation, leisure, and fitness studies | 11 | 0.3% | 0 | NA |
| Engineering | 8 | 0.2% | 0 | NA |
| Physical sciences | 6 | 0.2% | 0 | NA |
| Communications technologies/technicians and support services | 6 | 0.2% | 0 | NA |
| Agriculture, agriculture operations, and related sciences | 6 | 0.2% | 0 | NA |
| Communication, journalism, and related programs | 5 | 0.2% | 0 | NA |
| Architecture and related services | 4 | 0.1% | 0 | NA |
| Mathematics and statistics | 1 | 0.0% | 0 | NA |

Source: National Center for Education Statistics (IPEDS) 2011-2013 Completions

4.2 Bachelor's Degree Completions

Shippensburg University's workforce region is home to approximately 14 different institutions that offer a range of bachelor's degree programs.¹² From 2011 to 2013, these institutions in SU's workforce region awarded, on average, 5,700 bachelor's degrees annually. The top three program areas in the region's bachelor degree production include:

- Business, management, marketing, and related support services,
- Education, and
- Social sciences.

Of the 5,700 average annual completions of bachelor's degrees, these three program areas accounted for 36% of completions in the region.

4.2.1 Shippensburg University's Bachelor's Degree Completions

From 2011 to 2013, Shippensburg University awarded, on average, 1,400 bachelor's degrees annually. The top program areas for bachelor degrees from Shippensburg University include:

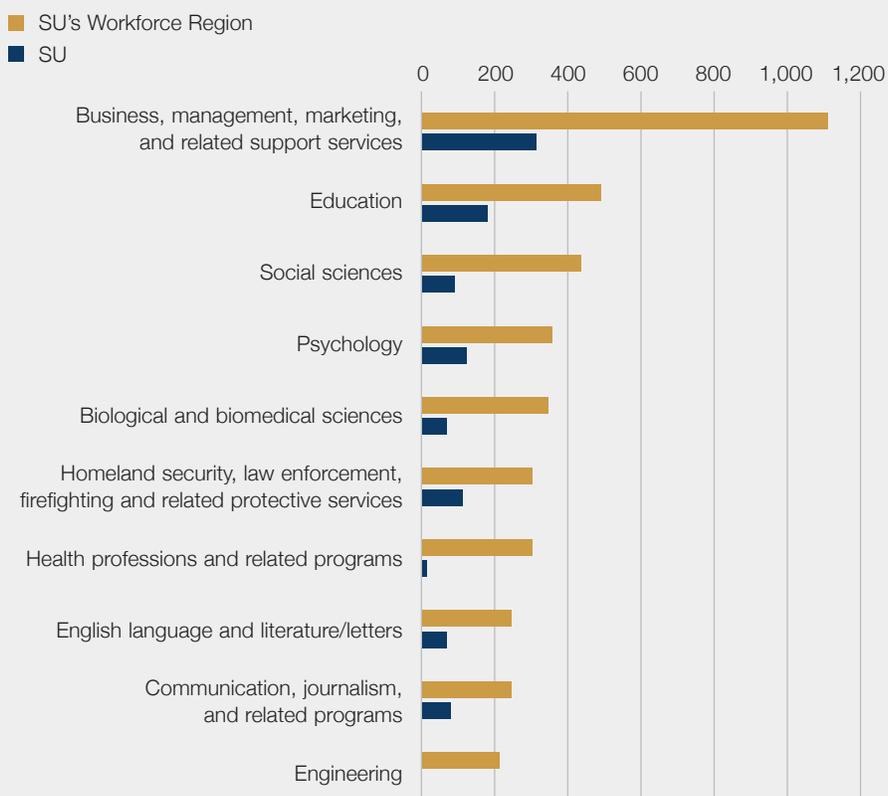
- Business, management, marketing, and related support services,
- Education, and
- Psychology.

Of the 1,400 average annual completions of bachelor's degrees from Shippensburg University, these three program areas accounted for 47% of bachelor's degree completions.

Fig. 26 highlights the top program areas for bachelor's completions in SU's workforce region, along with the corresponding bachelor's completions from Shippensburg University.

¹² This number includes the location of a physical campus/structure as reported to NCES. Institutions with extension campuses that report to their main campus may not be captured within this list.

Fig. 26: Bachelor's Degree Program Completions from Shippensburg University and SU's Workforce Region, 2011-2013 Annual Average



Source: National Center for Education Statistics (IPEDS) 2011-2013 Completions

Fig. 27 on the next page provides the total number of bachelor's degrees awarded in SU's workforce region by major field of study as well as the total number of bachelor's degrees awarded by Shippensburg University.

Fig. 27: Bachelor's Degree Total Program Completions from Shippensburg University and SU's Workforce Region, 2011-2013 Annual Average

| Major Category | SU's Workforce Region 3-year Average Bachelor Completions | Share of Total SU's Workforce Region Bachelor Completions | SU 3-year Average Bachelor Completions | Share of Total SU Bachelor Completions |
|--|--|--|---|---|
| Total | 5,667 | 100.0% | 1,382 | 100.0% |
| Business, management, marketing, and related support services | 1,123 | 19.8% | 309 | 22.3% |
| Education | 488 | 8.6% | 183 | 13.2% |
| Social sciences | 441 | 7.8% | 84 | 6.1% |
| Psychology | 355 | 6.3% | 125 | 9.0% |
| Biological and biomedical sciences | 344 | 6.1% | 67 | 4.8% |
| Homeland security, law enforcement, firefighting and related protective services | 306 | 5.4% | 110 | 8.0% |
| Health professions and related programs | 297 | 5.2% | 8 | 0.6% |
| English language and literature/letters | 250 | 4.4% | 71 | 5.2% |
| Communication, journalism, and related programs | 242 | 4.3% | 79 | 5.7% |
| Engineering | 210 | 3.7% | 2 | 0.1% |
| Computer and information sciences and support services | 201 | 3.5% | 53 | 3.9% |
| History | 187 | 3.3% | 60 | 4.3% |
| Visual and performing arts | 186 | 3.3% | 32 | 2.3% |
| Parks, recreation, leisure, and fitness studies | 139 | 2.5% | 35 | 2.5% |
| Multi/interdisciplinary studies | 136 | 2.4% | 10 | 0.7% |
| Public administration and social service professions | 118 | 2.1% | 64 | 4.6% |
| Natural resources and conservation | 114 | 2.0% | 33 | 2.4% |
| Physical sciences | 91 | 1.6% | 22 | 1.6% |
| Foreign languages, literatures, and linguistics | 85 | 1.5% | 11 | 0.8% |
| Mathematics and statistics | 75 | 1.3% | 26 | 1.9% |
| Area, ethnic, cultural, gender, and group studies | 72 | 1.3% | 0 | 0.0% |
| Family and consumer sciences/human sciences | 65 | 1.2% | 0 | 0.0% |
| Philosophy and religious studies | 56 | 1.0% | 0 | 0.0% |
| Theology and religious vocations | 24 | 0.4% | 0 | 0.0% |
| Liberal arts and sciences, general studies and humanities | 21 | 0.4% | 0 | 0.0% |
| Legal professions and studies | 20 | 0.4% | 0 | 0.0% |
| Agriculture, agriculture operations, and related sciences | 9 | 0.2% | 0 | 0.0% |
| Communications technologies/technicians and support services | 8 | 0.1% | 0 | 0.0% |

Source: National Center for Education Statistics (IPEDS) 2011-2013 Completions

4.3 Graduate Degree Completions

Shippensburg University's workforce region is home to approximately 13 different institutions that offer a range of graduate degree programs.¹³ From 2011 to 2013, these institutions in SU's workforce region awarded, on average, 1,300 graduate degrees annually. The top three program areas in the region's graduate degree production include:

- Education,
- Health professions and related programs, and
- Business, management, marketing, and related support services.

Of the 1,300 average annual completions of graduate degrees in SU's workforce region, these three program areas accounted for 60% of graduate completions.

4.3.1 Shippensburg University Graduate Degree Completions

From 2011 to 2013, Shippensburg University awarded, on average, 370 graduate degrees annually. The top program areas for graduate degrees from Shippensburg University include:

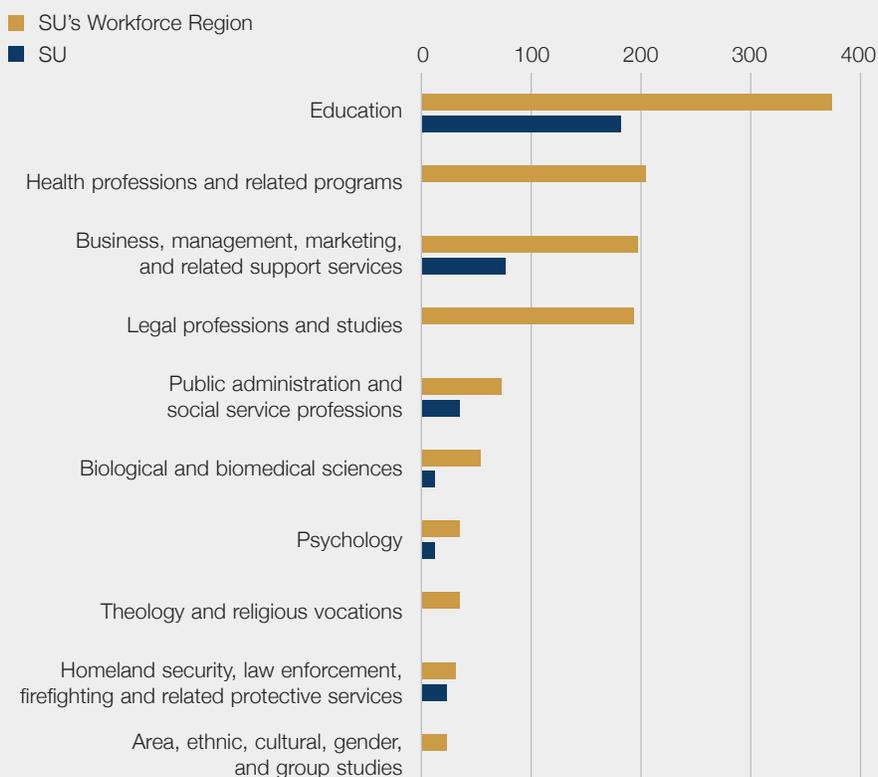
- Education,
- Business, management, marketing, and related support services, and
- Public administration and social service professions.

Of the 370 average annual completions of graduate degrees from Shippensburg University, these three program areas accounted for 78% of graduate degree completions.

Fig. 28 highlights the top program areas for graduate completions in SU's workforce region, along with the corresponding graduate completions from Shippensburg University.

¹³ This number includes the location of a physical campus/structure as reported to NCES. Institutions with extension campuses that report to their main campus may not be captured within this list.

Fig. 28: Graduate Degree Program Completions from Shippensburg University and SU's Workforce Region, 2011-2013 Annual Average



Source: National Center for Education Statistics (IPEDS) 2011-2013 Completions

Fig. 29 on the next page provides the total number of graduate degrees awarded in SU's workforce region by major category as well as the total number of graduate degrees awarded by Shippensburg University.

The next section evaluates the combination of completions by degree type (education supply) against the demand for skilled labor by occupation to determine whether potential gaps (excess demand or supply surplus) exist within the region's postsecondary education system.

Fig. 29: Graduate Degree Total Program Completions from Shippensburg University and SU's Workforce Region, 2011-2013 Annual Average

| Major Category | SU's Workforce Region 3-year Average Graduate Completions | Share of Total SU's Workforce Region Graduate Completions | SU 3-year Average Graduate Completions | Share of Total SU Graduate Completions |
|--|---|---|--|--|
| Total | 1,305 | 100.0% | 371 | 100.0% |
| Education | 377 | 28.9% | 181 | 48.8% |
| Health professions and related programs | 204 | 15.7% | 0 | 0.0% |
| Business, management, marketing, and related support services | 198 | 15.1% | 76 | 20.4% |
| Legal professions and studies | 193 | 14.8% | 0 | 0.0% |
| Public administration and social service professions | 72 | 5.5% | 34 | 9.2% |
| Biological and biomedical sciences | 54 | 4.2% | 11 | 3.0% |
| Psychology | 36 | 2.8% | 10 | 2.8% |
| Theology and religious vocations | 34 | 2.6% | 0 | 0.0% |
| Homeland security, law enforcement, firefighting and related protective services | 32 | 2.4% | 22 | 5.9% |
| Area, ethnic, cultural, gender, and group studies | 23 | 1.8% | 0 | 0.0% |
| History | 14 | 1.1% | 14 | 3.8% |
| Computer and information sciences and support services | 13 | 1.0% | 7 | 1.8% |
| Engineering | 12 | 0.9% | 0 | 0.0% |
| Communication, journalism, and related programs | 12 | 0.9% | 9 | 2.5% |
| Visual and performing arts | 12 | 0.9% | 0 | 0.0% |
| Liberal arts and sciences, general studies and humanities | 9 | 0.7% | 0 | 0.0% |
| Natural resources and conservation | 7 | 0.5% | 7 | 1.9% |
| Engineering technologies and engineering-related fields | 4 | 0.3% | 0 | 0.0% |

Source: National Center for Education Statistics (IPEDS) 2011-2013 Completions

5. OVERVIEW OF GAP ANALYSIS

A gap analysis comparing educational supply and occupational demand serves as a critical first step in efforts to align education programs with the workforce needs of Pennsylvania employers. It provides a data-driven perspective of employer demand (growing occupations across the state) and postsecondary education supply (degree production by program and level). This section focuses on the demand gaps and supply surpluses for skilled occupations in SU's workforce region.¹⁴

To make the connection between employer demand and education supply a crosswalk between the taxonomy of occupation codes (Standard Occupation Codes, or SOC) and major programs (Classification of Instructional Program or CIP) is required. The State System's Gap Analysis project conducted original research to enhance the traditional taxonomy of major program to occupation crosswalk using American Community Survey data that demonstrate a broader spectrum of connections between education programs and occupations.¹⁵ This hybrid crosswalk connected the CIP and SOC using both the NCES and Pennsylvania standard crosswalks and the additional real-world connections using the American Community Survey.

¹⁴ Skilled occupations are occupations in Job Zones 3, 4, and 5.

¹⁵ The existing crosswalks available include a national NCES crosswalk and a state crosswalk specific to Pennsylvania. Additional connections were made using data available in the ACS.

EDUCATION TO OCCUPATION CROSSWALKS AND WHAT SETS THIS GAP ANALYSIS APART FROM PREVIOUS STUDIES

Typical gap analysis will use one of two approaches when building a crosswalk: The Department of Education (DOE) crosswalk or the American Community Survey (ACS) crosswalk.

The DOE crosswalk, completed through collaboration with the Bureau of Labor Statistics and the National Center for Education Statistics (NCES), attempts to link occupation classifications (SOC code) to their related educational programs (CIP code). The drawback is that there is often not a one-to-one connection between education programs and occupations and in even some extreme cases, education programs related to occupations do not match the reality of careers people enter. Another drawback is that occupations often employ a range of degree and non-degree completers, which reflects the reality of the labor market. For example a customer representative for a technology company may have a bachelor's degree in computer programming, whereas a customer service representative for a retail company may only have a high school diploma.

The ACS crosswalk is built on a large survey sample consisting of 160 education program codes and 261 occupation classifications (note: these are not as detailed as CIP and SOC codes), reflecting the careers individuals take after they complete their education programs. Whereas DOE's crosswalk seeks to state what should be, the ACS crosswalk states what is. This approach is very practical when dealing with education programs that don't match closely to a specific occupation (e.g. liberal arts degrees, history degrees, etc.). Additionally, ACS data provide a measure that estimates the demand for workers with various levels of postsecondary education in a given occupation. For example if 21% of customer service representatives have a bachelor's degree, then only 21% of the annual demand for customer service representatives will be counted against the supply of matching education programs.

The methodology developed for this gap analysis bridges the two approaches above. Occupations that

are linked through DOE are not discounted, even if ACS suggests that there are relatively few degree completions entering the occupation field. Additionally, the use of ACS more closely captures the reality of where degree holders have found employment in Pennsylvania and surrounding states—note the geography for measuring gaps was restricted to Pennsylvania only, however occupation to education linkages were built on a multi-state region. While there are certainly exceptions to the rule, which were ultimately reviewed on a case-by-case basis as described in detail in Appendix E, the approach does capture the vast majority of relevant and compelling connections between education programs and occupations. Lastly, the methodology takes into account the labor market behavior of both employers and employees in the following ways:

- It provides a measure of education distribution by degree level demonstrating that a range of skill levels can exist within occupation classification.
- It captures the demand and range for bachelor's degree field of study within an occupation classification.*
- It provides a reality-driven process to connect bachelor's degree field of study to occupations, especially in the liberal arts programs.
- It provides a regionalized crosswalk that better reflects the competition for jobs in Pennsylvania and the surrounding region.

By modeling these features, this gap analysis accounts for issues that were not accounted for in previous gap analysis studies.

* The ACS reports two separate pieces of information: highest level of educational attainment for an individual and major field of study for an individual's bachelor degree. The major field of study is not reported for associate's degrees or graduate degrees.

5.1 How to use the Gap Analysis

The gap analysis results are presented as two main sets of findings: demand gaps (excess employer demand) and supply surpluses. Each outcome has a different set of implications for area stakeholders, postsecondary education institutions, and learners. These outcomes are summarized briefly below and then described further in each relevant section.

The uses of a gap analysis are many and varied and include:

- **Strategic engagement:** Increased collaboration and alignment between regional employers and education programs helps ensure a competitive, vibrant regional economy. The gap analysis enables this process by helping postsecondary institutions identify areas of employer need. The analysis provides a data-driven starting point to begin conversations with employers on how postsecondary institutions can help meet education/training needs in the regional economy.
- **Enhanced program development/evaluation:** The gap analysis serves as an additional tool for decision-making in academic program planning by addressing one aspect of the external eco-system—alignment of academic programs to the regional labor market.
- **Student engagement/career guidance:** The analysis provides information that can be used for career guidance and job search. The gap analysis results can inform learners about the alignment of education programs to careers, as well as the market demand for jobs.
- **Marketing:** By highlighting information about high demand occupations that are linked to education programs, postsecondary education institutions can demonstrate how learners will succeed after program completion. Where compelling information exists, this can be used in student recruitment efforts.

While the State System's Gap Analysis project is critical to understanding the connections between education programs and occupations, it is important to recall the caveats of this Gap Analysis report:

- When considering making adjustments to programs in degree areas related to occupations displaying gaps, further research should be considered to confirm the extent of alignment needed to arrive at equilibrium with the labor market.
- Government data that capture labor market demand lag real-time employer demand as well as higher education industry trends. As such, the gap analysis findings may lag these market changes.

