

Spring 2020

Labor Market Overview

North Central Valley/
Northern Mother Lode Subregion



Prepared by the Central Valley/Mother Lode Center of Excellence

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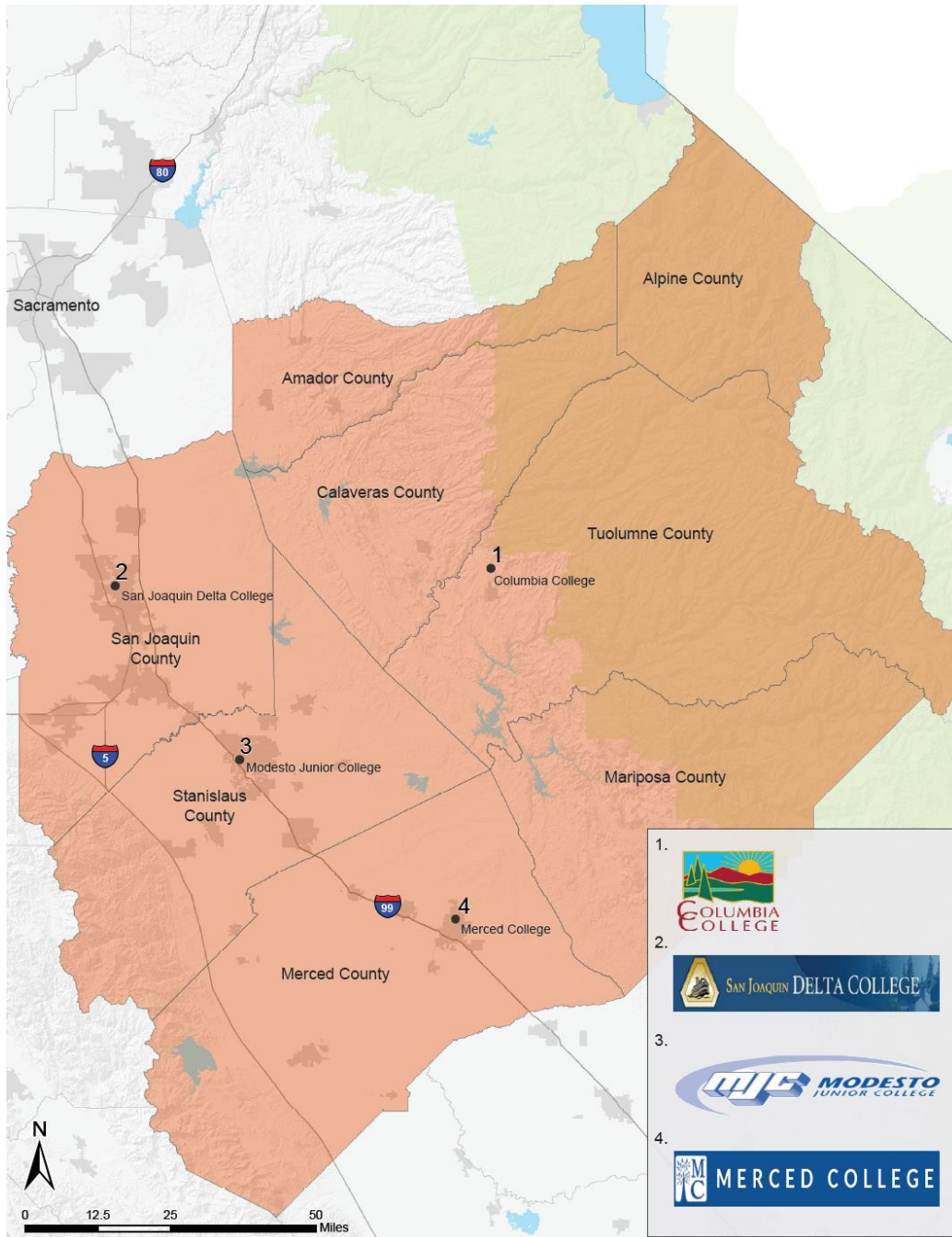


Exhibit 1: Map of community colleges in the North Central Valley/Northern Mother Lode subregion

Executive Summary

The Central Valley/Mother Lode Center of Excellence is in the process of updating its annual report on the 12 sectors and occupational groupings (sectors) critical to the region's economic vitality. As part of the study, the center also analyzes the subregions comprising the larger area. This report focuses on the North Central Valley/Northern Mother Lode (NCV/NML) subregion. It examines where future job growth is expected to occur and estimates workforce gaps, i.e., potential shortages of workers to fill middle-skill jobs in each sector.

In the subregion, population growth is expected to slow. The population currently totals more than 1.7 million, and by 2023, the subregion is expected to add 73,750 residents, totaling 1.8 million.

Within the NCV/NML subregion, the 12 sectors are expected to offer more than 38,500 job openings annually.

A large proportion of new middle-skill jobs will be in the business sector, which will have 7,704 annual openings in the NCV/NML subregion. Retail, hospitality, tourism, and entertainment (RHTE) is expected to offer 6,185 annual openings.

In the region and NCV/NML subregion, strategic planning is imperative for the business sector. A comparison of community college supply and projected workforce demand shows that the business sector will have the largest supply gap in the subregion, a shortage of 6,762 workers. The RHTE sector will have a supply gap of 5,414 workers. After business and RHTE, the third largest gap is in the logistics sector, with a projected shortage of 4,468 workers.

On average each year, community colleges in the region confer 5,772 awards (degrees and certificates) in areas related to the 12 sectors. The greatest number of awards are in health care, 1,655, followed by business, 942, and RHTE, 771. Highlighting an area of need, only six awards are conferred on average each year in logistics.