- This analysis only focuses on program output as a supply pool (i.e. new graduates). However, regional workforces comprise additional pools of supply—specifically: employed workers, skilled unemployed workers, and skilled underemployed workers. When evaluating gaps, this analysis focuses on new and replacement demand, as opposed to job churn.¹⁶ This helps to mitigate some of the issues involving the employed workforce.

Excess Employer Demand (Demand Gap)

A demand gap exists where the regional supply of talent is insufficient to support the workforce needs of businesses located there. Where such gaps exist businesses will likely seek talent from outside the area, which can become costly from an HR perspective. This especially affects small and medium sized businesses that usually do not have well-developed HR functions. Additionally,

ABSOLUTE DEMAND GAP VS. RELATIVE DEMAND GAP

Results for demand gaps in this analysis are calculated in two different ways. An absolute demand gap is a nominal comparison, wherein the supply of program completions which align to an occupation is subtracted from the demand for those aligned occupations. This produces a “headcount” of the additional number of program completions needed to meet the demand within an occupation.

A relative demand gap is a ratio of program supply to occupation demand, which is expressed as a percentage. A percentage below 100% indicates excess employer demand relatively (e.g. the number of program completers is less than the occupation demand), whereas a value over 100% indicates that there are more program completions relative to occupation demand.

This analysis factors in both the absolute measure and relative measure to enable a broader perspective for interpretation. For example, an occupation that may indicate an average annual demand for 40 jobs per year with 30 annual completers would require 25% more completions to bridge the gap ($30 / 40 = 0.75$). However, this absolute gap would suggest that the increased amount of program output—10 additional completers—is relatively small. Therefore for program planning purposes, both perspectives are helpful to set the context of the demand gap.

¹⁶ Replacement jobs include retirements, deaths, and other workers who permanently leave an occupation. Job churn occurs when a worker leaves one job for another, but continues working in the same occupation.

employers—especially those in more rural areas—may face higher costs as they attempt to draw in workers from more populated areas.

This creates an opportunity to expand output or develop programs. For education institutions, gaps present an opportunity for program expansion (where current programs align, but are not creating enough output). The strategy for increasing output may differ—whether capacity or learner recruitment is a constraining factors. If a program does not exist, a gap may present an opportunity for new program development.

Learners may gain a competitive employment edge when excess employer demand exists. For learners, when demand exceeds supply, graduates in relevant disciplines usually benefit—providing opportunities for career progression and higher earnings in both the short and long term.

Supply Surplus (Supply Gap)

A supply surplus for an occupation exists when the number of program completions within a region exceeds the employer demand. This presents some key implications to consider.

ABSOLUTE SUPPLY SURPLUS VS. RELATIVE SUPPLY SURPLUS

Results for supply surpluses are calculated in two different ways. An absolute supply surplus is a nominal comparison, wherein the supply of program completions which align to an occupation is subtracted from the demand for those aligned occupations. This produces a “headcount” of the number of program completions that exceed the projected demand for a given occupation.

A relative supply surplus is a ratio of program supply to occupation demand, which is expressed as a percentage. A percent above 100% indicates a relative supply surplus (e.g. the number of program completers is more than the occupation demand).

This analysis factors both ways to enable a broader perspective for interpretation. For example, an occupation that may indicate an average annual demand for 40 jobs per year with 50 annual completers would suggest that there are about 25% more completions than the workforce demands for occupations that tie to that program ($50 / 40 = 1.25$). However, this absolute gap would suggest that the increased amount of program output—10 additional completers—is relatively small. Furthermore, this may indeed fall within “tolerable levels” of program supply surplus. Therefore for programming planning and evaluation purposes, both perspectives are helpful to set the context of the supply surplus.

If employer demand is less than education production in relevant occupations, learners are likely to leave the region after graduation causing learner attrition and out-migration. Surpluses in talent supply can also suppress wages for graduates in certain careers. Classic labor market economic theory suggests that increased competition for jobs will put downward pressure on wages—i.e. the more people competing for the same job gives an employer a better bargaining position for wage/salary. While a college degree in and of itself has a measured wage premium, specific programs areas may have a range of wage premiums based on the supply of new talent competing for jobs and the conditions of the labor market.

5.2 Excess Demand Gaps for Skilled Occupations

Excess demand gaps exist for many skilled occupations (occupations in Job Zones Three, Four and Five) within SU's workforce region. The degree programs that align to these occupations span associate's degrees through graduate degrees. Recall that a demand gap exists where the regional supply of talent is insufficient to support the workforce needs of businesses located there. The top excess demand gaps are identified by the size of the annual gap.

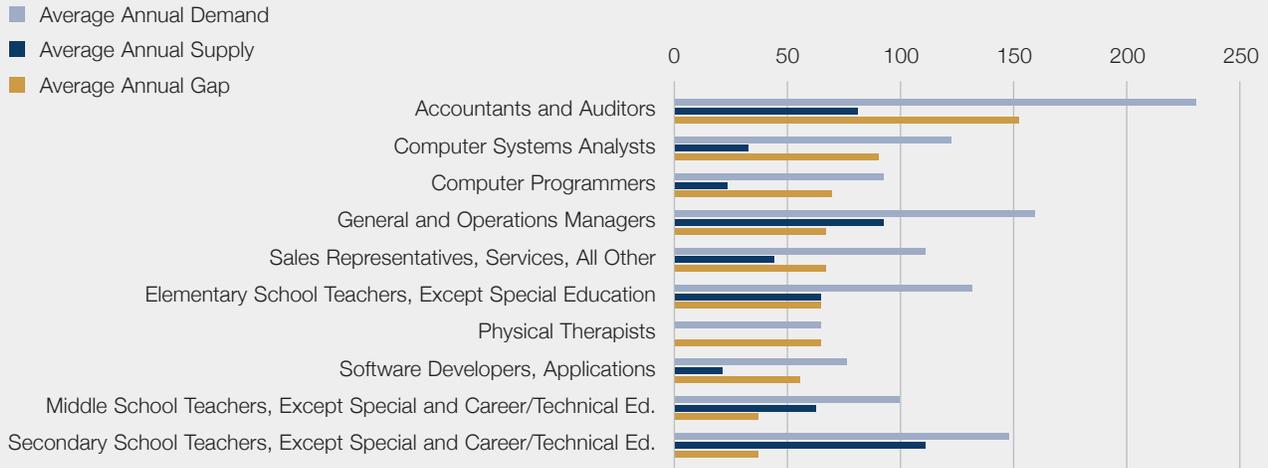
In SU's workforce region, growth in the finance and insurance sector has increased demand for business and sales occupations. Eight out of the top twenty demand gaps are occupations related to sales and business occupations, combining for an average annual demand gap of 405. The largest demand gap exists for accountants and auditors with an average annual gap of 151.

Additionally, growth in professional, technical and scientific services has driven significant demand for computer occupations, which, in-turn, has driven the demand for STEM majors.¹⁷ Computer systems analysts, computer programmers, and software developers, applications combined for an average annual demand gap of 214.

Fig. 30 and Fig. 31 provide further detail about the top occupation gaps that reveal excess employer demand. The table includes the occupation title, occupation job zone, projected annual employer demand (for associate's degrees and higher), the annual supply of program completions (allocated to the occupation), the average annual gap, and a ratio of supply to demand (S/D Ratio).

¹⁷ STEM majors include programs in the fields of Science, Technology, Engineering, and Mathematics.

Fig. 30: Top Demand Gaps for Skilled Occupations in Shippensburg University's Workforce Region



Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections; NCES (IPEDS 2011-2013 Completions)

Fig. 31: Top Demand Gaps for Skilled Occupations in Shippensburg University's Workforce Region

| Occupation Title | Job Zone | Average Annual Demand | Average Annual Supply | Average Annual Gap | S/D Ratio |
|--|----------|-----------------------|-----------------------|--------------------|-----------|
| Accountants and Auditors | 4 | 231 | 80 | 151 | 0.35 |
| Computer Systems Analysts | 4 | 122 | 33 | 89 | 0.27 |
| Computer Programmers | 4 | 93 | 24 | 69 | 0.26 |
| General and Operations Managers | 4 | 158 | 91 | 67 | 0.58 |
| Sales Representatives, Services, All Other | 4 | 110 | 43 | 67 | 0.39 |
| Elementary School Teachers, Except Special Education | 4 | 130 | 65 | 65 | 0.50 |
| Physical Therapists | 5 | 64 | 0 | 64 | 0.00 |
| Software Developers, Applications | 4 | 77 | 21 | 56 | 0.27 |
| Middle School Teachers, Except Special and Career/Technical Education | 4 | 100 | 63 | 37 | 0.63 |
| Secondary School Teachers, Except Special and Career/Technical Education | 4 | 147 | 110 | 37 | 0.75 |
| Human Resources Specialists | 4 | 84 | 48 | 36 | 0.57 |
| Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products | 4 | 75 | 39 | 36 | 0.52 |
| Insurance Sales Agents | 4 | 54 | 22 | 32 | 0.41 |
| Financial Analysts | 4 | 45 | 14 | 31 | 0.31 |
| Civil Engineers | 4 | 43 | 13 | 30 | 0.30 |
| Registered Nurses | 3 | 428 | 398 | 30 | 0.93 |
| Mechanical Engineers | 4 | 38 | 11 | 27 | 0.29 |
| Rehabilitation Counselors | 5 | 31 | 4 | 27 | 0.13 |
| Claims Adjusters, Examiners, and Investigators | 4 | 43 | 17 | 26 | 0.40 |
| Market Research Analysts and Marketing Specialists | 4 | 56 | 30 | 26 | 0.54 |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections; NCES (IPEDS 2011-2013 Completions)

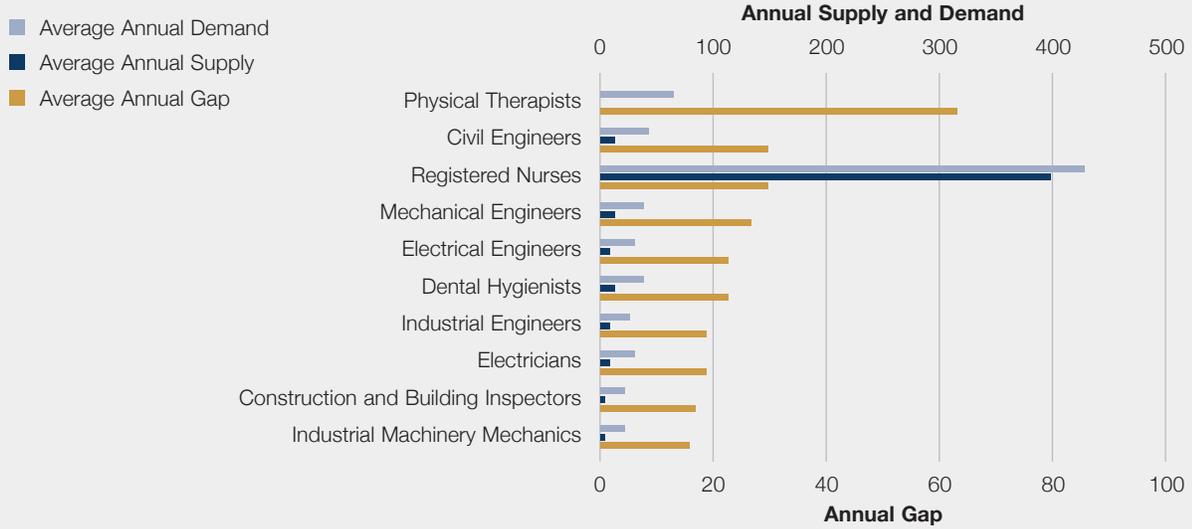
5.3 Excess Demand Gaps for Occupations Without a Shippensburg University Match

The breadth of programs offered at Shippensburg University indicates a number of strong linkages to occupations. However, many occupations within SU's workforce region show excess demand for which Shippensburg University did not produce completers in a matching program area. Furthermore, analysis indicates continued demand for these occupations over the next decade. Recall that a demand gap exists where the regional supply of talent is insufficient to support the workforce needs of businesses located there.

Fig. 32 displays the top excess demand gaps for occupations that did not have matching program completers at Shippensburg University. Physical therapists show the largest excess annual demand gap at 64. This is followed by: civil engineers, registered nurses, mechanical engineers, and electrical engineers.

Fig. 33 provides detailed information for each occupation the occupation title, occupation job zone, projected annual employer demand (for associate's degrees and higher), the annual supply of program completions (allocated to the occupation), the average annual gap, and a ratio of supply to demand (S/D Ratio).

Fig. 32: Top Demand Gaps for Skilled Occupations in Shippensburg University's Workforce Region Without a State System Program



Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections; NCES (IPEDS 2011-2013 Completions)

Fig. 33: Top Demand Gaps for Skilled Occupations in Shippensburg University's Workforce Region Without a State System Program

| Occupation Title | Job Zone | Average Annual Demand | Average Annual Supply | Average Annual Gap | S/D Ratio |
|---|----------|-----------------------|-----------------------|--------------------|-----------|
| Physical Therapists | 5 | 64 | 0 | 64 | 0.00 |
| Civil Engineers | 4 | 43 | 13 | 30 | 0.30 |
| Registered Nurses | 3 | 428 | 398 | 30 | 0.93 |
| Mechanical Engineers | 4 | 38 | 11 | 27 | 0.29 |
| Electrical Engineers | 4 | 30 | 7 | 23 | 0.23 |
| Dental Hygienists | 3 | 37 | 14 | 23 | 0.38 |
| Industrial Engineers | 4 | 27 | 8 | 19 | 0.30 |
| Electricians | 3 | 29 | 10 | 19 | 0.34 |
| Construction and Building Inspectors | 3 | 23 | 6 | 17 | 0.26 |
| Industrial Machinery Mechanics | 3 | 22 | 6 | 16 | 0.27 |
| Veterinarians | 5 | 15 | 1 | 14 | 0.07 |
| Engineers, All Other | 4 | 18 | 5 | 13 | 0.28 |
| Nurse Practitioners | 5 | 19 | 7 | 12 | 0.37 |
| Automotive Service Technicians and Mechanics | 3 | 26 | 14 | 12 | 0.54 |
| Environmental Engineers | 5 | 16 | 5 | 11 | 0.31 |
| Emergency Medical Technicians and Paramedics | 3 | 9 | 2 | 7 | 0.22 |
| Vocational Education Teachers, Postsecondary | 3 | 8 | 2 | 6 | 0.25 |
| Teachers and Instructors, All Other, Except Substitute Teachers | 3 | 9 | 3 | 6 | 0.33 |
| Respiratory Therapists | 3 | 16 | 10 | 6 | 0.63 |
| Pharmacy Technicians | 3 | 6 | 0 | 6 | 0.00 |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections; NCES (IPEDS 2011-2013 Completions)

5.4 Supply Surplus Gaps

Supply surplus gaps for skilled occupations cover occupations in Job Zones Three, Four and Five. The degree programs that align to these occupations span associate's degrees through graduate degrees. Recall that a supply surplus for an occupation exists where the number of program completions within a region exceeds the employer demand. The top supply surplus gaps are identified by the size of the annual gap.

The top supply surpluses within SU's workforce region cover a broad range of both technical and non-technical occupations. When considering program changes in degree areas related to occupations displaying a supply surplus, further research should be considered to confirm the extent of alignment needed to arrive at equilibrium with the labor market.

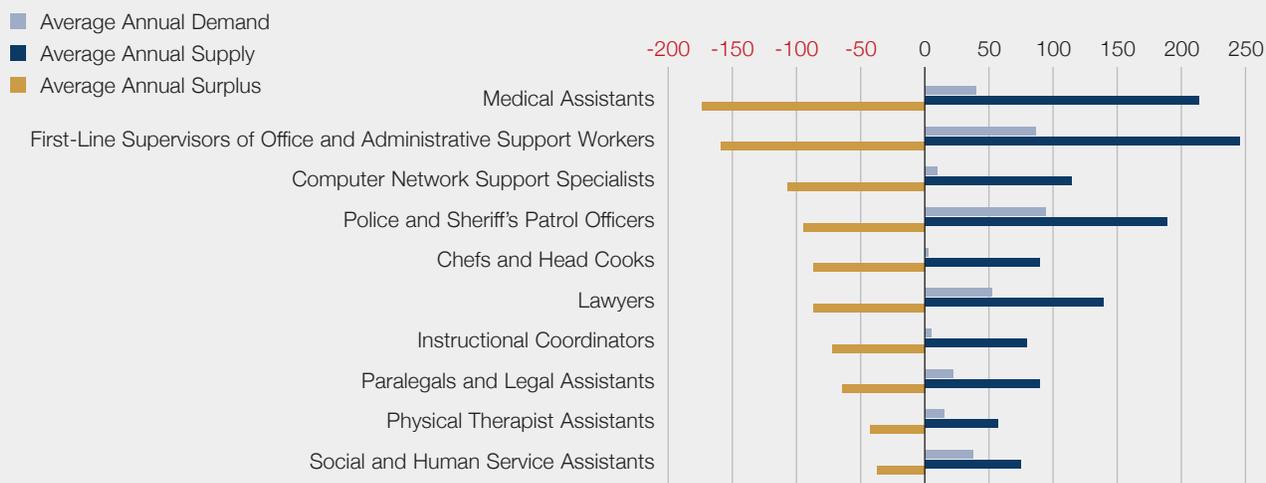
In SU's workforce region, the data reveal the number of graduates that are aligned to education, training, and library occupations greatly exceed the annual demand for workers by a combined annual average of 140 completions. Other occupations that indicate a supply surplus in SU's workforce region are concentrated in legal occupations. Lawyers and paralegals and legal assistants combine for an average annual supply surplus of 160.

The largest supply surplus gap in the region exists for medical assistants with an average annual supply surplus of 174. Program completers in the top supply surplus occupations may face increased competition for occupations related to their field of study within the region.

Fig. 34 illustrates the top supply surpluses for skilled occupations in SU's workforce region. Fig. 35 provides the occupation title, occupation job zone, projected annual employer demand (for associate's degrees and higher), the annual supply of program completions (allocated to the occupation), the average annual gap, and a ratio of supply to demand (S/D Ratio).