Future planning efforts by community colleges also should take into consideration occupations with the most annual openings in the NCV/NML subregion:

- Heavy and tractor-trailer truck drivers, 1,951 annual openings
- Office clerks (general), 1,556 annual openings
- Teacher assistants, 985 annual openings
- Secretaries and administrative assistants (except legal, medical, and executive), 957 annual openings

12 Sectors and Occupational Groupings:

- Agriculture, water and environmental technologies (AGWET)
- Advanced manufacturing
- Business and entrepreneurship (Business)
- Energy, construction and utilities (ECU)
- Education
- Global trade
- Health care
- ICT/digital media
- Logistics
- Mechanics and welding
- Protective services
- Retail, hospitality, tourism and entertainment

Introduction

The Center of Excellence conducted a labor market analysis focusing on the Central Valley/Mother Lode subregions. This report focuses on the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The community colleges in the subregion are shown in Exhibit 1. In total, 12 sectors were analyzed for this report, and their workforce demand was compared with community college supply. A sector represents a cluster or grouping of occupations, comprising a segment of one or multiple industries. For each sector, the report details current employment numbers, projected occupational demand, entry-level and median wages, and three-year average supply of degrees and certificates from two-year higher education institutions. Each sector section contains a gap analysis. This report is organized by the 12 top sectors in the subregion:

- Agriculture, water, and environmental technologies
- Advanced manufacturing
- Business
- Energy, construction, and utilities
- Education
- Global trade
- Health care
- ICT/digital media
- Logistics
- Mechanics and welding
- Protective services
- Retail, hospitality, tourism, and entertainment

Methodology

Quantitative data collection and analysis were conducted for this report. Labor market data, particularly secondary data related to industry workforce demand and occupational employment, informed the report's findings. The North American Industry Classification System (NAICS) and the Standard Occupational Classification (SOC) System were used to source data. The average living wage for a single adult in the North Central Valley/Northern Mother Lode (NCV/NML) subregion is \$10.27/hour¹; however, the state's minimum wage is \$12.00 - \$13.00/hour depending on business size. The criteria for occupations included in this report were determined by the Central Valley/Mother Lode Center of Excellence based on consortium discussions and recommendations. The occupational demand data include only community college relevant (middle-skill) jobs directly related to a sector having 10 or more annual openings. Occupational projections include annual openings. Replacements can be determined by subtracting annual openings from overall job change. If the change is negative, then all the annual openings are replacements. For more information on the data sources employed by this study, please refer to Appendix A. Each industry sector section of the report contains an analysis of educational supply section which counts awards by TOP4 codes from the Taxonomy of Programs and Classification of Instructional Program (CIP) codes. Appendix B contains typical education level, work experience, and on-the-job training required for each occupation discussed in the sector sections. Current Population Survey (CPS) data are also included, which is used to evaluate whether bachelor's-degree-education-level occupations are considered middle-skill. An occupation is considered middle-skill when one-third or more of current workers in B.A./B.S.-level occupations have completed some college up to an associate degree as their highest level of education.

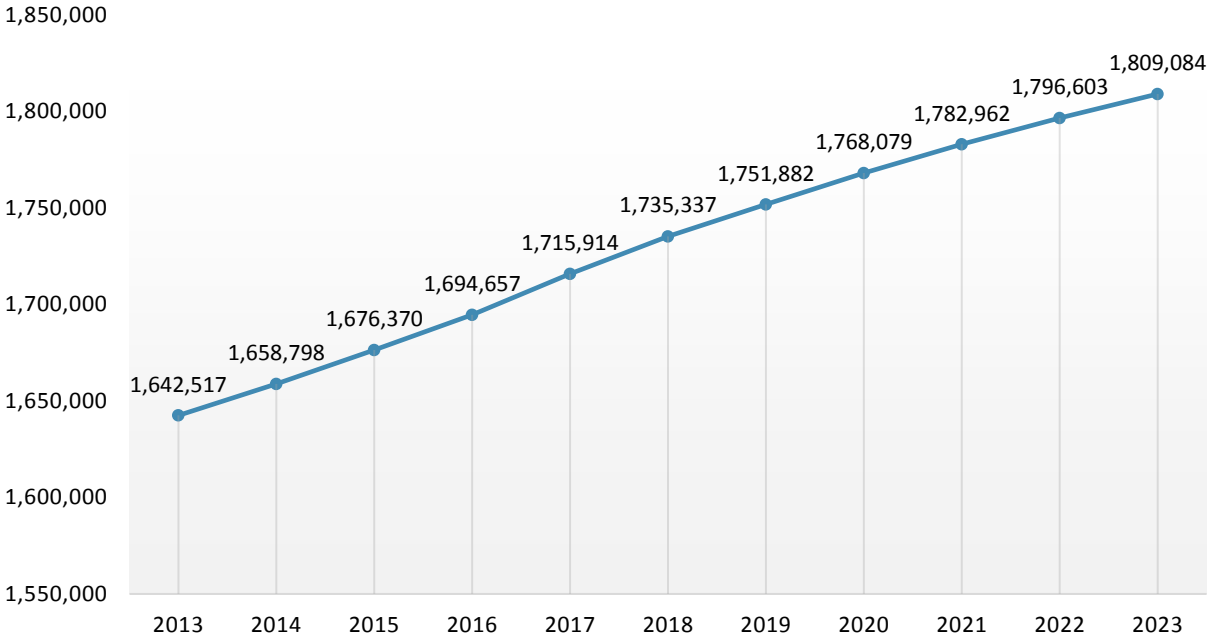
¹ The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the subregion: <https://insightcced.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

Regional Overview

Residential Population

According to the latest U.S. Census data, the NCV/NML subregion is home to approximately 1.7 residents (Exhibit 2). Between 2013 and 2018, the region added 92,820 residents. By 2023, the subregion is projected to add 57,200 new residents, totaling 1.8 million residents.

Exhibit 2: Population estimates and projections in the NCV/NML subregion



Demographics

The NCV/NML subregion's gender composition is equivalent to the state. The population is equally divided between men and women. Exhibit 3 shows projected changes in the NCV/NML subregion's demographics by 2023. The number of individuals identifying as white, non-Hispanic is expected to decline by 46,644 in the subregion by 2023.

In the NCV/NML subregion, the most rapid growth is projected to occur among individuals identifying as two or more races, Hispanic, 32% growth; native Hawaiian or Pacific Islander, non-Hispanic, 30%; and black, Hispanic, 28%.

The most substantial population growth by number of residents is projected for:

- White, Hispanic residents, an increase of 130,802, representing 22% growth;
- Asian, non-Hispanic residents, an increase of 37,238, 25% growth; and
- Black, non-Hispanic residents, an increase of 11,283, 16% growth.

Exhibit 3: Projected changes in race/ethnicity in the NCV/NML subregion

RACE/ETHNICITY	2013	2023	CHANGE	% CHANGE
White, Non-Hispanic	685,081	638,437	(46,644)	(7%)
Black, Non-Hispanic	72,319	83,602	11,283	16%
American Indian or Alaskan Native, Non-Hispanic	9,792	9,845	53	1%
Asian, Non-Hispanic	147,581	184,819	37,238	25%
Native Hawaiian or Pacific Islander, Non-Hispanic	7,841	10,203	2,362	30%
Two or More Races, Non-Hispanic	43,950	53,925	9,975	23%
White, Hispanic	594,734	725,536	130,802	22%
Black, Hispanic	14,299	18,374	4,075	28%
American Indian or Alaskan Native, Hispanic	23,855	29,606	5,751	24%
Asian, Hispanic	15,930	19,170	3,240	20%
Native Hawaiian or Pacific Islander, Hispanic	3,036	3,765	729	24%
Two or More Races, Hispanic	24,100	31,803	7,703	32%
TOTAL	1,642,517	1,809,084	166,567	10%

For cohorts under age 20, the largest projected increase over the next five years will occur in children under age 5, a 15% increase representing the addition of more than 18,600 children (Exhibit 4). There is a projected 3% decrease in the 5-9 age cohort, a decline of 3,800 children in the subregion.

Exhibit 4: Projected change in age cohorts in the NCV/NML subregion, 2018-2023

AGE COHORT	2018 POPULATION	2023 POPULATION	CHANGE	% CHANGE	2018 % OF COHORT
Under 5 years	120,985	139,670	18,685	15%	6.97%
5 to 9 years	128,195	124,392	(3,803)	(3%)	7.39%
10 to 14 years	132,553	132,906	353	0%	7.64%
15 to 19 years	126,212	129,023	2,811	2%	7.27%
20 to 24 years	115,689	114,220	(1,469)	(1%)	6.67%
25 to 29 years	126,075	118,824	(7,251)	(6%)	7.27%
30 to 34 years	116,909	131,120	14,211	12%	6.74%
35 to 39 years	114,544	120,321	5,777	5%	6.60%
40 to 44 years	103,624	115,769	12,145	12%	5.97%
45 to 49 years	104,540	101,930	(2,610)	(2%)	6.02%
50 to 54 years	102,618	101,509	(1,109)	(1%)	5.91%
55 to 59 years	105,496	99,301	(6,195)	(6%)	6.08%
60 to 64 years	96,189	101,344	5,155	5%	5.54%
65 to 69 years	79,885	91,067	11,182	14%	4.60%
70 to 74 years	63,091	71,426	8,335	13%	3.64%
75 to 79 years	42,261	53,733	11,472	27%	2.44%
80 to 84 years	27,856	32,670	4,814	17%	1.61%
85 years and over	28,616	29,859	1,243	4%	1.65%
TOTAL	1,735,337	1,809,084	73,747	4%	100.00%