This section provided an overview of gaps from the perspective of excess demand and supply surpluses. It is intended to set the data-driven foundation for understanding current alignment of education production in SU's workforce region compared to the region's employer demand for graduates in specific program areas. Results for the gaps are largely driven by industry employment growth. As market conditions change, the resulting demand for skilled workers will also change. Therefore, results of this analysis should be taken in the context of changing industry sector employment and occupational demand.

Fig. 34: Top Supply Surplus Gaps for Skilled Occupations in Shippensburg University's Workforce Region



Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections; NCES (IPEDS 2011-2013 Completions)

Fig. 35: Top Supply Surplus Gaps for Skilled Occupations in Shippensburg University's Workforce Region

| Occupation Title | Job Zone | Average Annual Demand | Average Annual Supply | Average Annual Gap | S/D Ratio |
|---|----------|-----------------------|-----------------------|--------------------|-----------|
| Medical Assistants | 3 | 41 | 215 | -174 | 5.24 |
| First-Line Supervisors of Office and Administrative Support Workers | 3 | 88 | 248 | -160 | 2.82 |
| Computer Network Support Specialists | 4 | 9 | 116 | -107 | 12.89 |
| Police and Sheriff's Patrol Officers | 3 | 94 | 189 | -95 | 2.01 |
| Chefs and Head Cooks | 3 | 2 | 90 | -88 | 45.00 |
| Lawyers | 5 | 53 | 140 | -87 | 2.64 |
| Instructional Coordinators | 5 | 6 | 79 | -73 | 13.17 |
| Paralegals and Legal Assistants | 3 | 23 | 89 | -66 | 3.87 |
| Physical Therapist Assistants | 3 | 15 | 57 | -42 | 3.80 |
| Social and Human Service Assistants | 4 | 38 | 75 | -37 | 1.97 |
| Architectural and Civil Drafters | 4 | 7 | 42 | -35 | 6.00 |
| Engineering Technicians, Except Drafters, All Other | 3 | 10 | 45 | -35 | 4.50 |
| Preschool Teachers, Except Special Education | 3 | 47 | 81 | -34 | 1.72 |
| Substitute Teachers | 3 | 10 | 43 | -33 | 4.30 |
| Correctional Officers and Jailers | 3 | 24 | 50 | -26 | 2.08 |
| Educational, Guidance, School, and Vocational Counselors | 5 | 22 | 44 | -22 | 2.00 |
| Food Service Managers | 3 | 8 | 28 | -20 | 3.50 |
| Public Relations Specialists | 4 | 10 | 30 | -20 | 3.00 |
| Clergy | 5 | 5 | 24 | -19 | 4.80 |
| First-Line Supervisors of Police and Detectives | 3 | 16 | 33 | -17 | 2.06 |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections; NCES (IPEDS 2011-2013 Completions)

6. CONCLUSION

The State System Gap Analysis report provides a data-driven foundation for program planning and alignment in order to drive economic value and career success within the state and its regions. The analysis itself is not the solution, but can lend credible insight to guide decision-making at the strategic level. The content is designed to be a starting point and resource for program evaluation and planning.

It is important to remember that the results for the gaps are largely driven by industry employment growth. As labor market conditions change, the resulting demand for skilled workers will also change. Therefore, the results of this analysis should be taken in a context of changing industry sector employment and occupational demand.

Additionally, areas of future research should be considered when considering program evaluation and planning. These areas include (but are not limited to):

- Strong vs. weak occupation to education alignment,
- Wage trend research and supply/demand effects on wages,
- Career pathways, outcomes, and lifetime earnings,
- Issues of mal-employment¹⁸ and underemployment,¹⁹ and
- Program alignment best practices.

As more insights into the connections between education programs and labor market outcomes are gained, students, universities, workers, and employers will all benefit significantly.

18 Mal-employment is a specific type of underemployment that exists in the labor market. This occurs when college-educated workers choose to work in occupations that do not utilize the skills and abilities gained in college. An example of this would include a person who has a bachelor's degree in political science but works as bartender. For more on mal-employment see Harrington and Fogg (2011) "Rising Mal-Employment and the Great Recession: The Growing Disconnection between Recent College Graduates and the College Labor Market."

19 Underemployment occurs in the labor market when workers' skills, experience, and willingness to work are not fully utilized. An example of this would include a person who is employed part-time but wants to work full-time.

7. ABOUT THE STATE SYSTEM'S GAP ANALYSIS PROJECT

The gap analysis methodology and report was produced through a multi-organization collaboration that consisted of Pennsylvania's State System of Higher Education Office of the Chancellor and Oxford Economics USA Inc. —the team. Throughout the project and research process, the team sought feedback and insight from senior administration and representatives from each of the 14 State System Universities. The team also drew on insight and feedback from Georgetown University's Center on Education and the Workforce as well as subject matter experts involved in labor market intelligence and education program alignment.

The modeling and results presented here are based on information provided by third parties, upon which Oxford Economics has relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

Oxford Economics is a key adviser to corporate, financial, government and education decision-makers and thought leaders. Oxford Economics' worldwide client base now comprises over 1000 international organizations, including leading multinational companies and financial institutions; key government bodies and trade associations; and top universities, consultancies, and think tanks.

This report is confidential to stakeholders of Pennsylvania's State System of Higher Education and may not be published or distributed without their prior written permission. Contact information for such request is provided below:

Dr. Sue Mukherjee

Executive Director for Program Alignment and Policy Development

Phone: (717) 720-4201

Email: SMukherjee@passhe.edu

8. DATA SOURCES KEY

Bureau of Labor Statistics (BLS):

- QCEW - Quarterly Census of Employment & Wages - <http://www.bls.gov/cew/>
- OES – Occupational Employment Statistics - <http://www.bls.gov/oes/>
- LAUS – Local Area Unemployment Statistics - <http://www.bls.gov/lau/>

U.S. Census Bureau (Census):

- LEHD – Longitudinal Employer-Household Dynamics - <http://lehd.census.gov/>
- ACS – American Community Survey - <http://www.census.gov/acs/www/>
- SAIPE – Small Area Income and Poverty Estimates - <http://www.census.gov/did/www/saipe/>

National Center for Education Statistics (NCES):

- IPEDS – Integrated Postsecondary Education Data System (National Center for Education Statistics) - <https://nces.ed.gov/ipeds/>

Pennsylvania Department of Labor and Industry (PADLI):

- www.paworkstats.pa.gov

O*NET Resource Center (O*NET)

- Job Zones – www.onetonline.org/help/online/zones

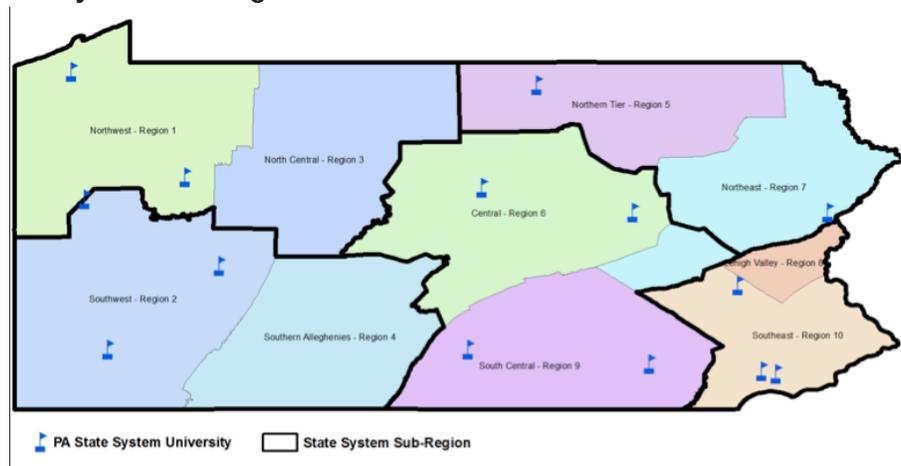
Economic Modeling Specialists International (EMSI)

APPENDIX A: STATE SYSTEM SUB-REGIONS WITH PREP REGIONS AND WIA REGIONS

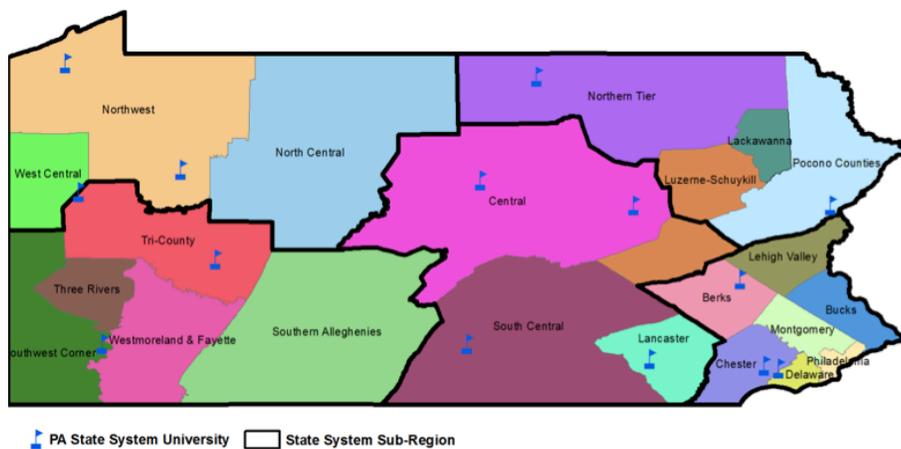
Partnerships for Regional Economic Performance (PREP) regions provide geographic context of how the Pennsylvania Department of Community & Economic Development divides resources and services to support business development, start-ups, investment and other economic development initiatives. To define sub-regions for this project, PREP regions served as the starting point. The following figures outline the sub-regions in relation to PREP regions.

An additional map of Pennsylvania's Workforce Investment Act (WIA) regional boundaries is also provided.

State System Sub-regions and PREP Boundaries



State System Sub-regions and WIA Boundaries



APPENDIX B: O*NET JOB ZONE CODES

The O*NET program is the nation's primary source of occupational information. Central to the project is the O*NET database, containing information on hundreds of standardized and occupation-specific descriptors. The database, which is available to the public at no cost, is continually updated by surveying a broad range of workers from each occupation.²⁰

JOB ZONE ONE: Little or No Preparation Needed

- *Education* – Some of these occupations may require a high school diploma or GED certificate.
- *Related Experience* – Little or no previous work-related skill, knowledge, or experience is needed for these occupations. For example, a person can become a waiter or waitress even if he/she has never worked before.
- *Job Training* – Employees in these occupations need anywhere from a few days to a few months of training. Usually, an experienced worker could show you how to do the job.
- *Job Zone Examples* – These occupations involve following instructions and helping others. Examples include taxi drivers, amusement and recreation attendants, counter and rental clerks, nonfarm animal caretakers, continuous mining machine operators, and waiters/waitresses.

JOB ZONE TWO: Some Preparation Needed

- *Education* – These occupations usually require a high school diploma.
- *Related Experience* – Some previous work-related skill, knowledge, or experience is usually needed. For example, a teller would benefit from experience working directly with the public.
- *Job Training* – Employees in these occupations need anywhere from a few months to one year of working with experienced employees. A recognized apprenticeship program may be associated with these occupations.

²⁰ <http://www.onetcenter.org/overview.html>

- *Job Zone Examples* – These occupations often involve using your knowledge and skills to help others. Examples include sheet metal workers, forest fire fighters, customer service representatives, physical therapist aides, salespersons (retail), and tellers.

JOB ZONE THREE: Medium Preparation Needed

- *Education* – Most occupations in this zone require training in vocational schools, related on-the-job experience, or an associate's degree.
- *Related Experience* – Previous work-related skill, knowledge, or experience is required for these occupations. For example, an electrician must have completed three or four years of apprenticeship or several years of vocational training, and often must have passed a licensing exam, in order to perform the job.
- *Job Training* – Employees in these occupations usually need one or two years of training involving both on-the-job experience and informal training with experienced workers. A recognized apprenticeship program may be associated with these occupations.
- *Job Zone Examples* – These occupations usually involve using communication and organizational skills to coordinate, supervise, manage, or train others to accomplish goals. Examples include food service managers, electricians, agricultural technicians, legal secretaries, occupational therapy assistants, and medical assistants.

JOB ZONE FOUR: Considerable Preparation Needed

- *Education* – Most of these occupations require a four-year bachelor's degree, but some do not.
- *Related Experience* – A considerable amount of work-related skill, knowledge, or experience is needed for these occupations. For example, an accountant must complete four years of college and work for several years in accounting to be considered qualified.
- *Job Training* – Employees in these occupations usually need several years of work-related experience, on-the-job training, and/or vocational training.
- *Job Zone Examples* – Many of these occupations involve coordinating, supervising, managing, or training others. Examples include accountants, sales managers, database administrators, teachers, chemists, art directors, and cost estimators.

JOB ZONE FIVE: Extensive Preparation Needed

- *Education* – Most of these occupations require graduate school. For example, they may require a master’s degree, and some require a Ph.D., M.D., or J.D. (law degree).
- *Related Experience* – Extensive skill, knowledge, and experience are needed for these occupations. Many require more than five years of experience. For example, surgeons must complete four years of college and an additional five to seven years of specialized medical training to be able to do their job.
- *Job Training* – Employees may need some on-the-job training, but most of these occupations assume that the person will already have the required skills, knowledge, work-related experience, and/or training.
- *Job Zone Examples* – These occupations often involve coordinating, training, supervising, or managing the activities of others to accomplish goals. Very advanced communication and organizational skills are required. Examples include librarians, lawyers, sports medicine physicians, wildlife biologists, school psychologists, surgeons, treasurers, and controllers.

APPENDIX C: STRONG, LIMITED AND WEAK EDUCATION PROGRAM TO OCCUPATION CONNECTIONS²¹

| | Direct Connection | Limited Connection | Weak Connection |
|----------|---|--|--|
| Surplus | Definitive surplus of graduates to projected demand; indicates strong market relationship between CIP and SOC(s) suggesting limited need for additional investments in program. | Apparent surplus of graduates in most related occupations. Likely intense competition for limited job opportunities. Moderate occupation ties require identification of special market links prior to added program investments. | Data indicates surplus of graduates likely, however the weak connection of the education program to specific occupations does not conform to traditional supply/demand data analysis. |
| Balanced | Balanced supply of graduates relative to demand. Job competition for newly minted graduates will be competitive, but opportunities in related occupations exist. | Apparent balanced supply of graduates relative to job demand in most related occupations. Data may be indeterminate relative to labor surplus or shortage situation. Added program review required to determine if greater labor market opportunities are present due to emerging or evolving occupations. | Data indicates balanced supply of graduates likely, but the weak connection to specific occupations does not conform to traditional supply/demand data analysis. Review occupational connections in CIP to SOC crosswalk to determine possible job market opportunities. |
| Gap | Definitive gap of completers relative to occupation demand. Data indicates likely shortages. Program is a strong candidate for additional resources and targeted recruitment efforts increase supply. | Apparent gap of graduates relative to job demand in at least one closely related occupation. Job opportunities may exist in at least one other related occupation. More research worthwhile to determine possible added occupation connections. | Data indicates gap of graduates likely, but weak connection to specific occupations does not conform to traditional supply/demand data analysis. Related jobs may exist but are not directly connected to the program. Review crosswalk for possible occupation links. |

21 The relationship matrix is drawn from: Labor Supply/Demand Analysis: Approaches and Concerns (2010) by Richard Froeschle formerly of the Texas Workforce Commission's Labor Market and Career Information (LMCI). While this context is important to know, Oxford Economics' methodology sought to minimize these issues by developing a crosswalk that uses real world education program to occupation matches through U.S. Census ACS data to more closely reflect the careers program completers actually enter into after graduation.

APPENDIX D: 4-DIGIT INDUSTRY EMPLOYMENT PROJECTIONS

The table below displays the employment numbers for industries at the four-digit NAICS level in SU's workforce region in 2010, 2014, and 2024. It also provides the detailed NAICS code, industry title, 2014 industry LQ, and projected job growth to 2024.

| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|--------------|--|------------|----------------|----------------|--------------------|
| Total | All Industries | 1.0 | 603,701 | 662,613 | 9.8% |
| 1111 | Oilseed and Grain Farming | 0.5 | 122 | 132 | 8.2% |
| 1112 | Vegetable and Melon Farming | 0.5 | 227 | 257 | 13.2% |
| 1113 | Fruit and Tree Nut Farming | 1.2 | 1,077 | 1,115 | 3.5% |
| 1114 | Greenhouse, Nursery, and Floriculture Production | 0.7 | 430 | 468 | 8.8% |
| 1119 | Other Crop Farming | 0.2 | 56 | 63 | 12.5% |
| 1121 | Cattle Ranching and Farming | 1.5 | 1,007 | 1,140 | 13.2% |
| 1122 | Hog and Pig Farming | 1.2 | 165 | 188 | 13.9% |
| 1123 | Poultry and Egg Production | 2.0 | 349 | 373 | 6.9% |
| 1124 | Sheep and Goat Farming | 0.8 | 5 | 6 | 20.0% |
| 1125 | Aquaculture | 1.7 | 47 | 53 | 12.8% |
| 1129 | Other Animal Production | 2.4 | 200 | 215 | 7.5% |
| 1131 | Timber Tract Operations | 0.3 | 8 | 11 | 37.5% |
| 1133 | Logging | 0.2 | 40 | 47 | 17.5% |
| 1142 | Hunting and Trapping | 1.6 | 13 | 3 | -76.9% |
| 1151 | Support Activities for Crop Production | 0.4 | 638 | 811 | 27.1% |
| 1152 | Support Activities for Animal Production | 1.7 | 205 | 243 | 18.5% |
| 1153 | Support Activities for Forestry | 0.4 | 26 | 34 | 30.8% |
| 2111 | Oil and Gas Extraction | 0.0 | 3 | 2 | -33.3% |
| 2121 | Coal Mining | 0.1 | 33 | 29 | -12.1% |
| 2123 | Nonmetallic Mineral Mining and Quarrying | 1.9 | 763 | 865 | 13.4% |
| 2131 | Support Activities for Mining | 0.1 | 111 | 141 | 27.0% |
| 2211 | Electric Power Generation, Transmission and Distribution | 0.9 | 1,852 | 1,687 | -8.9% |
| 2212 | Natural Gas Distribution | 0.7 | 345 | 361 | 4.6% |
| 2213 | Water, Sewage and Other Systems | 1.1 | 1,020 | 1,058 | 3.7% |

| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|------------|---|---------|-----------|-----------|--------------------|
| 2361 | Residential Building Construction | 1.0 | 2,809 | 3,452 | 22.9% |
| 2362 | Nonresidential Building Construction | 1.2 | 3,591 | 4,033 | 12.3% |
| 2371 | Utility System Construction | 1.4 | 2,836 | 3,806 | 34.2% |
| 2372 | Land Subdivision | 0.2 | 39 | 50 | 28.2% |
| 2373 | Highway, Street, and Bridge Construction | 0.7 | 1,235 | 1,481 | 19.9% |
| 2379 | Other Heavy and Civil Engineering Construction | 0.3 | 146 | 203 | 39.0% |
| 2381 | Foundation, Structure, and Building Exterior Contractors | 0.8 | 2,629 | 3,157 | 20.1% |
| 2382 | Building Equipment Contractors | 0.9 | 7,435 | 8,336 | 12.1% |
| 2383 | Building Finishing Contractors | 0.6 | 1,885 | 2,056 | 9.1% |
| 2389 | Other Specialty Trade Contractors | 1.2 | 2,965 | 3,507 | 18.3% |
| 3111 | Animal Food Manufacturing | 4.1 | 979 | 975 | -0.4% |
| 3112 | Grain and Oilseed Milling | 1.1 | 281 | 337 | 19.9% |
| 3113 | Sugar and Confectionery Product Manufacturing | 8.5 | 2,613 | 2,770 | 6.0% |
| 3114 | Fruit and Vegetable Preserving and Specialty Food Manufacturing | 2.5 | 1,864 | 1,796 | -3.6% |
| 3115 | Dairy Product Manufacturing | 2.5 | 1,510 | 1,431 | -5.2% |
| 3116 | Animal Slaughtering and Processing | 0.7 | 1,518 | 1,851 | 21.9% |
| 3118 | Bakeries and Tortilla Manufacturing | 1.6 | 2,068 | 2,072 | 0.2% |
| 3119 | Other Food Manufacturing | 5.2 | 4,301 | 4,591 | 6.7% |
| 3121 | Beverage Manufacturing | 0.7 | 575 | 659 | 14.6% |
| 3122 | Tobacco Manufacturing | 0.8 | 46 | 56 | 21.7% |
| 3131 | Fiber, Yarn, and Thread Mills | 0.3 | 36 | 20 | -44.4% |
| 3132 | Fabric Mills | 0.3 | 61 | 44 | -27.9% |
| 3133 | Textile and Fabric Finishing and Fabric Coating Mills | 0.6 | 80 | 71 | -11.3% |
| 3141 | Textile Furnishings Mills | 0.2 | 36 | 31 | -13.9% |
| 3149 | Other Textile Product Mills | 0.3 | 96 | 63 | -34.4% |
| 3151 | Apparel Knitting Mills | 0.3 | 17 | 14 | -17.6% |
| 3152 | Cut and Sew Apparel Manufacturing | 0.5 | 240 | 110 | -54.2% |
| 3159 | Apparel Accessories and Other Apparel Manufacturing | 0.3 | 16 | 8 | -50.0% |
| 3161 | Leather and Hide Tanning and Finishing | 8.2 | 161 | 194 | 20.5% |
| 3169 | Other Leather and Allied Product Manufacturing | 2.1 | 107 | 110 | 2.8% |
| 3211 | Sawmills and Wood Preservation | 0.9 | 341 | 436 | 27.9% |
| 3212 | Veneer, Plywood, and Engineered Wood Product Manufacturing | 0.5 | 156 | 193 | 23.7% |
| 3219 | Other Wood Product Manufacturing | 1.6 | 1,519 | 1,872 | 23.2% |
| 3221 | Pulp, Paper, and Paperboard Mills | 1.5 | 703 | 642 | -8.7% |
| 3222 | Converted Paper Product Manufacturing | 3.0 | 3,498 | 3,831 | 9.5% |
| 3231 | Printing and Related Support Activities | 2.2 | 4,346 | 3,974 | -8.6% |
| 3241 | Petroleum and Coal Products Manufacturing | 1.0 | 505 | 530 | 5.0% |
| 3251 | Basic Chemical Manufacturing | 0.1 | 86 | 79 | -8.1% |

| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|------------|--|---------|-----------|-----------|--------------------|
| 3252 | Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing | 0.1 | 54 | 43 | -20.4% |
| 3253 | Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing | 1.5 | 248 | 248 | 0.0% |
| 3254 | Pharmaceutical and Medicine Manufacturing | 0.2 | 268 | 276 | 3.0% |
| 3255 | Paint, Coating, and Adhesive Manufacturing | 0.2 | 57 | 61 | 7.0% |
| 3256 | Soap, Cleaning Compound, and Toilet Preparation Manufacturing | 0.7 | 344 | 294 | -14.5% |
| 3259 | Other Chemical Product and Preparation Manufacturing | 0.7 | 271 | 325 | 19.9% |
| 3261 | Plastics Product Manufacturing | 1.1 | 2,604 | 2,688 | 3.2% |
| 3262 | Rubber Product Manufacturing | 1.3 | 759 | 826 | 8.8% |
| 3271 | Clay Product and Refractory Manufacturing | 3.1 | 538 | 657 | 22.1% |
| 3272 | Glass and Glass Product Manufacturing | 1.8 | 656 | 704 | 7.3% |
| 3273 | Cement and Concrete Product Manufacturing | 1.7 | 1,314 | 1,482 | 12.8% |
| 3274 | Lime and Gypsum Product Manufacturing | 0.0 | 0 | 0 | 0.0% |
| 3279 | Other Nonmetallic Mineral Product Manufacturing | 0.6 | 193 | 233 | 20.7% |
| 3311 | Iron and Steel Mills and Ferroalloy Manufacturing | 1.2 | 484 | 382 | -21.1% |
| 3312 | Steel Product Manufacturing from Purchased Steel | 2.5 | 657 | 674 | 2.6% |
| 3313 | Alumina and Aluminum Production and Processing | 2.0 | 520 | 618 | 18.8% |
| 3314 | Nonferrous Metal (except Aluminum) Production and Processing | 1.0 | 276 | 290 | 5.1% |
| 3315 | Foundries | 1.2 | 648 | 650 | 0.3% |
| 3321 | Forging and Stamping | 1.5 | 672 | 650 | -3.3% |
| 3322 | Cutlery and Handtool Manufacturing | 1.3 | 214 | 223 | 4.2% |
| 3323 | Architectural and Structural Metals Manufacturing | 1.7 | 2,618 | 2,900 | 10.8% |
| 3324 | Boiler, Tank, and Shipping Container Manufacturing | 1.5 | 655 | 765 | 16.8% |
| 3325 | Hardware Manufacturing | 0.2 | 24 | 23 | -4.2% |
| 3326 | Spring and Wire Product Manufacturing | 1.3 | 240 | 209 | -12.9% |
| 3327 | Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing | 1.0 | 1,623 | 1,702 | 4.9% |
| 3328 | Coating, Engraving, Heat Treating, and Allied Activities | 1.0 | 604 | 615 | 1.8% |
| 3329 | Other Fabricated Metal Product Manufacturing | 1.2 | 1,519 | 1,461 | -3.8% |
| 3331 | Agriculture, Construction, and Mining Machinery Manufacturing | 3.0 | 3,292 | 3,411 | 3.6% |
| 3332 | Industrial Machinery Manufacturing | 1.3 | 608 | 543 | -10.7% |
| 3333 | Commercial and Service Industry Machinery Manufacturing | 0.4 | 150 | 138 | -8.0% |
| 3334 | Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing | 3.2 | 1,835 | 1,823 | -0.7% |
| 3335 | Metalworking Machinery Manufacturing | 1.8 | 1,471 | 1,528 | 3.9% |
| 3336 | Engine, Turbine, and Power Transmission Equipment Manufacturing | 3.3 | 1,461 | 1,241 | -15.1% |
| 3339 | Other General Purpose Machinery Manufacturing | 1.5 | 1,754 | 1,900 | 8.3% |
| 3341 | Computer and Peripheral Equipment Manufacturing | 0.0 | 24 | 26 | 8.3% |
| 3342 | Communications Equipment Manufacturing | 0.1 | 58 | 66 | 13.8% |
| 3343 | Audio and Video Equipment Manufacturing | 0.1 | 9 | 10 | 11.1% |

| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|------------|--|---------|-----------|-----------|--------------------|
| 3344 | Semiconductor and Other Electronic Component Manufacturing | 1.3 | 2,091 | 1,822 | -12.9% |
| 3345 | Navigational, Measuring, Electromedical, and Control Instruments Manufacturing | 0.1 | 233 | 161 | -30.9% |
| 3346 | Manufacturing and Reproducing Magnetic and Optical Media | 0.5 | 41 | 46 | 12.2% |
| 3351 | Electric Lighting Equipment Manufacturing | 0.6 | 133 | 117 | -12.0% |
| 3352 | Household Appliance Manufacturing | 0.8 | 215 | 236 | 9.8% |
| 3353 | Electrical Equipment Manufacturing | 0.9 | 563 | 565 | 0.4% |
| 3359 | Other Electrical Equipment and Component Manufacturing | 4.1 | 2,314 | 2,198 | -5.0% |
| 3361 | Motor Vehicle Manufacturing | 0.0 | 0 | 0 | 0.0% |
| 3362 | Motor Vehicle Body and Trailer Manufacturing | 0.4 | 239 | 307 | 28.5% |
| 3363 | Motor Vehicle Parts Manufacturing | 0.6 | 1,519 | 1,509 | -0.7% |
| 3364 | Aerospace Product and Parts Manufacturing | 0.8 | 1,699 | 2,152 | 26.7% |
| 3365 | Railroad Rolling Stock Manufacturing | 0.8 | 92 | 117 | 27.2% |
| 3369 | Other Transportation Equipment Manufacturing | 13.0 | 1,855 | 1,964 | 5.9% |
| 3371 | Household and Institutional Furniture and Kitchen Cabinet Manufacturing | 1.0 | 1,059 | 1,092 | 3.1% |
| 3372 | Office Furniture (including Fixtures) Manufacturing | 1.0 | 458 | 516 | 12.7% |
| 3379 | Other Furniture Related Product Manufacturing | 0.0 | 0 | 0 | 0.0% |
| 3391 | Medical Equipment and Supplies Manufacturing | 1.1 | 1,508 | 1,430 | -5.2% |
| 3399 | Other Miscellaneous Manufacturing | 0.8 | 1,028 | 1,029 | 0.1% |
| 4231 | Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers | 1.6 | 2,418 | 2,464 | 1.9% |
| 4232 | Furniture and Home Furnishing Merchant Wholesalers | 0.3 | 134 | 148 | 10.4% |
| 4233 | Lumber and Other Construction Materials Merchant Wholesalers | 0.8 | 755 | 829 | 9.8% |
| 4234 | Professional and Commercial Equipment and Supplies Merchant Wholesalers | 0.8 | 2,121 | 2,076 | -2.1% |
| 4235 | Metal and Mineral (except Petroleum) Merchant Wholesalers | 0.8 | 430 | 429 | -0.2% |
| 4236 | Household Appliances and Electrical and Electronic Goods Merchant Wholesalers | 0.7 | 939 | 950 | 1.2% |
| 4237 | Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers | 1.1 | 1,141 | 1,354 | 18.7% |
| 4238 | Machinery, Equipment, and Supplies Merchant Wholesalers | 1.0 | 3,053 | 3,409 | 11.7% |
| 4239 | Miscellaneous Durable Goods Merchant Wholesalers | 0.7 | 872 | 1,105 | 26.7% |
| 4241 | Paper and Paper Product Merchant Wholesalers | 1.0 | 532 | 509 | -4.3% |
| 4242 | Drugs and Druggists' Sundries Merchant Wholesalers | 0.5 | 444 | 464 | 4.5% |
| 4243 | Apparel, Piece Goods, and Notions Merchant Wholesalers | 0.1 | 86 | 77 | -10.5% |
| 4244 | Grocery and Related Product Merchant Wholesalers | 1.0 | 3,210 | 3,350 | 4.4% |
| 4245 | Farm Product Raw Material Merchant Wholesalers | 0.4 | 116 | 131 | 12.9% |
| 4246 | Chemical and Allied Products Merchant Wholesalers | 0.6 | 321 | 365 | 13.7% |
| 4247 | Petroleum and Petroleum Products Merchant Wholesalers | 0.5 | 237 | 205 | -13.5% |
| 4248 | Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers | 0.4 | 288 | 310 | 7.6% |
| 4249 | Miscellaneous Nondurable Goods Merchant Wholesalers | 0.7 | 1,045 | 976 | -6.6% |

| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|------------|--|---------|-----------|-----------|--------------------|
| 4251 | Wholesale Electronic Markets and Agents and Brokers | 0.7 | 2,805 | 2,723 | -2.9% |
| 4411 | Automobile Dealers | 1.2 | 6,059 | 7,151 | 18.0% |
| 4412 | Other Motor Vehicle Dealers | 0.9 | 572 | 660 | 15.4% |
| 4413 | Automotive Parts, Accessories, and Tire Stores | 0.8 | 1,992 | 2,218 | 11.3% |
| 4421 | Furniture Stores | 0.7 | 635 | 565 | -11.0% |
| 4422 | Home Furnishings Stores | 0.7 | 762 | 755 | -0.9% |
| 4431 | Electronics and Appliance Stores | 0.7 | 1,473 | 1,455 | -1.2% |
| 4441 | Building Material and Supplies Dealers | 0.9 | 4,420 | 4,885 | 10.5% |
| 4442 | Lawn and Garden Equipment and Supplies Stores | 1.3 | 836 | 919 | 9.9% |
| 4451 | Grocery Stores | 1.1 | 12,773 | 13,616 | 6.6% |
| 4452 | Specialty Food Stores | 1.0 | 963 | 1,059 | 10.0% |
| 4453 | Beer, Wine, and Liquor Stores | 1.2 | 868 | 970 | 11.8% |
| 4461 | Health and Personal Care Stores | 0.8 | 3,774 | 3,735 | -1.0% |
| 4471 | Gasoline Stations | 1.3 | 5,051 | 4,886 | -3.3% |
| 4481 | Clothing Stores | 0.7 | 3,323 | 3,145 | -5.4% |
| 4482 | Shoe Stores | 0.7 | 654 | 657 | 0.5% |
| 4483 | Jewelry, Luggage, and Leather Goods Stores | 0.8 | 514 | 548 | 6.6% |
| 4511 | Sporting Goods, Hobby, and Musical Instrument Stores | 0.9 | 2,196 | 2,216 | 0.9% |
| 4512 | Book Stores and News Dealers | 0.6 | 248 | 134 | -46.0% |
| 4521 | Department Stores | 0.8 | 4,600 | 3,867 | -15.9% |
| 4529 | Other General Merchandise Stores | 0.9 | 7,161 | 7,921 | 10.6% |
| 4531 | Florists | 1.2 | 318 | 273 | -14.2% |
| 4532 | Office Supplies, Stationery, and Gift Stores | 1.0 | 1,285 | 1,045 | -18.7% |
| 4533 | Used Merchandise Stores | 0.9 | 676 | 851 | 25.9% |
| 4539 | Other Miscellaneous Store Retailers | 1.1 | 1,489 | 1,637 | 9.9% |
| 4541 | Electronic Shopping and Mail-Order Houses | 0.9 | 1,267 | 1,268 | 0.1% |
| 4542 | Vending Machine Operators | 1.5 | 251 | 266 | 6.0% |
| 4543 | Direct Selling Establishments | 1.8 | 1,062 | 1,144 | 7.7% |
| 4811 | Scheduled Air Transportation | 0.2 | 304 | 267 | -12.2% |
| 4812 | Nonscheduled Air Transportation | 0.0 | 6 | 6 | 0.0% |
| 4832 | Inland Water Transportation | 0.2 | 29 | 38 | 31.0% |
| 4841 | General Freight Trucking | 2.6 | 11,121 | 13,057 | 17.4% |
| 4842 | Specialized Freight Trucking | 1.0 | 2,040 | 2,588 | 26.9% |
| 4851 | Urban Transit Systems | 0.2 | 238 | 239 | 0.4% |
| 4852 | Interurban and Rural Bus Transportation | 0.0 | 3 | 4 | 33.3% |
| 4853 | Taxi and Limousine Service | 0.2 | 57 | 58 | 1.8% |
| 4854 | School and Employee Bus Transportation | 2.9 | 3,127 | 3,531 | 12.9% |
| 4855 | Charter Bus Industry | 0.7 | 99 | 110 | 11.1% |

| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|------------|---|---------|-----------|-----------|--------------------|
| 4859 | Other Transit and Ground Passenger Transportation | 0.7 | 284 | 392 | 38.0% |
| 4862 | Pipeline Transportation of Natural Gas | 0.7 | 92 | 106 | 15.2% |
| 4869 | Other Pipeline Transportation | 0.2 | 9 | 8 | -11.1% |
| 4871 | Scenic and Sightseeing Transportation, Land | 1.0 | 61 | 55 | -9.8% |
| 4872 | Scenic and Sightseeing Transportation, Water | 0.4 | 28 | 36 | 28.6% |
| 4881 | Support Activities for Air Transportation | 0.2 | 191 | 238 | 24.6% |
| 4882 | Support Activities for Rail Transportation | 1.3 | 183 | 215 | 17.5% |
| 4884 | Support Activities for Road Transportation | 1.6 | 803 | 1,138 | 41.7% |
| 4885 | Freight Transportation Arrangement | 1.0 | 821 | 1,024 | 24.7% |
| 4889 | Other Support Activities for Transportation | 1.2 | 170 | 227 | 33.5% |
| 4911 | Postal Service | 1.1 | 2,901 | 2,249 | -22.5% |
| 4921 | Couriers and Express Delivery Services | 1.5 | 3,484 | 3,445 | -1.1% |
| 4922 | Local Messengers and Local Delivery | 0.6 | 139 | 156 | 12.2% |
| 4931 | Warehousing and Storage | 4.4 | 14,632 | 17,790 | 21.6% |
| 5111 | Newspaper, Periodical, Book, and Directory Publishers | 0.7 | 1,322 | 1,019 | -22.9% |
| 5112 | Software Publishers | 0.1 | 110 | 99 | -10.0% |
| 5121 | Motion Picture and Video Industries | 0.5 | 736 | 761 | 3.4% |
| 5122 | Sound Recording Industries | 0.2 | 16 | 15 | -6.3% |
| 5151 | Radio and Television Broadcasting | 0.9 | 833 | 848 | 1.8% |
| 5152 | Cable and Other Subscription Programming | 0.0 | 0 | 0 | 0.0% |
| 5171 | Wired Telecommunications Carriers | 0.7 | 1,925 | 1,644 | -14.6% |
| 5172 | Wireless Telecommunications Carriers (except Satellite) | 0.4 | 258 | 212 | -17.8% |
| 5174 | Satellite Telecommunications | 0.3 | 14 | 14 | 0.0% |
| 5179 | Other Telecommunications | 0.1 | 42 | 30 | -28.6% |
| 5182 | Data Processing, Hosting, and Related Services | 1.1 | 1,368 | 1,422 | 3.9% |
| 5191 | Other Information Services | 0.5 | 842 | 905 | 7.5% |
| 5221 | Depository Credit Intermediation | 0.9 | 6,994 | 6,898 | -1.4% |
| 5222 | Nondepository Credit Intermediation | 0.4 | 1,049 | 1,016 | -3.1% |
| 5223 | Activities Related to Credit Intermediation | 0.2 | 205 | 194 | -5.4% |
| 5231 | Securities and Commodity Contracts Intermediation and Brokerage | 0.3 | 576 | 686 | 19.1% |
| 5232 | Securities and Commodity Exchanges | 0.1 | 2 | 3 | 50.0% |
| 5239 | Other Financial Investment Activities | 0.4 | 746 | 1,074 | 44.0% |
| 5241 | Insurance Carriers | 2.1 | 11,128 | 10,239 | -8.0% |
| 5242 | Agencies, Brokerages, and Other Insurance Related Activities | 1.5 | 6,465 | 8,056 | 24.6% |
| 5251 | Insurance and Employee Benefit Funds | 0.0 | 0 | 0 | 0.0% |
| 5259 | Other Investment Pools and Funds | 21.7 | 338 | 410 | 21.3% |
| 5311 | Lessors of Real Estate | 0.5 | 1,260 | 1,269 | 0.7% |
| 5312 | Offices of Real Estate Agents and Brokers | 0.5 | 687 | 824 | 19.9% |

| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|------------|--|---------|-----------|-----------|--------------------|
| 5313 | Activities Related to Real Estate | 0.4 | 1,163 | 1,330 | 14.4% |
| 5321 | Automotive Equipment Rental and Leasing | 1.1 | 905 | 1,089 | 20.3% |
| 5322 | Consumer Goods Rental | 0.6 | 403 | 466 | 15.6% |
| 5323 | General Rental Centers | 1.2 | 200 | 225 | 12.5% |
| 5324 | Commercial and Industrial Machinery and Equipment Rental and Leasing | 0.7 | 469 | 619 | 32.0% |
| 5331 | Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) | 0.2 | 18 | 24 | 33.3% |
| 5411 | Legal Services | 0.7 | 3,436 | 3,543 | 3.1% |
| 5412 | Accounting, Tax Preparation, Bookkeeping, and Payroll Services | 0.6 | 2,675 | 3,006 | 12.4% |
| 5413 | Architectural, Engineering, and Related Services | 0.9 | 5,591 | 6,777 | 21.2% |
| 5414 | Specialized Design Services | 0.2 | 97 | 99 | 2.1% |
| 5415 | Computer Systems Design and Related Services | 0.7 | 5,540 | 7,842 | 41.6% |
| 5416 | Management, Scientific, and Technical Consulting Services | 0.6 | 3,508 | 3,978 | 13.4% |
| 5417 | Scientific Research and Development Services | 0.1 | 301 | 395 | 31.2% |
| 5418 | Advertising, Public Relations, and Related Services | 0.7 | 1,417 | 1,508 | 6.4% |
| 5419 | Other Professional, Scientific, and Technical Services | 0.8 | 2,234 | 2,489 | 11.4% |
| 5511 | Management of Companies and Enterprises | 1.4 | 13,179 | 16,189 | 22.8% |
| 5611 | Office Administrative Services | 0.1 | 222 | 290 | 30.6% |
| 5612 | Facilities Support Services | 0.6 | 390 | 553 | 41.8% |
| 5613 | Employment Services | 1.3 | 19,105 | 25,567 | 33.8% |
| 5614 | Business Support Services | 0.7 | 2,608 | 2,870 | 10.0% |
| 5615 | Travel Arrangement and Reservation Services | 0.6 | 495 | 583 | 17.8% |
| 5616 | Investigation and Security Services | 0.7 | 2,654 | 3,430 | 29.2% |
| 5617 | Services to Buildings and Dwellings | 0.8 | 7,100 | 8,918 | 25.6% |
| 5619 | Other Support Services | 1.4 | 1,889 | 2,509 | 32.8% |
| 5621 | Waste Collection | 0.9 | 629 | 771 | 22.6% |
| 5622 | Waste Treatment and Disposal | 1.4 | 732 | 820 | 12.0% |
| 5629 | Remediation and Other Waste Management Services | 0.8 | 451 | 474 | 5.1% |
| 6111 | Elementary and Secondary Schools | 0.9 | 30,861 | 29,160 | -5.5% |
| 6112 | Junior Colleges | 0.7 | 2,269 | 2,521 | 11.1% |
| 6113 | Colleges, Universities, and Professional Schools | 0.8 | 9,835 | 9,723 | -1.1% |
| 6114 | Business Schools and Computer and Management Training | 0.6 | 197 | 193 | -2.0% |
| 6115 | Technical and Trade Schools | 0.6 | 383 | 439 | 14.6% |
| 6116 | Other Schools and Instruction | 0.5 | 792 | 956 | 20.7% |
| 6117 | Educational Support Services | 0.5 | 350 | 496 | 41.7% |
| 6211 | Offices of Physicians | 1.0 | 10,710 | 12,763 | 19.2% |
| 6212 | Offices of Dentists | 0.8 | 3,294 | 3,849 | 16.8% |
| 6213 | Offices of Other Health Practitioners | 1.2 | 4,277 | 5,995 | 40.2% |
| 6214 | Outpatient Care Centers | 0.9 | 3,099 | 3,845 | 24.1% |

| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|------------|---|---------|-----------|-----------|--------------------|
| 6215 | Medical and Diagnostic Laboratories | 0.8 | 888 | 1,063 | 19.7% |
| 6216 | Home Health Care Services | 0.6 | 3,303 | 4,465 | 35.2% |
| 6219 | Other Ambulatory Health Care Services | 1.0 | 1,317 | 1,729 | 31.3% |
| 6221 | General Medical and Surgical Hospitals | 0.9 | 23,166 | 24,775 | 6.9% |
| 6222 | Psychiatric and Substance Abuse Hospitals | 0.7 | 709 | 921 | 29.9% |
| 6223 | Specialty (except Psychiatric and Substance Abuse) Hospitals | 1.6 | 1,778 | 2,219 | 24.8% |
| 6231 | Nursing Care Facilities (Skilled Nursing Facilities) | 0.9 | 6,766 | 7,425 | 9.7% |
| 6232 | Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities | 1.1 | 3,406 | 3,609 | 6.0% |
| 6233 | Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly | 1.8 | 6,903 | 8,482 | 22.9% |
| 6239 | Other Residential Care Facilities | 1.6 | 1,245 | 1,462 | 17.4% |
| 6241 | Individual and Family Services | 1.0 | 9,700 | 13,630 | 40.5% |
| 6242 | Community Food and Housing, and Emergency and Other Relief Services | 0.7 | 507 | 650 | 28.2% |
| 6243 | Vocational Rehabilitation Services | 0.7 | 1,019 | 1,413 | 38.7% |
| 6244 | Child Day Care Services | 1.1 | 3,934 | 4,862 | 23.6% |
| 7111 | Performing Arts Companies | 0.2 | 117 | 133 | 13.7% |
| 7112 | Spectator Sports | 0.7 | 416 | 416 | 0.0% |
| 7113 | Promoters of Performing Arts, Sports, and Similar Events | 0.4 | 225 | 258 | 14.7% |
| 7114 | Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures | 0.1 | 7 | 6 | -14.3% |
| 7115 | Independent Artists, Writers, and Performers | 0.5 | 115 | 133 | 15.7% |
| 7121 | Museums, Historical Sites, and Similar Institutions | 0.7 | 718 | 901 | 25.5% |
| 7131 | Amusement Parks and Arcades | 1.3 | 1,068 | 1,023 | -4.2% |
| 7132 | Gambling Industries | 2.6 | 3,057 | 3,899 | 27.5% |
| 7139 | Other Amusement and Recreation Industries | 1.0 | 5,657 | 6,351 | 12.3% |
| 7211 | Traveler Accommodation | 0.9 | 7,168 | 7,679 | 7.1% |
| 7212 | RV (Recreational Vehicle) Parks and Recreational Camps | 1.4 | 358 | 382 | 6.7% |
| 7213 | Rooming and Boarding Houses | 0.3 | 18 | 20 | 11.1% |
| 7223 | Special Food Services | 1.1 | 3,063 | 3,497 | 14.2% |
| 7224 | Drinking Places (Alcoholic Beverages) | 0.8 | 1,234 | 1,256 | 1.8% |
| 7225 | Restaurants and Other Eating Places | 0.8 | 35,453 | 39,810 | 12.3% |
| 8111 | Automotive Repair and Maintenance | 1.0 | 3,813 | 4,102 | 7.6% |
| 8112 | Electronic and Precision Equipment Repair and Maintenance | 2.9 | 1,295 | 1,551 | 19.8% |
| 8113 | Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance | 1.2 | 1,051 | 1,213 | 15.4% |
| 8114 | Personal and Household Goods Repair and Maintenance | 0.6 | 199 | 197 | -1.0% |
| 8121 | Personal Care Services | 1.1 | 3,295 | 3,670 | 11.4% |
| 8122 | Death Care Services | 1.2 | 710 | 822 | 15.8% |
| 8123 | Drycleaning and Laundry Services | 0.6 | 848 | 904 | 6.6% |
| 8129 | Other Personal Services | 0.5 | 694 | 901 | 29.8% |

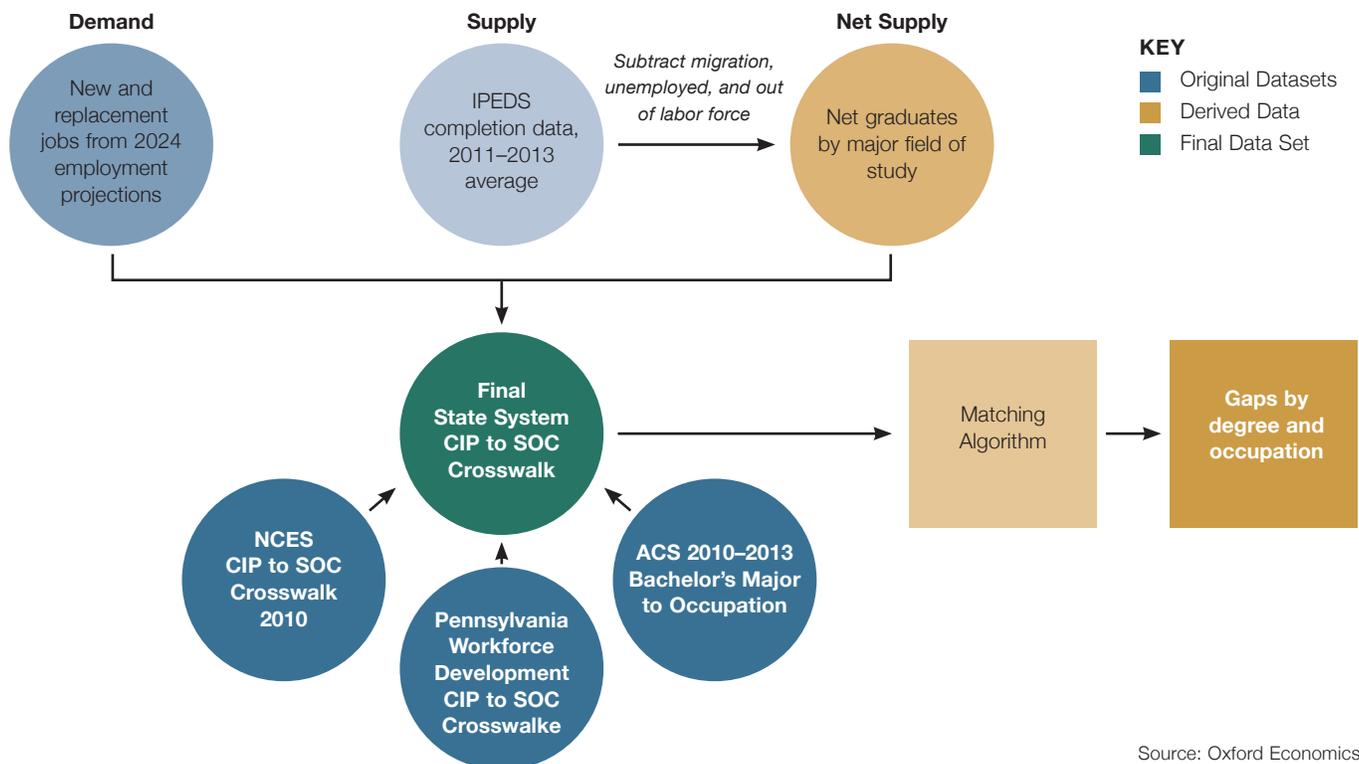
| NAICS Code | Industry Title | 2014 LQ | 2014 Jobs | 2024 Jobs | % Change 2014-2024 |
|-------------------|---|----------------|------------------|------------------|---------------------------|
| 8131 | Religious Organizations | 0.7 | 597 | 603 | 1.0% |
| 8132 | Grantmaking and Giving Services | 1.5 | 886 | 786 | -11.3% |
| 8133 | Social Advocacy Organizations | 0.8 | 757 | 800 | 5.7% |
| 8134 | Civic and Social Organizations | 2.5 | 4,397 | 4,475 | 1.8% |
| 8139 | Business, Professional, Labor, Political, and Similar Organizations | 1.6 | 3,051 | 3,163 | 3.7% |
| 8141 | Private Households | 0.2 | 258 | 240 | -7.0% |
| 9211 | Executive, Legislative, and Other General Government Support | 1.3 | 17,467 | 16,314 | -6.6% |
| 9221 | Justice, Public Order, and Safety Activities | 0.9 | 7,353 | 7,312 | -0.6% |
| 9231 | Administration of Human Resource Programs | 1.3 | 4,478 | 4,206 | -6.1% |
| 9241 | Administration of Environmental Quality Programs | 1.6 | 2,249 | 2,315 | 2.9% |
| 9251 | Administration of Housing Programs, Urban Planning, and Community Development | 1.4 | 515 | 534 | 3.7% |
| 9261 | Administration of Economic Programs | 1.8 | 4,631 | 4,576 | -1.2% |
| 9281 | National Security and International Affairs | 3.4 | 8,621 | 7,731 | -10.3% |

Source: BLS (QCEW and OES); Pennsylvania Department of Labor & Industry; Oxford Economics Projections

APPENDIX E: METHODOLOGY

The data-driven process involved in developing this gap analysis required multiple steps including compiling education output and forecasting occupation demand. Broadly speaking, supply-side educational completion data were assembled at the program level for State System Universities as well as other institutions within Pennsylvania. A three-year average was used to mitigate year-to-year variability in completions. A mapping analysis, known as a crosswalk, was developed looking at education programs and occupations and using a combination of the National Center for Education Statistics' (NCES) and US Census American Community Survey (ACS) data. The crosswalk was applied to occupation demand projections, which were produced by Oxford Economics and updated to 2014-2024, to calculate both new and replacement jobs. Linking annual program completions (supply) and annual occupation

Fig. 36: Summary of Gap Analysis Methodology

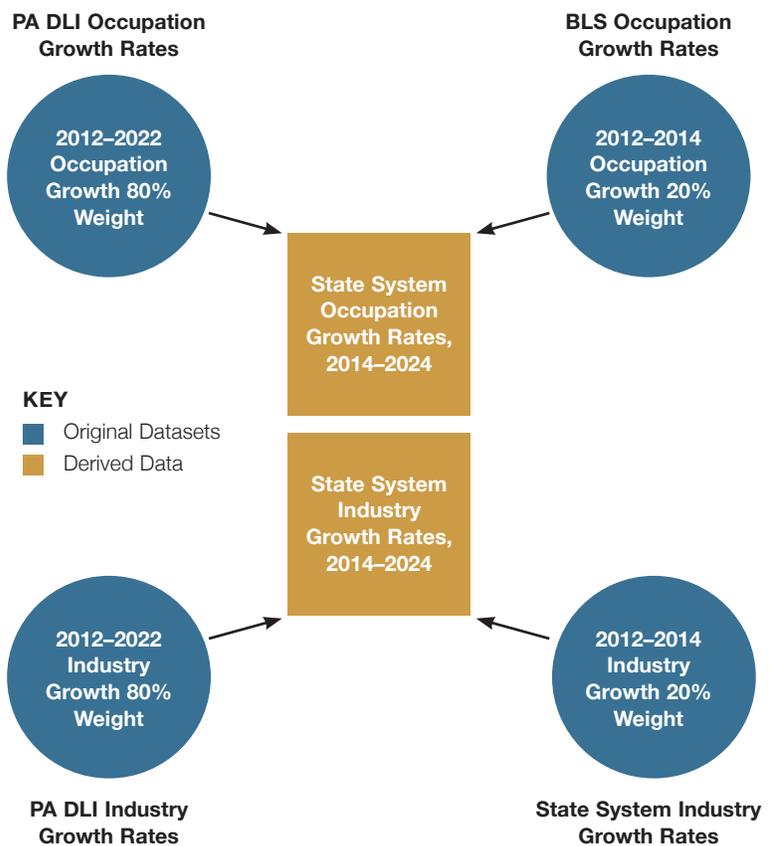


Source: Oxford Economics

projections (demand) enabled the calculation of the difference between the two, providing an insight into potential workforce gaps and surpluses for educational institutions to consider. Fig. 36 provides a high-level flow chart of the process to calculate gaps/surpluses.

A primary goal of the research was to produce updated forecasts for industries and occupations at the county level for Pennsylvania. Fig. 37 provides a summary of the growth rate calculations used in the forecasts.

Fig. 37: Summary of Growth Rate Calculations



APPENDIX F: GAP ANALYSIS RESULTS

The following table provides the results of the gap analysis for all detailed occupations in SU's workforce region. The following information is provided in the table below:

- A description of the occupation – SOC Code and occupation title.
- A description of the level of the occupation – Job Zone.
- Gap indicator with the following color codes:
 - Green = Projected excess employer demand
 - Purple = Projected excess demand at specific degree level
 - Yellow = Projected balance
 - Blue = Projected supply surplus
- Average annual supply, demand, and gap number for each occupation and the detailed degree level supply, demand, and gap number for each occupation.
- The ratio of average annual supply to average annual demand (S/D Ratio).