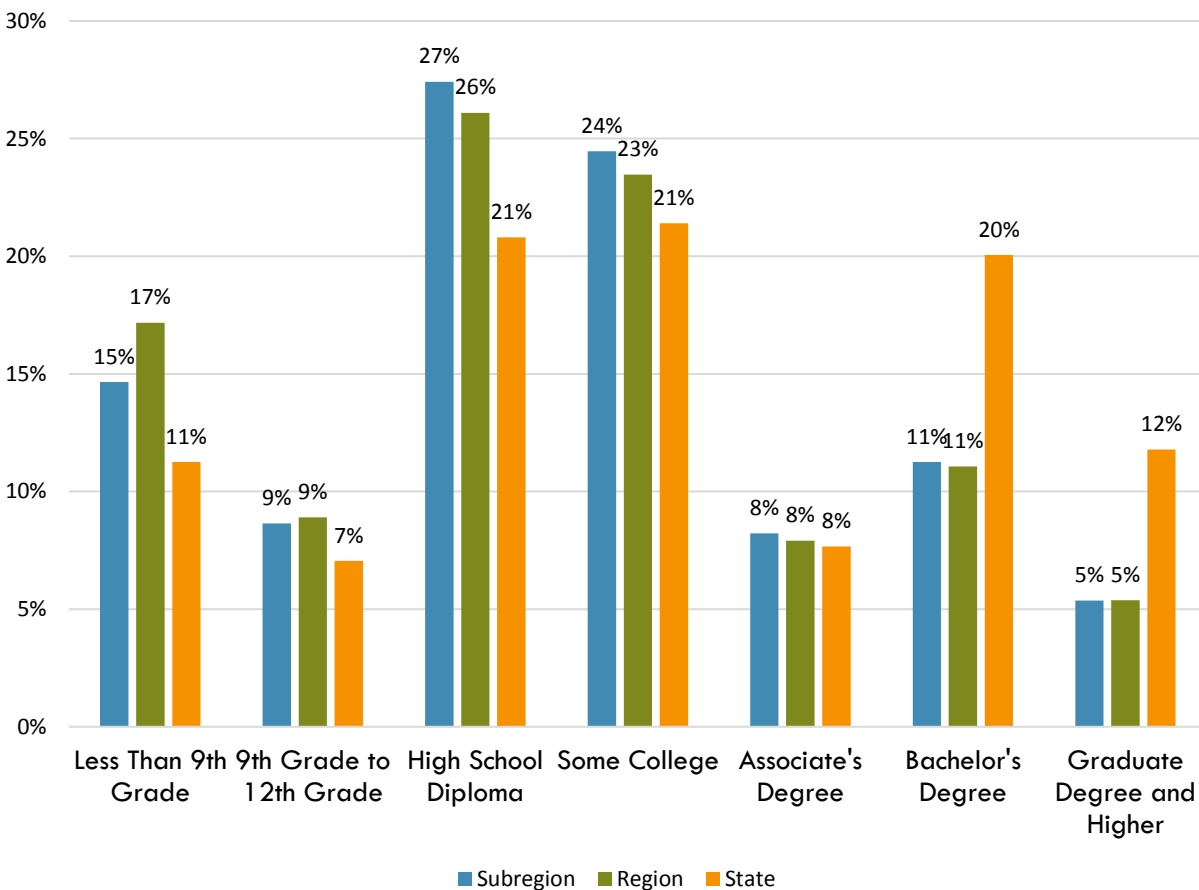
Educational Attainment

The NCV/NML subregion trails the state in bachelor's degree attainment, with only 11% of the adult population holding a bachelor's degree, compared to 20% in the state (Exhibit 8).

Regarding associate degree attainment, the subregion and the state are the same, 8%. The subregion has a higher percentage of population that has completed a high school diploma than the state, 27% compared to 21%. A greater proportion of the subregion has completed some college compared to the state and nation. In the subregion, 24% of the population has completed some college, which is greater than the state, 21%.

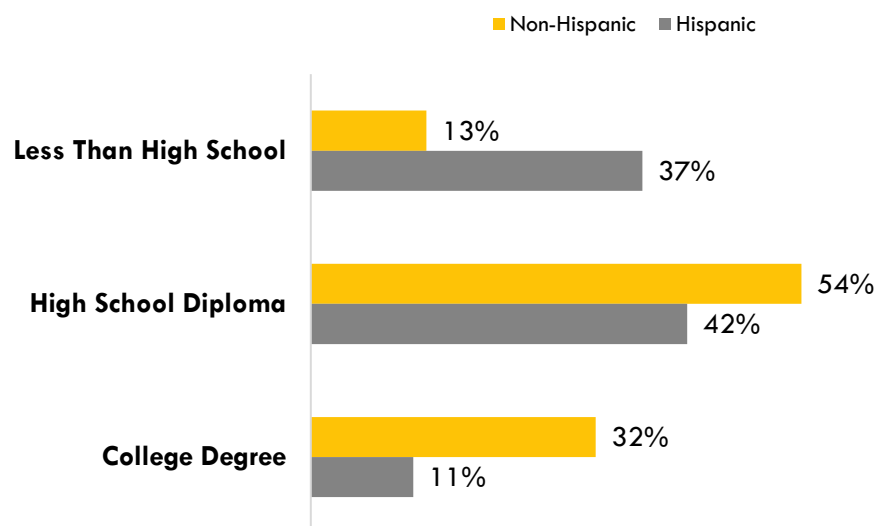
Compared to the state, a higher proportion of residents 25 years of age or older in the subregion have completed less than a 9th grade education and less than a 12th grade education, which indicates a greater need for adult education in the region. Fifteen percent of residents in the subregion have less than a 9th grade education and 9% have less than a 12th grade education, compared to 11% and 7% in the state, respectively.

Exhibit 8: Educational attainment comparison of the nation, state and NCV/NML subregion



In the subregion, 32% of the non-Hispanic adult population has a college degree, compared to 11% of the Hispanic population (Exhibit 9). Also, a greater proportion of the Hispanic population has less than a high school education. More than 35% of the Hispanic population has less than a high school diploma, compared to 13% of the non-Hispanic population.

Exhibit 9: Hispanic/non-Hispanic educational attainment in the subregion, 2018



Labor Force & Employment

The size and characteristics of a region’s labor force are important considerations in workforce planning. Labor force, employment and unemployment data are based upon “place of residence” – where people live, regardless of where they work. Individuals who have more than one job are counted only once. These data elements differ from industry employment estimates that are “place-of-work” based – where the employer/workplace is located, regardless of where the employee resides. (For terms and definitions, see Appendix A.)

The labor force in the NCV/NML subregion has increased by nearly 17,000 workers over the last five years (Exhibit 10). Unemployment has declined from 13% to 6% during the same period. Employment has increased by 62,430 workers, from 640,840 workers in 2013 to 703,270 workers in 2018.

Exhibit 10: Labor force size, employment and unemployment in the NCV/NML subregion, 2013-2018

METRIC	2013	2018	5-YEAR CHANGE
Labor Force	733,920	750,910	16,990
Employment	640,840	703,270	62,430
Unemployment	93,060	47,660	(45,400)
Unemployment Rate	13%	6%	(6%)

Regional growth in labor appears to have been more limited than subregional growth. Since 2013, the labor force in the Central Valley/Mother Lode region has grown by nearly 23,000 workers. Total employment increased by 125,210 workers (Exhibit 11). In 2013, more than 243,000 individuals were unemployed. By 2018, this number had declined by 102,280. Because total employment increased more than the labor force, the unemployment rate decreased from 13% in 2013 (compared to 9% statewide) to 7% in 2018 (compared to 4% statewide).

Exhibit 11: Labor force size, employment and unemployment in the CV/ML region, 2013-2018

METRIC	2013	2018	5-YEAR CHANGE
Labor Force	1,904,580	1,927,560	22,980
Employment	1,661,150	1,786,360	125,210
Unemployment	243,310	141,030	(102,280)
Unemployment Rate	13%	7%	(5%)

At 4%, the state's unemployment rate is lower than the region's and subregion's unemployment rates (Exhibit 12). Over the last five years, the labor force has added more than 773,000 workers, growing to nearly 19.4 million. Unemployment has declined from 1.7 million workers in 2013 to 815,400 workers in 2018 statewide.

Exhibit 12: Labor force size, employment and unemployment in California, 2013-2018

METRIC	2013	2018	5-YEAR CHANGE
Labor Force	18,625,000	19,398,200	773,200
Employment	16,958,400	18,582,800	1,624,400
Unemployment	1,666,600	815,400	(851,200)
Unemployment Rate	9%	4%	(5%)

Agriculture, Water & Environmental Technologies

Summary

Agriculture, water, and environmental technologies occupations with the greatest employment in the NCV/NML subregion include farmers, ranchers and other agricultural managers; agricultural equipment operators; and first-line supervisors of farming, fishing and forestry workers. Occupations with strong projected growth include veterinary technologists and technicians; compliance officers; and veterinary assistants and laboratory animal caretakers. Food scientists and technologists earn the highest median hourly wages, \$31.37 followed by compliance officers, \$31.70. On average each year, community colleges in the subregion confer 335 awards related to agriculture, water and environmental technologies. The gap analysis reveals a shortage of 1,853 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 24: Agriculture, water and environmental technologies employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Farmers, Ranchers, and Other Agricultural Managers	7,298	6,829	(469)	(6%)	699
Agricultural Equipment Operators	2,071	2,178	107	5%	366
First-Line Supervisors of Farming, Fishing, and Forestry Workers	1,641	1,677	36	2%	254
Mobile Heavy Equipment Mechanics, Except Engines	758	798	40	5%	86
Veterinary Assistants and Laboratory Animal Caretakers	431	489	58	13%	85
Farm Equipment Mechanics and Service Technicians	644	723	79	12%	84
Water and Wastewater Treatment Plant and System Operators	809	816	7	1%	77
Compliance Officers	607	683	76	13%	72
Forest and Conservation Technicians	508	491	(17)	(3%)	61
Agricultural and Food Science Technicians	470	482	12	3%	61
Pest Control Workers	355	380	25	7%	57
Veterinary Technologists and Technicians	437	503	66	15%	51
Animal Trainers	282	288	6	2%	44
Forest and Conservation Workers	190	202	12	6%	38
Pesticide Handlers, Sprayers, and Applicators, Vegetation	218	243	25	11%	35
Logging Equipment Operators	179	186	7	4%	31
Agricultural Inspectors	146	160	14	10%	25
Life, Physical, and Social Science Technicians, All Other	142	154	12	8%	20
Animal Breeders	93	95	2	2%	16
Food Scientists and Technologists	128	132	4	3%	15

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Fishers and Related Fishing Workers	57	58	1	2%	10

Wages

Exhibit 25: Agriculture, water and environmental technologies wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Compliance Officers	\$25.05	\$31.70
Food Scientists and Technologists	\$24.94	\$31.37
Water and Wastewater Treatment Plant and System Operators	\$24.82	\$30.96
Mobile Heavy Equipment Mechanics, Except Engines	\$19.75	\$27.66
Agricultural Inspectors	\$19.29	\$23.92
Farm Equipment Mechanics and Service Technicians	\$17.57	\$22.29
Agricultural and Food Science Technicians	\$16.81	\$21.26
Farmers, Ranchers, and Other Agricultural Managers	\$16.23	\$33.72
Pesticide Handlers, Sprayers, and Applicators, Vegetation	\$15.95	\$24.13
Pest Control Workers	\$15.71	\$19.93
Logging Equipment Operators	\$15.33	\$19.91
First-Line Supervisors of Farming, Fishing, and Forestry Workers	\$14.44	\$18.74
Veterinary Technologists and Technicians	\$14.29	\$16.72
Forest and Conservation Technicians	\$13.61	\$15.67
Animal Breeders	\$12.99	\$14.44
Agricultural Equipment Operators	\$12.47	\$15.04
Veterinary Assistants and Laboratory Animal Caretakers	\$11.52	\$12.81
Life, Physical, and Social Science Technicians, All Other	\$11.14	\$14.95
Fishers and Related Fishing Workers	\$11.02	\$11.85
Forest and Conservation Workers	\$11.00	\$11.21
Animal Trainers	\$10.63	\$14.67
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

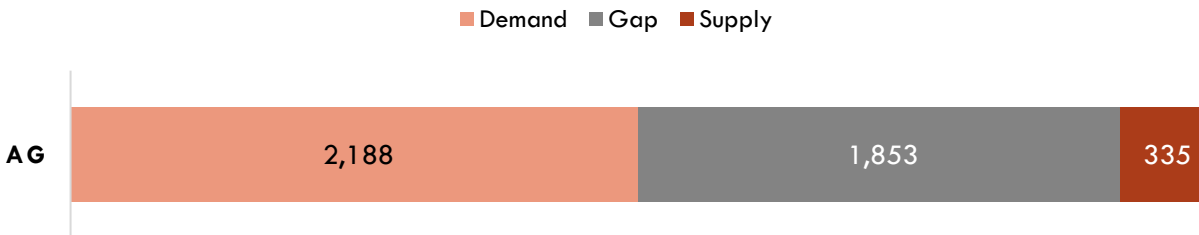
Community College Supply

Exhibit 26: Agriculture, water and environmental technologies community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
010100 - Agriculture Technology and Sciences, General		14	17	18	16
010200 - Animal Science	60	98	123	93	125
010300 - Plant Science		17	27	18	21
010900 - Horticulture		10	11	16	12
011200 - Agriculture Business, Sales and Service		53	45	63	54
011400 - Forestry		5	12	8	8
011500 - Natural Resources		17	27	14	19
011600 - Agricultural Power Equipment Technology		45	79	85	70
019900 - Other Agriculture and Natural Resources		8	12	9	10
Total	60	267	353	324	335