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual Demand | Average Annual Supply | Average Annual Gap | S/D Ratio | Associate Demand | Associate Supply | Associate Gap | Bachelor Demand | Bachelor Supply | Bachelor Gap | Graduate Demand | Graduate Supply | Graduate Gap |
|-----------------|--|----------|---------------|-----------------------|-----------------------|--------------------|-----------|------------------|------------------|---------------|-----------------|-----------------|--------------|-----------------|-----------------|--------------|
| 11-1011 | Chief Executives | 5 | | 19 | 10 | 9 | 0.53 | 0 | 0 | 0 | 16 | 7 | 9 | 3 | 3 | 0 |
| 11-1021 | General and Operations Managers | 4 | | 158 | 91 | 67 | 0.58 | 0 | 0 | 0 | 120 | 48 | 72 | 38 | 43 | -5 |
| 11-2021 | Marketing Managers | 4 | | 15 | 13 | 2 | 0.87 | 0 | 0 | 0 | 13 | 11 | 2 | 2 | 2 | 0 |
| 11-2022 | Sales Managers | 4 | | 19 | 16 | 3 | 0.84 | 0 | 0 | 0 | 16 | 14 | 2 | 3 | 2 | 1 |
| 11-2031 | Public Relations and Fundraising Managers | 4 | | 1 | 2 | -1 | 2.00 | 0 | 0 | 0 | 1 | 2 | -1 | 0 | 0 | 0 |
| 11-3011 | Administrative Services Managers | 3 | | 6 | 2 | 4 | 0.33 | 0 | 0 | 0 | 6 | 2 | 4 | 0 | 0 | 0 |
| 11-3021 | Computer and Information Systems Managers | 4 | | 43 | 23 | 20 | 0.53 | 0 | 0 | 0 | 26 | 9 | 17 | 17 | 14 | 3 |
| 11-3031 | Financial Managers | 4 | | 22 | 14 | 8 | 0.64 | 0 | 0 | 0 | 14 | 6 | 8 | 8 | 8 | 0 |
| 11-3051 | Industrial Production Managers | 4 | | 13 | 6 | 7 | 0.46 | 0 | 0 | 0 | 11 | 5 | 6 | 2 | 2 | 0 |
| 11-3061 | Purchasing Managers | 4 | | 3 | 1 | 2 | 0.33 | 0 | 0 | 0 | 3 | 1 | 2 | 0 | 0 | 0 |
| 11-3071 | Transportation, Storage, and Distribution Managers | 4 | | 9 | 4 | 5 | 0.44 | 0 | 0 | 0 | 9 | 4 | 5 | 0 | 0 | 0 |
| 11-3121 | Human Resources Managers | 4 | | 12 | 9 | 3 | 0.75 | 0 | 0 | 0 | 6 | 3 | 3 | 6 | 6 | 0 |
| 11-3131 | Training and Development Managers | 4 | | 4 | 3 | 1 | 0.75 | 0 | 0 | 0 | 2 | 1 | 1 | 2 | 2 | 0 |
| 11-9021 | Construction Managers | 4 | | 15 | 5 | 10 | 0.33 | 0 | 0 | 0 | 15 | 5 | 10 | 0 | 0 | 0 |
| 11-9031 | Education Administrators, Preschool and Childcare Center/Program | 4 | | 9 | 7 | 2 | 0.78 | 0 | 0 | 0 | 3 | 1 | 2 | 7 | 5 | 2 |
| 11-9032 | Education Administrators, Elementary and Secondary School | 5 | | 20 | 20 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 20 | 0 |
| 11-9033 | Education Administrators, Postsecondary | 5 | | 9 | 7 | 2 | 0.78 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 7 | 2 |
| 11-9039 | Education Administrators, All Other | 5 | | 2 | 2 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| 11-9041 | Architectural and Engineering Managers | 5 | | 18 | 9 | 9 | 0.50 | 0 | 0 | 0 | 10 | 3 | 7 | 8 | 6 | 2 |
| 11-9051 | Food Service Managers | 3 | | 8 | 28 | -20 | 3.50 | 3 | 26 | -23 | 5 | 2 | 3 | 0 | 0 | 0 |
| 11-9061 | Funeral Service Managers | 3 | | 1 | 0 | 1 | 0.00 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 11-9071 | Gaming Managers | 3 | | 2 | 1 | 1 | 0.50 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 |
| 11-9081 | Lodging Managers | 3 | | 4 | 2 | 2 | 0.50 | 0 | 0 | 0 | 4 | 2 | 2 | 0 | 0 | 0 |
| 11-9111 | Medical and Health Services Managers | 5 | | 30 | 33 | -3 | 1.10 | 0 | 0 | 0 | 18 | 7 | 11 | 12 | 26 | -14 |
| 11-9121 | Natural Sciences Managers | 5 | | 2 | 3 | -1 | 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | -1 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual | | S/D Ratio | Associate | | Bachelor | | Graduate | |
|-----------------|--|----------|---------------|----------------|--------|-----------|-----------|--------|----------|--------|----------|--------|
| | | | | Demand | Supply | | Demand | Supply | Demand | Supply | Demand | Supply |
| 11-9141 | Property, Real Estate, and Community Association Managers | 4 | | 7 | 3 | 4 | 0 | 0 | 7 | 3 | 4 | 0 |
| 11-9151 | Social and Community Service Managers | 4 | | 20 | 22 | -2 | 0 | 0 | 11 | 12 | -1 | 9 |
| 11-9199 | Managers, All Other | 4 | | 19 | 32 | -13 | 0 | 0 | 14 | 27 | -13 | 4 |
| 13-1022 | Wholesale and Retail Buyers, Except Farm Products | 3 | | 9 | 5 | 4 | 0 | 0 | 9 | 5 | 4 | 0 |
| 13-1023 | Purchasing Agents, Except Wholesale, Retail, and Farm Products | 4 | | 23 | 9 | 14 | 0 | 0 | 23 | 9 | 14 | 0 |
| 13-1031 | Claims Adjusters, Examiners, and Investigators | 4 | | 43 | 17 | 26 | 0 | 0 | 43 | 17 | 26 | 0 |
| 13-1032 | Insurance Appraisers, Auto Damage | 3 | | 4 | 2 | 2 | 0 | 0 | 4 | 2 | 2 | 0 |
| 13-1041 | Compliance Officers | 4 | | 27 | 11 | 16 | 0 | 0 | 27 | 11 | 16 | 0 |
| 13-1051 | Cost Estimators | 4 | | 38 | 13 | 25 | 0 | 0 | 38 | 13 | 25 | 0 |
| 13-1071 | Human Resources Specialists | 4 | | 84 | 48 | 36 | 0 | 0 | 59 | 23 | 36 | 25 |
| 13-1075 | Labor Relations Specialists | 4 | | 2 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 0 |
| 13-1081 | Logisticians | 4 | | 18 | 8 | 10 | 0 | 0 | 18 | 8 | 10 | 0 |
| 13-1111 | Management Analysts | 4 | | 54 | 33 | 21 | 0 | 0 | 28 | 11 | 17 | 26 |
| 13-1121 | Meeting, Convention, and Event Planners | 4 | | 11 | 17 | -6 | 0 | 0 | 11 | 17 | -6 | 0 |
| 13-1131 | Fundraisers | 4 | | 13 | 5 | 8 | 0 | 0 | 6 | 3 | 3 | 6 |
| 13-1141 | Compensation, Benefits, and Job Analysis Specialists | 4 | | 5 | 2 | 3 | 0 | 0 | 5 | 2 | 3 | 0 |
| 13-1151 | Training and Development Specialists | 4 | | 21 | 9 | 12 | 0 | 0 | 21 | 9 | 12 | 0 |
| 13-1161 | Market Research Analysts and Marketing Specialists | 4 | | 56 | 30 | 26 | 0 | 0 | 56 | 30 | 26 | 0 |
| 13-1199 | Business Operations Specialists, All Other | 4 | | 8 | 3 | 5 | 0 | 0 | 6 | 2 | 4 | 2 |
| 13-2011 | Accountants and Auditors | 4 | | 231 | 80 | 151 | 0 | 0 | 185 | 79 | 106 | 46 |
| 13-2021 | Appraisers and Assessors of Real Estate | 4 | | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 13-2031 | Budget Analysts | 4 | | 13 | 3 | 10 | 0 | 0 | 8 | 3 | 5 | 6 |
| 13-2041 | Credit Analysts | 4 | | 10 | 2 | 8 | 0 | 0 | 6 | 2 | 4 | 4 |
| 13-2051 | Financial Analysts | 4 | | 45 | 14 | 31 | 0 | 0 | 32 | 13 | 19 | 13 |
| 13-2052 | Personal Financial Advisors | 4 | | 27 | 10 | 17 | 0 | 0 | 23 | 10 | 13 | 4 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual Demand | Average Annual Supply | Average Annual Gap | S/D Ratio | Associate Demand | Associate Supply | Associate Gap | Bachelor Demand | Bachelor Supply | Bachelor Gap | Graduate Demand | Graduate Supply | Graduate Gap |
|-----------------|--|----------|---------------|-----------------------|-----------------------|--------------------|-----------|------------------|------------------|---------------|-----------------|-----------------|--------------|-----------------|-----------------|--------------|
| 13-2053 | Insurance Underwriters | 4 | | 25 | 10 | 15 | 0.40 | 0 | 0 | 0 | 25 | 10 | 15 | 0 | 0 | 0 |
| 13-2061 | Financial Examiners | 4 | | 6 | 2 | 4 | 0.33 | 0 | 0 | 0 | 4 | 2 | 2 | 2 | 0 | 2 |
| 13-2071 | Credit Counselors | 4 | | 5 | 2 | 3 | 0.40 | 0 | 0 | 0 | 5 | 2 | 3 | 0 | 0 | 0 |
| 13-2072 | Loan Officers | 3 | | 22 | 9 | 13 | 0.41 | 0 | 0 | 0 | 22 | 9 | 13 | 0 | 0 | 0 |
| 13-2081 | Tax Examiners and Collectors, and Revenue Agents | 3 | | 10 | 4 | 6 | 0.40 | 0 | 0 | 0 | 10 | 4 | 6 | 0 | 0 | 0 |
| 13-2082 | Tax Preparers | 3 | | 1 | 1 | 0 | 1.00 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 13-2099 | Financial Specialists, All Other | 4 | | 1 | 0 | 1 | 0.00 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 15-1121 | Computer Systems Analysts | 4 | | 122 | 33 | 89 | 0.27 | 0 | 0 | 0 | 92 | 26 | 66 | 30 | 7 | 23 |
| 15-1122 | Information Security Analysts | 4 | | 12 | 3 | 9 | 0.25 | 0 | 0 | 0 | 8 | 2 | 6 | 4 | 1 | 3 |
| 15-1131 | Computer Programmers | 4 | | 93 | 24 | 69 | 0.26 | 0 | 0 | 0 | 72 | 19 | 53 | 22 | 4 | 18 |
| 15-1132 | Software Developers, Applications | 4 | | 77 | 21 | 56 | 0.27 | 0 | 0 | 0 | 77 | 21 | 56 | 0 | 0 | 0 |
| 15-1133 | Software Developers, Systems Software | 4 | | 7 | 2 | 5 | 0.29 | 0 | 0 | 0 | 7 | 2 | 5 | 0 | 0 | 0 |
| 15-1134 | Web Developers | 3 | | 13 | 3 | 10 | 0.23 | 0 | 0 | 0 | 13 | 3 | 10 | 0 | 0 | 0 |
| 15-1141 | Database Administrators | 4 | | 19 | 5 | 14 | 0.26 | 0 | 0 | 0 | 14 | 4 | 10 | 5 | 1 | 4 |
| 15-1142 | Network and Computer Systems Administrators | 4 | | 16 | 4 | 12 | 0.25 | 0 | 0 | 0 | 12 | 3 | 9 | 4 | 1 | 3 |
| 15-1143 | Computer Network Architects | 4 | | 11 | 3 | 8 | 0.27 | 0 | 0 | 0 | 7 | 2 | 5 | 3 | 1 | 2 |
| 15-1151 | Computer User Support Specialists | 3 | | 68 | 73 | -5 | 1.07 | 18 | 60 | -42 | 50 | 13 | 37 | 0 | 0 | 0 |
| 15-1152 | Computer Network Support Specialists | 4 | | 9 | 116 | -107 | 12.89 | 2 | 114 | -112 | 5 | 1 | 4 | 2 | 0 | 2 |
| 15-1199 | Computer Occupations, All Other | 4 | | 23 | 6 | 17 | 0.26 | 0 | 0 | 0 | 18 | 5 | 13 | 5 | 1 | 4 |
| 15-2011 | Actuaries | 4 | | 10 | 12 | -2 | 1.20 | 0 | 0 | 0 | 6 | 7 | -1 | 4 | 5 | -1 |
| 15-2031 | Operations Research Analysts | 5 | | 9 | 6 | 3 | 0.67 | 0 | 0 | 0 | 6 | 2 | 4 | 3 | 3 | 0 |
| 15-2041 | Statisticians | 5 | | 9 | 11 | -2 | 1.22 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 11 | -2 |
| 17-1022 | Surveyors | 4 | | 5 | 7 | -2 | 1.40 | 0 | 0 | 0 | 5 | 7 | -2 | 0 | 0 | 0 |
| 17-2011 | Aerospace Engineers | 4 | | 3 | 1 | 2 | 0.33 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 1 |
| 17-2031 | Biomedical Engineers | 4 | | 1 | 0 | 1 | 0.00 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 17-2041 | Chemical Engineers | 4 | | 2 | 1 | 1 | 0.50 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 |
| 17-2051 | Civil Engineers | 4 | | 43 | 13 | 30 | 0.30 | 0 | 0 | 0 | 43 | 13 | 30 | 0 | 0 | 0 |
| 17-2071 | Electrical Engineers | 4 | | 30 | 7 | 23 | 0.23 | 0 | 0 | 0 | 17 | 5 | 12 | 13 | 2 | 11 |
| 17-2081 | Environmental Engineers | 5 | | 16 | 5 | 11 | 0.31 | 0 | 0 | 0 | 10 | 3 | 7 | 6 | 3 | 3 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual | | S/D Ratio | Associate | | Bachelor | | Graduate | | |
|-----------------|--|----------|---------------|----------------|--------|-----------|-----------|--------|----------|--------|----------|--------|-----|
| | | | | Demand | Supply | | Demand | Supply | Demand | Supply | Demand | Supply | Gap |
| 17-2111 | Health and Safety Engineers, Except Mining Safety Engineers and Inspectors | 4 | | 3 | 1 | 2 | 0 | 0 | 3 | 1 | 2 | 0 | 0 |
| 17-2112 | Industrial Engineers | 4 | | 27 | 8 | 19 | 0 | 0 | 27 | 8 | 19 | 0 | 0 |
| 17-2131 | Materials Engineers | 4 | | 5 | 1 | 4 | 0 | 0 | 5 | 1 | 4 | 0 | 0 |
| 17-2141 | Mechanical Engineers | 4 | | 38 | 11 | 27 | 0 | 0 | 38 | 11 | 27 | 0 | 0 |
| 17-2161 | Nuclear Engineers | 4 | | 6 | 2 | 4 | 0 | 0 | 6 | 2 | 4 | 0 | 0 |
| 17-2199 | Engineers, All Other | 4 | | 18 | 5 | 13 | 0 | 0 | 10 | 3 | 7 | 8 | 2 |
| 17-3011 | Architectural and Civil Drafters | 4 | | 7 | 42 | -35 | 7 | 42 | 0 | 0 | 0 | 0 | 0 |
| 17-3013 | Mechanical Drafters | 3 | | 2 | 10 | -8 | 2 | 10 | 0 | 0 | 0 | 0 | 0 |
| 17-3022 | Civil Engineering Technicians | 3 | | 6 | 10 | -4 | 3 | 9 | 3 | 1 | 2 | 0 | 0 |
| 17-3025 | Environmental Engineering Technicians | 4 | | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 17-3026 | Industrial Engineering Technicians | 3 | | 3 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 0 | 0 |
| 17-3027 | Mechanical Engineering Technicians | 3 | | 4 | 14 | -10 | 2 | 13 | 2 | 1 | 1 | 0 | 0 |
| 17-3029 | Engineering Technicians, Except Drafters, All Other | 3 | | 10 | 45 | -35 | 5 | 44 | 5 | 2 | 3 | 0 | 0 |
| 17-3031 | Surveying and Mapping Technicians | 3 | | 4 | 1 | 3 | 4 | 1 | 3 | 0 | 0 | 0 | 0 |
| 19-1012 | Food Scientists and Technologists | 4 | | 3 | 4 | -1 | 0 | 0 | 3 | 4 | -1 | 0 | 0 |
| 19-1021 | Biochemists and Biophysicists | 5 | | 1 | 2 | -1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| 19-1022 | Microbiologists | 5 | | 3 | 5 | -2 | 0 | 0 | 2 | 2 | 0 | 2 | 3 |
| 19-1031 | Conservation Scientists | 4 | | 3 | 3 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 |
| 19-1042 | Medical Scientists, Except Epidemiologists | 5 | | 9 | 11 | -2 | 0 | 0 | 0 | 0 | 0 | 9 | 11 |
| 19-2031 | Chemists | 4 | | 6 | 8 | -2 | 0 | 0 | 6 | 8 | -2 | 0 | 0 |
| 19-2041 | Environmental Scientists and Specialists, Including Health | 4 | | 14 | 22 | -8 | 0 | 0 | 8 | 18 | -10 | 6 | 4 |
| 19-2042 | Geoscientists, Except Hydrologists and Geographers | 4 | | 2 | 5 | -3 | 0 | 0 | 2 | 5 | -3 | 0 | 0 |
| 19-3031 | Clinical, Counseling, and School Psychologists | 5 | | 16 | 17 | -1 | 0 | 0 | 0 | 0 | 0 | 16 | 17 |
| 19-3039 | Psychologists, All Other | 5 | | 3 | 4 | -1 | 0 | 0 | 0 | 0 | 0 | 3 | 4 |
| 19-4021 | Biological Technicians | 4 | | 6 | 8 | -2 | 0 | 0 | 6 | 8 | -2 | 0 | 0 |
| 19-4031 | Chemical Technicians | 3 | | 10 | 6 | 4 | 0 | 0 | 10 | 6 | 4 | 0 | 0 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual | | S/D Ratio | Associate | | Bachelor | | Graduate | |
|-----------------|--|----------|---------------|----------------|--------|-----------|-----------|--------|----------|--------|----------|--------|
| | | | | Demand | Supply | | Demand | Supply | Demand | Supply | Demand | Supply |
| 19-4061 | Social Science Research Assistants | 4 | | 2 | 2 | 1.00 | 0 | 0 | 2 | 2 | 0 | 0 |
| 19-4091 | Environmental Science and Protection Technicians, Including Health | 4 | | 11 | 19 | 1.73 | 0 | 0 | 9 | 17 | -8 | 2 |
| 19-4093 | Forest and Conservation Technicians | 3 | | 2 | 3 | 1.50 | 0 | 0 | 2 | 3 | -1 | 0 |
| 19-4099 | Life, Physical, and Social Science Technicians, All Other | 3 | | 7 | 9 | 1.29 | 0 | 0 | 7 | 9 | -2 | 0 |
| 21-1011 | Substance Abuse and Behavioral Disorder Counselors | 5 | | 12 | 6 | 0.50 | 0 | 0 | 5 | 5 | 0 | 8 |
| 21-1012 | Educational, Guidance, School, and Vocational Counselors | 5 | | 22 | 44 | 2.00 | 0 | 0 | 0 | 0 | 0 | 22 |
| 21-1013 | Marriage and Family Therapists | 5 | | 5 | 1 | 0.20 | 0 | 0 | 0 | 0 | 0 | 5 |
| 21-1014 | Mental Health Counselors | 5 | | 26 | 3 | 0.12 | 0 | 0 | 0 | 0 | 0 | 26 |
| 21-1015 | Rehabilitation Counselors | 5 | | 31 | 4 | 0.13 | 0 | 0 | 0 | 0 | 0 | 31 |
| 21-1019 | Counselors, All Other | 5 | | 2 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 2 |
| 21-1021 | Child, Family, and School Social Workers | 4 | | 58 | 47 | 0.81 | 0 | 0 | 39 | 44 | -5 | 19 |
| 21-1022 | Healthcare Social Workers | 5 | | 30 | 4 | 0.13 | 0 | 0 | 0 | 0 | 0 | 30 |
| 21-1023 | Mental Health and Substance Abuse Social Workers | 5 | | 37 | 29 | 0.78 | 0 | 0 | 24 | 28 | -4 | 12 |
| 21-1029 | Social Workers, All Other | 5 | | 2 | 3 | 1.50 | 0 | 0 | 2 | 3 | -1 | 0 |
| 21-1091 | Health Educators | 4 | | 7 | 8 | 1.14 | 0 | 0 | 5 | 5 | 0 | 2 |
| 21-1092 | Probation Officers and Correctional Treatment Specialists | 4 | | 20 | 18 | 0.90 | 0 | 0 | 14 | 17 | -3 | 6 |
| 21-1093 | Social and Human Service Assistants | 4 | | 38 | 75 | 1.97 | 8 | 41 | 30 | 33 | -33 | 0 |
| 21-2011 | Clergy | 5 | | 5 | 24 | 4.80 | 0 | 0 | 2 | 9 | -7 | 3 |
| 21-2021 | Directors, Religious Activities and Education | 4 | | 5 | 8 | 1.60 | 0 | 0 | 5 | 8 | -3 | 0 |
| 23-1011 | Lawyers | 5 | | 53 | 140 | 2.64 | 0 | 0 | 0 | 0 | 0 | 53 |
| 23-1012 | Judicial Law Clerks | 5 | | 4 | 11 | 2.75 | 0 | 0 | 0 | 0 | 0 | 4 |
| 23-1021 | Administrative Law Judges, Adjudicators, and Hearing Officers | 5 | | 1 | 3 | 3.00 | 0 | 0 | 0 | 0 | 0 | 1 |
| 23-1022 | Arbitrators, Mediators, and Conciliators | 5 | | 1 | 4 | 4.00 | 0 | 0 | 0 | 0 | 0 | 1 |
| 23-2011 | Paralegals and Legal Assistants | 3 | | 23 | 89 | 3.87 | 3 | 61 | 20 | 28 | -58 | 0 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual | | S/D Ratio | Associate | | Bachelor | | Graduate | | | |
|-----------------|--|----------|---------------|----------------|--------|-----------|-----------|--------|----------|--------|----------|--------|-----|-----|
| | | | | Demand | Supply | | Demand | Supply | Demand | Supply | Demand | Supply | Gap | Gap |
| 23-2091 | Court Reporters | 3 | | 2 | 3 | 1.50 | 0 | 0 | 2 | 3 | -1 | 0 | 0 | 0 |
| 23-2093 | Title Examiners, Abstractors, and Searchers | 3 | | 3 | 4 | 1.33 | 0 | 0 | 3 | 4 | -1 | 0 | 0 | 0 |
| 25-1011 | Business Teachers, Postsecondary | 5 | | 10 | 11 | 1.10 | 0 | 0 | 0 | 0 | 0 | 10 | 11 | -1 |
| 25-1021 | Computer Science Teachers, Postsecondary | 5 | | 6 | 1 | 0.17 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 5 |
| 25-1022 | Mathematical Science Teachers, Postsecondary | 5 | | 6 | 1 | 0.17 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 5 |
| 25-1031 | Architecture Teachers, Postsecondary | 5 | | 1 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 25-1032 | Engineering Teachers, Postsecondary | 5 | | 8 | 3 | 0.38 | 0 | 0 | 0 | 0 | 0 | 8 | 3 | 5 |
| 25-1042 | Biological Science Teachers, Postsecondary | 5 | | 5 | 8 | 1.60 | 0 | 0 | 0 | 0 | 0 | 5 | 8 | -3 |
| 25-1051 | Atmospheric, Earth, Marine, and Space Sciences Teachers, Postsecondary | 5 | | 1 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 25-1052 | Chemistry Teachers, Postsecondary | 5 | | 3 | 1 | 0.33 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 2 |
| 25-1054 | Physics Teachers, Postsecondary | 5 | | 2 | 1 | 0.50 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 |
| 25-1061 | Anthropology and Archeology Teachers, Postsecondary | 5 | | 2 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| 25-1063 | Economics Teachers, Postsecondary | 5 | | 3 | 1 | 0.33 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 2 |
| 25-1065 | Political Science Teachers, Postsecondary | 5 | | 2 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| 25-1066 | Psychology Teachers, Postsecondary | 5 | | 5 | 6 | 1.20 | 0 | 0 | 0 | 0 | 0 | 5 | 6 | -1 |
| 25-1067 | Sociology Teachers, Postsecondary | 5 | | 4 | 1 | 0.25 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 3 |
| 25-1069 | Social Sciences Teachers, Postsecondary, All Other | 5 | | 1 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 25-1071 | Health Specialties Teachers, Postsecondary | 5 | | 9 | 9 | 1.00 | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 0 |
| 25-1072 | Nursing Instructors and Teachers, Postsecondary | 5 | | 5 | 2 | 0.40 | 0 | 0 | 0 | 0 | 0 | 5 | 2 | 3 |
| 25-1081 | Education Teachers, Postsecondary | 5 | | 4 | 2 | 0.50 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 2 |
| 25-1111 | Criminal Justice and Law Enforcement Teachers, Postsecondary | 5 | | 2 | 13 | 6.50 | 0 | 0 | 0 | 0 | 0 | 2 | 13 | -11 |
| 25-1112 | Law Teachers, Postsecondary | 5 | | 1 | 3 | 3.00 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | -2 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual Demand | Average Annual Supply | Average Annual Gap | S/D Ratio | Associate Demand | Associate Supply | Associate Gap | Bachelor Demand | Bachelor Supply | Bachelor Gap | Graduate Demand | Graduate Supply | Graduate Gap |
|-----------------|--|----------|---------------|-----------------------|-----------------------|--------------------|-----------|------------------|------------------|---------------|-----------------|-----------------|--------------|-----------------|-----------------|--------------|
| 25-1121 | Art, Drama, and Music Teachers, Postsecondary | 5 | | 14 | 10 | 4 | 0.71 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 10 | 4 |
| 25-1122 | Communications Teachers, Postsecondary | 5 | | 3 | 6 | -3 | 2.00 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 6 | -3 |
| 25-1123 | English Language and Literature Teachers, Postsecondary | 5 | | 7 | 2 | 5 | 0.29 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 2 | 5 |
| 25-1124 | Foreign Language and Literature Teachers, Postsecondary | 5 | | 4 | 1 | 3 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 3 |
| 25-1125 | History Teachers, Postsecondary | 5 | | 3 | 1 | 2 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 2 |
| 25-1126 | Philosophy and Religion Teachers, Postsecondary | 5 | | 3 | 13 | -10 | 4.33 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 13 | -10 |
| 25-1191 | Graduate Teaching Assistants | 5 | | 1 | 0 | 1 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 25-1194 | Vocational Education Teachers, Postsecondary | 3 | | 8 | 2 | 6 | 0.25 | 0 | 0 | 0 | 8 | 2 | 6 | 0 | 0 | 0 |
| 25-1199 | Postsecondary Teachers, All Other | 5 | | 10 | 7 | 3 | 0.70 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 7 | 3 |
| 25-2011 | Preschool Teachers, Except Special Education | 3 | | 47 | 81 | -34 | 1.72 | 11 | 62 | -51 | 37 | 19 | 18 | 0 | 0 | 0 |
| 25-2012 | Kindergarten Teachers, Except Special Education | 4 | | 11 | 7 | 4 | 0.64 | 0 | 0 | 0 | 8 | 6 | 2 | 3 | 1 | 2 |
| 25-2021 | Elementary School Teachers, Except Special Education | 4 | | 130 | 65 | 65 | 0.50 | 0 | 0 | 0 | 42 | 44 | -2 | 87 | 22 | 65 |
| 25-2022 | Middle School Teachers, Except Special and Career/Technical Education | 4 | | 100 | 63 | 37 | 0.63 | 0 | 0 | 0 | 32 | 34 | -2 | 67 | 30 | 37 |
| 25-2023 | Career/Technical Education Teachers, Middle School | 4 | | 2 | 1 | 1 | 0.50 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 |
| 25-2031 | Secondary School Teachers, Except Special and Career/Technical Education | 4 | | 147 | 110 | 37 | 0.75 | 0 | 0 | 0 | 49 | 66 | -17 | 98 | 44 | 54 |
| 25-2032 | Career/Technical Education Teachers, Secondary School | 4 | | 8 | 4 | 4 | 0.50 | 0 | 0 | 0 | 3 | 3 | 0 | 5 | 1 | 4 |
| 25-2051 | Special Education Teachers, Preschool | 4 | | 2 | 2 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| 25-2052 | Special Education Teachers, Kindergarten and Elementary School | 4 | | 25 | 20 | 5 | 0.80 | 0 | 0 | 0 | 7 | 5 | 2 | 18 | 15 | 3 |
| 25-2053 | Special Education Teachers, Middle School | 4 | | 8 | 6 | 2 | 0.75 | 0 | 0 | 0 | 2 | 1 | 1 | 6 | 5 | 1 |
| 25-2054 | Special Education Teachers, Secondary School | 4 | | 19 | 14 | 5 | 0.74 | 0 | 0 | 0 | 5 | 2 | 3 | 14 | 11 | 3 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual | | S/D Ratio | Associate | | Bachelor | | Graduate | | | | |
|-----------------|---|----------|---------------|----------------|--------|-----------|-----------|--------|----------|--------|----------|--------|-----|-----|-----|
| | | | | Demand | Supply | | Demand | Supply | Demand | Supply | Demand | Supply | Gap | Gap | |
| 25-3021 | Self-Enrichment Education Teachers | 3 | | 7 | 3 | 4 | 0.43 | 0 | 0 | 7 | 3 | 4 | 0 | 0 | 0 |
| 25-3097 | Teachers and Instructors, All Other, Except Substitute Teachers | 3 | | 9 | 3 | 6 | 0.33 | 0 | 0 | 9 | 3 | 6 | 0 | 0 | 0 |
| 25-3098 | Substitute Teachers | 3 | | 10 | 43 | -33 | 4.30 | 0 | 0 | 7 | 3 | 4 | 3 | 40 | -37 |
| 25-4011 | Archivists | 5 | | 1 | 1 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 25-4031 | Library Technicians | 4 | | 6 | 9 | -3 | 1.50 | 0 | 0 | 6 | 9 | -3 | 0 | 0 | 0 |
| 25-9031 | Instructional Coordinators | 5 | | 6 | 79 | -73 | 13.17 | 0 | 0 | 0 | 0 | 0 | 6 | 79 | -73 |
| 25-9041 | Teacher Assistants | 3 | | 36 | 31 | 5 | 0.86 | 0 | 0 | 36 | 31 | 5 | 0 | 0 | 0 |
| 27-1011 | Art Directors | 4 | | 2 | 4 | -2 | 2.00 | 0 | 0 | 2 | 4 | -2 | 0 | 0 | 0 |
| 27-1014 | Multimedia Artists and Animators | 4 | | 1 | 2 | -1 | 2.00 | 0 | 0 | 1 | 2 | -1 | 0 | 0 | 0 |
| 27-1024 | Graphic Designers | 4 | | 19 | 32 | -13 | 1.68 | 0 | 0 | 19 | 32 | -13 | 0 | 0 | 0 |
| 27-1025 | Interior Designers | 4 | | 4 | 6 | -2 | 1.50 | 0 | 0 | 4 | 6 | -2 | 0 | 0 | 0 |
| 27-1026 | Merchandise Displayers and Window Trimmers | 3 | | 10 | 17 | -7 | 1.70 | 0 | 0 | 10 | 17 | -7 | 0 | 0 | 0 |
| 27-2012 | Producers and Directors | 4 | | 13 | 20 | -7 | 1.54 | 0 | 0 | 13 | 20 | -7 | 0 | 0 | 0 |
| 27-2022 | Coaches and Scouts | 4 | | 7 | 6 | 1 | 0.86 | 0 | 0 | 7 | 6 | 1 | 0 | 0 | 0 |
| 27-3011 | Radio and Television Announcers | 3 | | 3 | 4 | -1 | 1.33 | 0 | 0 | 3 | 4 | -1 | 0 | 0 | 0 |
| 27-3022 | Reporters and Correspondents | 4 | | 1 | 4 | -3 | 4.00 | 0 | 0 | 1 | 4 | -3 | 0 | 0 | 0 |
| 27-3031 | Public Relations Specialists | 4 | | 10 | 30 | -20 | 3.00 | 0 | 0 | 9 | 26 | -17 | 2 | 3 | -1 |
| 27-3041 | Editors | 4 | | 5 | 16 | -11 | 3.20 | 0 | 0 | 5 | 16 | -11 | 0 | 0 | 0 |
| 27-3042 | Technical Writers | 4 | | 4 | 8 | -4 | 2.00 | 0 | 0 | 4 | 8 | -4 | 0 | 0 | 0 |
| 27-3043 | Writers and Authors | 4 | | 1 | 5 | -4 | 5.00 | 0 | 0 | 1 | 5 | -4 | 0 | 0 | 0 |
| 27-4011 | Audio and Video Equipment Technicians | 3 | | 2 | 4 | -2 | 2.00 | 0 | 0 | 2 | 4 | -2 | 0 | 0 | 0 |
| 27-4012 | Broadcast Technicians | 3 | | 1 | 2 | -1 | 2.00 | 0 | 0 | 1 | 2 | -1 | 0 | 0 | 0 |
| 29-1031 | Dietitians and Nutritionists | 5 | | 2 | 2 | 0 | 1.00 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| 29-1061 | Anesthesiologists | 5 | | 6 | 6 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 0 |
| 29-1062 | Family and General Practitioners | 5 | | 26 | 26 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 26 | 26 | 0 |
| 29-1063 | Internists, General | 5 | | 2 | 2 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| 29-1064 | Obstetricians and Gynecologists | 5 | | 1 | 1 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 29-1065 | Pediatricians, General | 5 | | 2 | 2 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 |
| 29-1066 | Psychiatrists | 5 | | 1 | 1 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 29-1067 | Surgeons | 5 | | 12 | 12 | 0 | 1.00 | 0 | 0 | 0 | 0 | 0 | 12 | 12 | 0 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual Demand | Average Annual Supply | Average Annual Gap | S/D Ratio | Associate Demand | Associate Supply | Associate Gap | Bachelor Demand | Bachelor Supply | Bachelor Gap | Graduate Demand | Graduate Supply | Graduate Gap |
|-----------------|--|----------|---------------|-----------------------|-----------------------|--------------------|-----------|------------------|------------------|---------------|-----------------|-----------------|--------------|-----------------|-----------------|--------------|
| 29-1069 | Physicians and Surgeons, All Other | 5 | | 58 | 59 | -1 | 1.02 | 0 | 0 | 0 | 0 | 0 | 0 | 58 | 59 | -1 |
| 29-1081 | Podiatrists | 5 | | 4 | 5 | -1 | 1.25 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 5 | -1 |
| 29-1123 | Physical Therapists | 5 | | 64 | 0 | 64 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 0 | 64 |
| 29-1126 | Respiratory Therapists | 3 | | 16 | 10 | 6 | 0.63 | 12 | 7 | 5 | 4 | 3 | 1 | 0 | 0 | 0 |
| 29-1131 | Veterinarians | 5 | | 15 | 1 | 14 | 0.07 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 1 | 14 |
| 29-1141 | Registered Nurses | 3 | | 428 | 398 | 30 | 0.93 | 191 | 298 | -107 | 237 | 100 | 137 | 0 | 0 | 0 |
| 29-1171 | Nurse Practitioners | 5 | | 19 | 7 | 12 | 0.37 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 7 | 12 |
| 29-2011 | Medical and Clinical Laboratory Technologists | 4 | | 19 | 2 | 17 | 0.11 | 0 | 0 | 0 | 19 | 2 | 17 | 0 | 0 | 0 |
| 29-2012 | Medical and Clinical Laboratory Technicians | 3 | | 22 | 9 | 13 | 0.41 | 7 | 8 | -1 | 15 | 1 | 14 | 0 | 0 | 0 |
| 29-2021 | Dental Hygienists | 3 | | 37 | 14 | 23 | 0.38 | 37 | 14 | 23 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29-2031 | Cardiovascular Technologists and Technicians | 3 | | 6 | 11 | -5 | 1.83 | 6 | 11 | -5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29-2032 | Diagnostic Medical Sonographers | 3 | | 4 | 7 | -3 | 1.75 | 4 | 7 | -3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29-2034 | Radiologic Technologists | 3 | | 13 | 21 | -8 | 1.62 | 13 | 21 | -8 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29-2041 | Emergency Medical Technicians and Paramedics | 3 | | 9 | 2 | 7 | 0.22 | 0 | 0 | 0 | 9 | 2 | 7 | 0 | 0 | 0 |
| 29-2052 | Pharmacy Technicians | 3 | | 6 | 0 | 6 | 0.00 | 0 | 0 | 0 | 6 | 0 | 6 | 0 | 0 | 0 |
| 29-2055 | Surgical Technologists | 3 | | 3 | 7 | -4 | 2.33 | 3 | 7 | -4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29-2056 | Veterinary Technologists and Technicians | 3 | | 3 | 6 | -3 | 2.00 | 0 | 0 | 0 | 3 | 6 | -3 | 0 | 0 | 0 |
| 29-2071 | Medical Records and Health Information Technicians | 3 | | 7 | 4 | 3 | 0.57 | 0 | 0 | 0 | 7 | 4 | 3 | 0 | 0 | 0 |
| 29-2099 | Health Technologists and Technicians, All Other | 3 | | 1 | 1 | 0 | 1.00 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 29-9091 | Athletic Trainers | 5 | | 5 | 4 | 1 | 0.80 | 0 | 0 | 0 | 5 | 4 | 1 | 0 | 0 | 0 |
| 31-2011 | Occupational Therapy Assistants | 3 | | 16 | 15 | 1 | 0.94 | 11 | 11 | 0 | 5 | 4 | 1 | 0 | 0 | 0 |
| 31-2012 | Occupational Therapy Aides | 3 | | 5 | 5 | 0 | 1.00 | 4 | 4 | 0 | 2 | 1 | 1 | 0 | 0 | 0 |
| 31-2021 | Physical Therapist Assistants | 3 | | 15 | 57 | -42 | 3.80 | 15 | 57 | -42 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31-9011 | Massage Therapists | 3 | | 2 | 10 | -8 | 5.00 | 2 | 10 | -8 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31-9091 | Dental Assistants | 3 | | 8 | 14 | -6 | 1.75 | 8 | 14 | -6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31-9092 | Medical Assistants | 3 | | 41 | 215 | -174 | 5.24 | 41 | 215 | -174 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31-9094 | Medical Transcriptionists | 3 | | 2 | 2 | 0 | 1.00 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual | | S/D Ratio | Associate | | Bachelor | | Graduate | |
|-----------------|---|----------|---------------|----------------|--------|-----------|-----------|--------|----------|--------|----------|--------|
| | | | | Demand | Supply | | Demand | Supply | Demand | Supply | Demand | Supply |
| 33-1011 | First-Line Supervisors of Correctional Officers | 3 | | 4 | 9 | 2.25 | 2 | 6 | 2 | 2 | 0 | 0 |
| 33-1012 | First-Line Supervisors of Police and Detectives | 3 | | 16 | 33 | 2.06 | 6 | 21 | 10 | 13 | -3 | 0 |
| 33-1021 | First-Line Supervisors of Fire Fighting and Prevention Workers | 3 | | 2 | 2 | 1.00 | 0 | 0 | 2 | 2 | 0 | 0 |
| 33-1099 | First-Line Supervisors of Protective Service Workers, All Other | 3 | | 4 | 5 | 1.25 | 0 | 0 | 4 | 5 | -1 | 0 |
| 33-2011 | Firefighters | 3 | | 12 | 15 | 1.25 | 4 | 5 | 8 | 10 | -2 | 0 |
| 33-3012 | Correctional Officers and Jailers | 3 | | 24 | 50 | 2.08 | 12 | 35 | 12 | 15 | -3 | 0 |
| 33-3021 | Detectives and Criminal Investigators | 3 | | 10 | 24 | 2.40 | 0 | 0 | 8 | 10 | -2 | 13 |
| 33-3051 | Police and Sheriff's Patrol Officers | 3 | | 94 | 189 | 2.01 | 33 | 114 | 60 | 76 | -16 | 0 |
| 33-9021 | Private Detectives and Investigators | 3 | | 2 | 3 | 1.50 | 0 | 0 | 2 | 3 | -1 | 0 |
| 35-1011 | Chefs and Head Cooks | 3 | | 2 | 90 | 45.00 | 2 | 90 | 0 | 0 | 0 | 0 |
| 39-1021 | First-Line Supervisors of Personal Service Workers | 3 | | 13 | 5 | 0.38 | 0 | 0 | 13 | 5 | 8 | 0 |
| 39-7011 | Tour Guides and Escorts | 3 | | 3 | 1 | 0.33 | 0 | 0 | 3 | 1 | 2 | 0 |
| 39-9011 | Childcare Workers | 3 | | 18 | 16 | 0.89 | 0 | 0 | 18 | 16 | 2 | 0 |
| 39-9031 | Fitness Trainers and Aerobics Instructors | 3 | | 28 | 23 | 0.82 | 0 | 0 | 28 | 23 | 5 | 0 |
| 39-9032 | Recreation Workers | 4 | | 34 | 28 | 0.82 | 0 | 0 | 34 | 28 | 6 | 0 |
| 39-9041 | Residential Advisors | 3 | | 22 | 17 | 0.77 | 7 | 0 | 15 | 17 | -2 | 0 |
| 41-1012 | First-Line Supervisors of Non-Retail Sales Workers | 4 | | 3 | 1 | 0.33 | 0 | 0 | 3 | 1 | 2 | 0 |
| 41-3011 | Advertising Sales Agents | 3 | | 10 | 14 | 1.40 | 0 | 0 | 10 | 14 | -4 | 0 |
| 41-3021 | Insurance Sales Agents | 4 | | 54 | 22 | 0.41 | 0 | 0 | 54 | 22 | 32 | 0 |
| 41-3031 | Securities, Commodities, and Financial Services Sales Agents | 4 | | 21 | 9 | 0.43 | 0 | 0 | 21 | 9 | 12 | 0 |
| 41-3041 | Travel Agents | 3 | | 7 | 8 | 1.14 | 3 | 6 | 4 | 1 | 3 | 0 |
| 41-3099 | Sales Representatives, Services, All Other | 4 | | 110 | 43 | 0.39 | 19 | 2 | 72 | 37 | 35 | 19 |
| 41-4011 | Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products | 4 | | 7 | 4 | 0.57 | 0 | 0 | 7 | 4 | 3 | 0 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual | | S/D Ratio | Associate | | Bachelor | | Graduate | | |
|-----------------|--|----------|---------------|----------------|--------|-----------|-----------|--------|----------|--------|----------|--------|-----|
| | | | | Demand | Supply | | Demand | Supply | Demand | Supply | Demand | Supply | Gap |
| 41-4012 | Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products | 4 | | 75 | 39 | 0.52 | 0 | 0 | 75 | 39 | 36 | 0 | 0 |
| 41-9022 | Real Estate Sales Agents | 3 | | 11 | 5 | 0.45 | 2 | 2 | 9 | 3 | 6 | 0 | 0 |
| 41-9031 | Sales Engineers | 4 | | 6 | 2 | 0.33 | 0 | 0 | 6 | 2 | 4 | 0 | 0 |
| 41-9099 | Sales and Related Workers, All Other | 3 | | 1 | 1 | 1.00 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 43-1011 | First-Line Supervisors of Office and Administrative Support Workers | 3 | | 88 | 248 | 2.82 | 23 | 222 | 65 | 26 | 39 | 0 | 0 |
| 43-3031 | Bookkeeping, Accounting, and Auditing Clerks | 3 | | 63 | 67 | 1.06 | 20 | 49 | 43 | 18 | 25 | 0 | 0 |
| 43-3061 | Procurement Clerks | 3 | | 4 | 3 | 0.75 | 1 | 2 | 3 | 1 | 2 | 0 | 0 |
| 43-4011 | Brokerage Clerks | 3 | | 8 | 3 | 0.38 | 0 | 0 | 8 | 3 | 5 | 0 | 0 |
| 43-4031 | Court, Municipal, and License Clerks | 3 | | 7 | 8 | 1.14 | 2 | 3 | 5 | 5 | 0 | 0 | 0 |
| 43-4061 | Eligibility Interviewers, Government Programs | 3 | | 18 | 20 | 1.11 | 0 | 0 | 18 | 20 | -2 | 0 | 0 |
| 43-4131 | Loan Interviewers and Clerks | 3 | | 9 | 8 | 0.89 | 4 | 6 | 5 | 2 | 3 | 0 | 0 |
| 43-4161 | Human Resources Assistants, Except Payroll and Timekeeping | 3 | | 9 | 6 | 0.67 | 2 | 3 | 7 | 3 | 4 | 0 | 0 |
| 43-5061 | Production, Planning, and Expediting Clerks | 3 | | 34 | 22 | 0.65 | 7 | 11 | 28 | 11 | 17 | 0 | 0 |
| 43-6011 | Executive Secretaries and Executive Administrative Assistants | 3 | | 14 | 13 | 0.93 | 4 | 8 | 10 | 5 | 5 | 0 | 0 |
| 43-6012 | Legal Secretaries | 3 | | 13 | 11 | 0.85 | 4 | 7 | 9 | 5 | 4 | 0 | 0 |
| 43-6013 | Medical Secretaries | 3 | | 50 | 48 | 0.96 | 15 | 31 | 35 | 17 | 18 | 0 | 0 |
| 43-6014 | Secretaries and Administrative Assistants, Except Legal, Medical, and Executive | 3 | | 147 | 124 | 0.84 | 44 | 73 | 103 | 51 | 52 | 0 | 0 |
| 43-9011 | Computer Operators | 3 | | 4 | 3 | 0.75 | 2 | 3 | 2 | 1 | 1 | 0 | 0 |
| 43-9041 | Insurance Claims and Policy Processing Clerks | 3 | | 29 | 24 | 0.83 | 10 | 16 | 20 | 8 | 12 | 0 | 0 |
| 43-9111 | Statistical Assistants | 4 | | 1 | 1 | 1.00 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 43-9199 | Office and Administrative Support Workers, All Other | 3 | | 13 | 9 | 0.69 | 3 | 5 | 10 | 4 | 6 | 0 | 0 |
| 47-1011 | First-Line Supervisors of Construction Trades and Extraction Workers | 3 | | 14 | 6 | 0.43 | 0 | 0 | 14 | 6 | 8 | 0 | 0 |
| 47-2011 | Boilermakers | 3 | | 2 | 1 | 0.50 | 2 | 1 | 1 | 0 | 0 | 0 | 0 |