Gap Analysis

Exhibit 27: Agriculture, water and environmental technologies annual demand and supply in the NCV/NML subregion



Advanced Manufacturing

Summary

The largest occupation in the NCV/NML subregion's advanced manufacturing sector is packaging and filling machine operators and tenders, with 3,740 workers in 2018, 4% projected growth and 480 annual openings. This occupation is followed by first-line supervisors of production and operating workers with 2,292 workers in 2018, 6% projected growth and 266 annual openings. The highest paid occupations are industrial production managers, \$48.85/hour median, and first-line supervisors of production and operating workers, \$30.52/hour median. On average each year, community colleges in the subregion confer 45 awards related to advanced manufacturing. The gap analysis reveals a shortage of 2,205 advanced manufacturing workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 28: Advanced manufacturing employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Packaging and Filling Machine Operators and Tenders	3,740	3,906	166	4%	480
First-Line Supervisors of Production and Operating Workers	2,292	2,419	127	6%	266
Inspectors, Testers, Sorters, Samplers, and Weighers	1,799	1,782	(17)	(1%)	225
Industrial Machinery Mechanics	2,146	2,238	92	4%	222
Production, Planning, and Expediting Clerks	1,313	1,442	129	10%	168
Production Workers, All Other	1,290	1,329	39	3%	160
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	895	960	65	7%	120
Mixing and Blending Machine Setters, Operators, and Tenders	635	652	17	3%	79
Industrial Production Managers	701	738	37	5%	60
Sawing Machine Setters, Operators, and Tenders, Wood	401	431	30	7%	54
Maintenance Workers, Machinery	479	514	35	7%	52
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	311	334	23	7%	50
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	296	309	13	4%	36
Engineering Technicians, Except Drafters, All Other	321	335	14	4%	35
Conveyor Operators and Tenders	221	242	21	10%	32
Grinding and Polishing Workers, Hand	245	230	(15)	(6%)	28
Molders, Shapers, and Casters, Except Metal and Plastic	242	239	(3)	(1%)	27

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	166	187	21	13%	22
Electrical and Electronics Engineering Technicians	190	198	8	4%	21
Computer-Controlled Machine Tool Operators, Metal and Plastic	178	187	9	5%	21

Wages

Exhibit 29: Advanced manufacturing wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Industrial Production Managers	\$37.21	\$48.85
First-Line Supervisors of Production and Operating Workers	\$22.84	\$30.52
Industrial Machinery Mechanics	\$20.13	\$26.02
Maintenance Workers, Machinery	\$19.96	\$24.96
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	\$17.56	\$25.16
Engineering Technicians, Except Drafters, All Other	\$17.39	\$27.33
Electrical and Electronics Engineering Technicians	\$17.33	\$23.75
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	\$17.19	\$20.58
Computer-Controlled Machine Tool Operators, Metal and Plastic	\$16.61	\$20.26
Production, Planning, and Expediting Clerks	\$16.06	\$21.10
Molders, Shapers, and Casters, Except Metal and Plastic	\$15.89	\$22.14
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	\$14.11	\$16.36
Inspectors, Testers, Sorters, Samplers, and Weighers	\$14.02	\$17.59
Mixing and Blending Machine Setters, Operators, and Tenders	\$14.02	\$17.47
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	\$13.96	\$16.71
Sawing Machine Setters, Operators, and Tenders, Wood	\$12.18	\$13.86
Grinding and Polishing Workers, Hand	\$12.15	\$13.76
Packaging and Filling Machine Operators and Tenders	\$12.07	\$14.38
Production Workers, All Other	\$11.72	\$13.67

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Conveyor Operators and Tenders	\$3.06	\$12.57
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

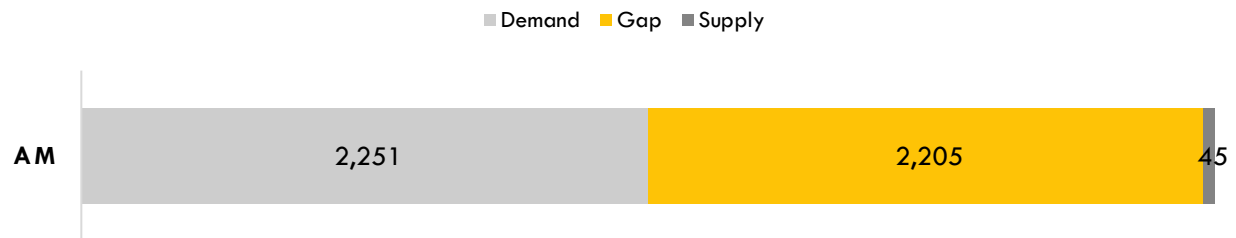
Community College Supply

Exhibit 30: Advanced manufacturing community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
090100 - Engineering, General		10	6	9	8
092400 - Engineering Technology, General		2	1	-	1
093500 - Electro-Mechanical Technology		-	2	7	3
094300 - Instrumentation Technology		5	2	1	3
094500 - Industrial Systems Technology and Maintenance		9	4	5	6
095630 - Machining and Machine Tools		27	32	11	23
099900 - Other Engineering and Related Industrial Technologies		3	-	-	1
Total		56	47	33	45

Gap Analysis

Exhibit 31: Advanced manufacturing annual demand and supply in the NCV/NML subregion