| Occupation Code | Occupation Title | Job Zone | Gap Indicator | Average Annual Demand | Average Annual Supply | Average Annual Gap | S/D Ratio | Associate Demand | Associate Supply | Associate Gap | Bachelor Demand | Bachelor Supply | Bachelor Gap | Graduate Demand | Graduate Supply | Graduate Gap |
|-----------------|---|----------|---------------|-----------------------|-----------------------|--------------------|-----------|------------------|------------------|---------------|-----------------|-----------------|--------------|-----------------|-----------------|--------------|
| 47-2111 | Electricians | 3 | | 29 | 10 | 19 | 0.34 | 29 | 10 | 19 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47-2152 | Plumbers, Pipefitters, and Steamfitters | 3 | | 6 | 2 | 4 | 0.33 | 6 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47-4011 | Construction and Building Inspectors | 3 | | 23 | 6 | 17 | 0.26 | 8 | 1 | 7 | 15 | 5 | 10 | 0 | 0 | 0 |
| 49-1011 | First-Line Supervisors of Mechanics, Installers, and Repairers | 3 | | 23 | 9 | 14 | 0.39 | 0 | 0 | 0 | 23 | 9 | 14 | 0 | 0 | 0 |
| 49-2011 | Computer, Automated Teller, and Office Machine Repairers | 3 | | 6 | 1 | 5 | 0.17 | 6 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49-2022 | Telecommunications Equipment Installers and Repairers, Except Line Installers | 3 | | 2 | 1 | 1 | 0.50 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 |
| 49-2094 | Electrical and Electronics Repairers, Commercial and Industrial Equipment | 3 | | 3 | 1 | 2 | 0.33 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49-2098 | Security and Fire Alarm Systems Installers | 3 | | 5 | 2 | 3 | 0.40 | 5 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49-3023 | Automotive Service Technicians and Mechanics | 3 | | 26 | 14 | 12 | 0.54 | 26 | 14 | 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49-9021 | Heating, Air Conditioning, and Refrigeration Mechanics and Installers | 3 | | 14 | 14 | 0 | 1.00 | 14 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49-9041 | Industrial Machinery Mechanics | 3 | | 22 | 6 | 16 | 0.27 | 22 | 6 | 16 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49-9043 | Maintenance Workers, Machinery | 3 | | 6 | 1 | 5 | 0.17 | 6 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49-9044 | Millwrights | 3 | | 2 | 1 | 1 | 0.50 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51-5111 | Prepress Technicians and Workers | 3 | | 1 | 2 | -1 | 2.00 | 0 | 0 | 0 | 1 | 2 | -1 | 0 | 0 | 0 |
| 51-8021 | Stationary Engineers and Boiler Operators | 3 | | 5 | 1 | 4 | 0.20 | 0 | 0 | 0 | 5 | 1 | 4 | 0 | 0 | 0 |