Business

Summary

In the NCV/NML subregion, the largest business occupations include office clerks (general) with 12,112 workers in 2018, and secretaries and administration assistants (except legal, medical and executive) with more than 8,283 workers. These occupations will offer a substantial number of annual openings in coming years. Most business-related occupations are projected to undergo modest to moderate growth; however, tellers are projected to decline by 9%, a loss of 120 jobs over five years, as are executive secretaries and executive administrative assistants, a 4% drop representing a loss of 49 jobs. Business operations specialists earn the highest median wage in the subregion, \$31.54/hour, followed by executive secretaries and executive administrative assistants, \$27.93/hour. On average each year, community colleges in the subregion confer 942 awards related to business. The gap analysis reveals a shortage of 6,762 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 32: Business employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Office Clerks, General	12,112	12,460	348	3%	1,556
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	8,283	8,304	21	0%	957
Bookkeeping, Accounting, and Auditing Clerks	6,672	6,724	52	1%	804
First-Line Supervisors of Office and Administrative Support Workers	5,390	5,586	196	4%	617
Receptionists and Information Clerks	3,335	3,587	252	8%	512
Business Operations Specialists, All Other	3,741	3,968	227	6%	414
Billing and Posting Clerks	1,822	1,946	124	7%	229
Office and Administrative Support Workers, All Other	1,678	1,739	61	4%	212
Tellers	1,374	1,254	(120)	(9%)	160
Executive Secretaries and Executive Administrative Assistants	1,342	1,293	(49)	(4%)	149
Real Estate Sales Agents	1,518	1,524	6	0%	148
Information and Record Clerks, All Other	938	964	26	3%	118
Dispatchers, Except Police, Fire, and Ambulance	1,114	1,157	43	4%	117
First-Line Supervisors of Non-Retail Sales Workers	1,106	1,133	27	2%	115
Interviewers, Except Eligibility and Loan	839	869	30	4%	113
Insurance Claims and Policy Processing Clerks	954	974	20	2%	106
Payroll and Timekeeping Clerks	901	904	3	0%	102

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	735	807	72	10%	102
Property, Real Estate, and Community Association Managers	1,196	1,208	12	1%	98
Order Clerks	769	799	30	4%	98

Wages

Exhibit 33: Business wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Business Operations Specialists, All Other	\$22.26	\$31.54
Executive Secretaries and Executive Administrative Assistants	\$22.23	\$27.93
First-Line Supervisors of Office and Administrative Support Workers	\$20.78	\$26.16
Payroll and Timekeeping Clerks	\$18.32	\$22.03
Dispatchers, Except Police, Fire, and Ambulance	\$16.04	\$21.26
Real Estate Sales Agents	\$15.95	\$25.99
Bookkeeping, Accounting, and Auditing Clerks	\$15.85	\$20.05
First-Line Supervisors of Non-Retail Sales Workers	\$15.75	\$24.61
Interviewers, Except Eligibility and Loan	\$15.44	\$17.83
Property, Real Estate, and Community Association Managers	\$15.44	\$24.58
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	\$14.89	\$18.76
Insurance Claims and Policy Processing Clerks	\$14.72	\$17.41
Billing and Posting Clerks	\$14.64	\$17.83
Order Clerks	\$14.62	\$17.67
Information and Record Clerks, All Other	\$14.17	\$18.56
Tellers	\$12.83	\$14.38
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	\$12.45	\$14.73
Office Clerks, General	\$12.23	\$16.05
Receptionists and Information Clerks	\$11.82	\$13.79
Office and Administrative Support Workers, All Other	\$11.63	\$14.00
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

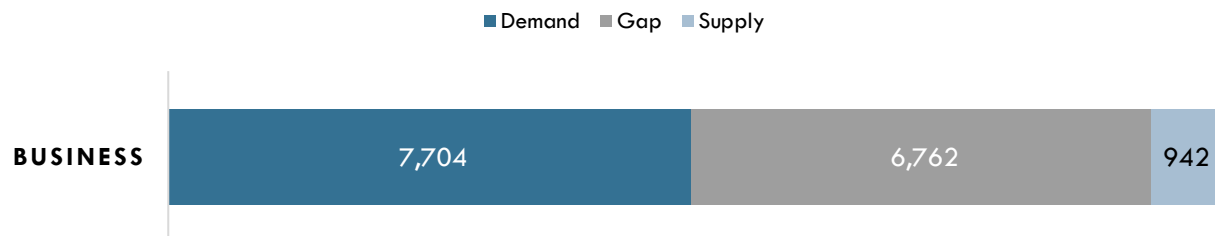
Community College Supply

Exhibit 34: Business community college supply

TOP4 or CIP Code and Program Title	2014 -15	2015 -16	2016 -17	2017 -18	Latest 3-Year Average
050200 - Accounting	36	186	184	141	182
050400 - Banking and Finance		5	1	-	2
050500 - Business Administration	8	274	273	279	278
050600 - Business Management		52	75	84	70
051100 - Real Estate		36	43	58	46
051400 - Office Technology/Office Computer Applications		84	59	75	73
051420 - Medical Office Technology		39	43	54	45
051440 - Office Management		9	7	9	8
22.0301 - Legal Administrative Assistant/Secretary	11	11	5		9
22.0303 - Court Reporting/Court Reporter	1	4	1		2
51.0716 - Medical Administrative/Executive Assistant and Medical Secretary	118	93	132		114
52.0401 - Administrative Assistant and Secretarial Science, General	34	39	37		37
52.0407 - Business/Office Automation/Technology/Data Entry	3	-	2		2
52.0408 - General Office Occupations and Clerical Services	93	61	44		66
059900 - Other Business and Management		1	2	-	1
140200 - Paralegal	10	9	-		6
Total	314	903	908	700	942