APPENDIX G: CROSSWALK OF PROGRAMS TO OCCUPATIONS

(Full List Available Upon Request)

| Occupation Code | Occupation Title | Degree Code | Degree Title | NCES | PA | ACS |
|-----------------|---------------------------------|-------------|---|------|----|-----|
| 11-1021 | General and Operations Managers | 44.0401 | Public Administration | • | | • |
| | | 50.1001 | Arts, Entertainment, and Media Management, General | | • | |
| | | 50.1002 | Fine and Studio Arts Management | | • | |
| | | 50.1003 | Music Management | | • | |
| | | 50.1004 | Theatre/Theatre Arts Management | | • | |
| | | 52.0101 | Business/Commerce, General | • | | • |
| | | 52.0201 | Business Administration and Management, General | • | • | • |
| | | 52.0204 | Office Management and Supervision | • | | |
| | | 52.0205 | Operations Management and Supervision | • | | |
| | | 52.0206 | Non-Profit/Public/Organizational Management | • | | |
| | | 52.0213 | Organizational Leadership | • | | |
| | | 52.0299 | Business Administration, Management and Operations, Other | • | | |
| | | 52.0501 | Business/Corporate Communications | | • | |
| | | 52.0701 | Entrepreneurship/Entrepreneurial Studies | • | | • |
| | | 52.0703 | Small Business Administration/Management | • | | |
| | | 52.0799 | Entrepreneurial and Small Business Operations, Other | • | | |
| | | 52.0801 | Finance, General | | | • |
| | | 52.1101 | International Business/Trade/Commerce | • | | • |
| | | 52.1201 | Management Information Systems, General | | • | |
| | | 52.1206 | Information Resources Management | | • | |
| | | 52.1207 | Knowledge Management | | • | |
| | | 52.1299 | Management Information Systems and Services, Other | | • | |
| | | 52.1301 | Management Science | | | • |

| Occupation Code | Occupation Title | Degree Code | Degree Title | NCES | PA | ACS |
|-----------------|--|-------------|---|---------|---|-----|
| 13-1161 | Market Research Analysts and Marketing Specialists | 45.0101 | Social Sciences, General | • | | |
| | | 45.0602 | Applied Economics | | | • |
| | | 45.9999 | Social Sciences, Other | • | | |
| | | 52.0101 | Business/Commerce, General | • | | |
| | | 52.0601 | Business/Managerial Economics | • | | |
| | | 52.1401 | Marketing/Marketing Management, General | • | • | • |
| | | 52.1402 | Marketing Research | • | • | • |
| | | 52.1403 | International Marketing | • | • | • |
| | | 52.1499 | Marketing, Other | • | • | |
| | | 13-2011 | Accountants and Auditors | 43.0117 | Financial Forensics and Fraud Investigation | • |
| 45.0601 | Economics, General | | | | • | |
| 45.0603 | Econometrics and Quantitative Economics | | | | • | |
| 45.0605 | International Economics | | | | • | |
| 45.0699 | Economics, Other | | | | • | |
| 52.0101 | Business/Commerce, General | | | • | | |
| 52.0301 | Accounting | | | • | • | • |
| 52.0303 | Auditing | | | • | • | • |
| 52.0304 | Accounting and Finance | | | • | • | • |
| 52.0305 | Accounting and Business/Management | | | • | • | • |
| 52.0399 | Accounting and Related Services, Other | | | • | • | |
| 52.0601 | Business/Managerial Economics | | | | • | |
| 52.0801 | Finance, General | | | • | • | |
| 52.0804 | Financial Planning and Services | | | | • | |
| 52.0807 | Investments and Securities | | | | • | |
| 52.0899 | Finance and Financial Management Services, Other | | | • | • | |
| 52.1304 | Actuarial Science | | | | • | |
| 52.1601 | Taxation | • | | • | | |
| 15-1121 | Computer Systems Analysts | 11.0101 | Computer and Information Sciences, General | • | | • |
| | | 11.0103 | Information Technology | • | | • |
| | | 11.0501 | Computer Systems Analysis/Analyst | • | • | • |
| | | 11.0701 | Computer Science | | • | |
| | | 11.0801 | Web Page, Digital/Multimedia and Information Resources Design | • | • | |
| | | 11.0803 | Computer Graphics | | • | |
| | | 11.0804 | Modeling, Virtual Environments and Simulation | | • | |

| Occupation Code | Occupation Title | Degree Code | Degree Title | NCES | PA | ACS |
|-----------------|-------------------|-------------|--|------|----|-----|
| | | 11.0899 | Computer Software and Media Applications, Other | | • | |
| | | 11.0901 | Computer Systems Networking and Telecommunications | | | • |
| | | 52.1201 | Management Information Systems, General | • | | |
| | | 52.1207 | Knowledge Management | • | | |
| | | 52.1299 | Management Information Systems and Services, Other | • | | |
| 29-1141 | Registered Nurses | 51.0000 | Health Services/Allied Health/Health Sciences, General | • | • | |
| | | 51.0704 | Health Unit Manager/Ward Supervisor | • | • | |
| | | 51.3801 | Registered Nursing/Registered Nurse | • | • | • |
| | | 51.3803 | Adult Health Nurse/Nursing | • | • | • |
| | | 51.3805 | Family Practice Nurse/Nursing | • | • | • |
| | | 51.3808 | Nursing Science | • | • | • |
| | | 51.3818 | Nursing Practice | • | • | • |
| | | 51.3899 | Registered Nursing, Nursing Administration, Nursing Research and Clinical Nursing, Other | • | • | • |