Gap Analysis

Exhibit 35: Business annual demand and supply in the NCV/NML subregion



Energy, Construction & Utilities

Summary

The largest energy, construction, and utilities occupation is maintenance and repair workers (general) with more than 5,665 workers in the NCV/NML subregion in 2018. This occupation is projected to undergo moderate growth, 7%, and will offer 644 annual openings. The second largest occupation is carpenters, with 4,189 workers in 2018 with 7% growth. This occupation will offer the second highest number of openings in the sector, 504 each year. Occupations earning the highest wages include first-line supervisors of construction trades and extraction workers, \$32.04/hour median, and telecommunications equipment installers and repairers, except line installers, \$27.80/hour median. On average each year, community colleges in the subregion confer 231 awards related to energy, construction, and utilities. The gap analysis reveals a shortage of 4,119 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 36: Energy, construction and utilities employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Maintenance and Repair Workers, General	5,665	6,049	384	7%	644
Carpenters	4,189	4,463	274	7%	504
Electricians	2,322	2,645	323	14%	353
First-Line Supervisors of Construction Trades and Extraction Workers	2,335	2,576	241	10%	306
Painters, Construction and Maintenance	2,190	2,452	262	12%	286
Operating Engineers and Other Construction Equipment Operators	1,527	1,748	221	14%	231
Plumbers, Pipefitters, and Steamfitters	1,376	1,541	165	12%	194
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,253	1,380	127	10%	154
Installation, Maintenance, and Repair Workers, All Other	1,244	1,305	61	5%	148
Construction Managers	1,443	1,557	114	8%	132
Cement Masons and Concrete Finishers	926	989	63	7%	115
Roofers	794	845	51	6%	96
Drywall and Ceiling Tile Installers	913	863	(50)	(5%)	95
Telecommunications Equipment Installers and Repairers, Except Line Installers	829	806	(23)	(3%)	93
Structural Iron and Steel Workers	586	657	71	12%	87
Brickmasons and Blockmasons	384	502	118	31%	67
Solar Photovoltaic Installers	315	414	99	31%	64
Cabinetmakers and Bench Carpenters	457	473	16	4%	52
Highway Maintenance Workers	328	377	49	15%	48
Tile and Marble Setters	368	407	39	11%	47

Wages

Exhibit 37: Energy, construction and utilities wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Telecommunications Equipment Installers and Repairers, Except Line Installers	\$24.45	\$27.80
First-Line Supervisors of Construction Trades and Extraction Workers	\$24.06	\$32.04
Operating Engineers and Other Construction Equipment Operators	\$21.73	\$26.25
Electricians	\$21.49	\$28.84
Drywall and Ceiling Tile Installers	\$20.13	\$27.73
Cement Masons and Concrete Finishers	\$19.37	\$25.55
Roofers	\$19.26	\$22.59
Structural Iron and Steel Workers	\$18.88	\$25.58
Construction Managers	\$17.80	\$31.96
Tile and Marble Setters	\$17.24	\$22.80
Plumbers, Pipefitters, and Steamfitters	\$17.13	\$23.09
Highway Maintenance Workers	\$17.12	\$24.30
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$16.97	\$23.85
Solar Photovoltaic Installers	\$16.97	\$20.44
Carpenters	\$16.42	\$23.37
Brickmasons and Blockmasons	\$16.25	\$21.69
Installation, Maintenance, and Repair Workers, All Other	\$14.06	\$17.42
Maintenance and Repair Workers, General	\$13.62	\$19.18
Painters, Construction and Maintenance	\$12.76	\$16.11
Cabinetmakers and Bench Carpenters	\$12.42	\$16.43
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

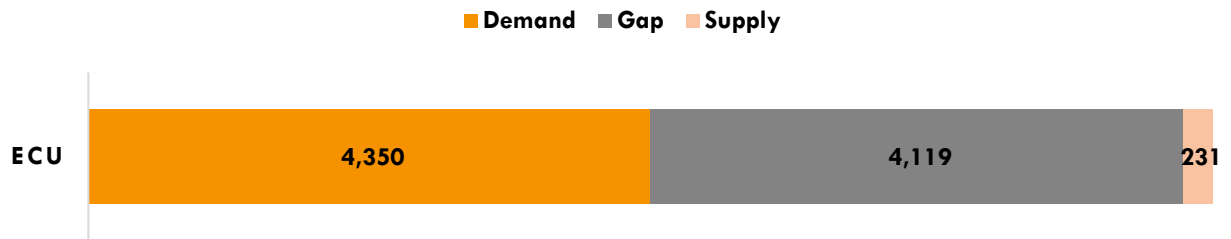
Community College Supply

Exhibit 38: Energy, construction and utilities community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
093400 - Electronics and Electric Technology	64	92	92	88	112
094600 - Environmental Control Technology	-	18	23		14
094600 - Environmental Control Technology (HVAC)		23	25	20	23
095200 - Construction Crafts Technology		21	36	38	32
095300 - Drafting Technology	9	34	47	48	46
095640 - Sheet Metal and Structural Metal		4	3	5	4
095700 - Civil and Construction Management Technology		2	1	-	1
Total	73	194	227	199	231

Gap Analysis

Exhibit 39: Energy, construction and utilities annual demand and supply in the NCV/NML subregion



Education

Summary

In the NCV/NML subregion, the largest education occupation is teacher assistants with 8,059 workers in 2018. This occupation has a projected growth rate of 7% with 985 annual openings. Childcare workers comprise the second largest occupation, with 4,953 workers in 2018, followed by preschool teachers (except special education), with 1,706 workers. There are projected to be 722 annual openings for childcare workers, even though this occupation is expected to decline by 7%. Preschool teachers is an occupation with a low rate of projected growth, 4%; however, this occupation will offer 191 annual openings. The highest paid occupation is career/technical education teachers (secondary school), \$46.33/hour median. Kindergarten teachers (except special education) earn \$36.83/hour median. On average each year, community colleges in the subregion confer 408 awards related to education. The gap analysis reveals a shortage of 2,001 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 40: Education employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Teacher Assistants	8,059	8,587	528	7%	985
Childcare Workers	4,953	4,591	(362)	(7%)	722
Preschool Teachers, Except Special Education	1,706	1,770	64	4%	191
Self-Enrichment Education Teachers	1,325	1,448	123	9%	183
Training and Development Specialists	724	789	65	9%	94
Library Technicians	480	485	5	1%	76
Kindergarten Teachers, Except Special Education	603	655	52	9%	73
Library Assistants, Clerical	244	250	6	2%	39
Education Administrators, Preschool and Childcare Center/Program	281	278	(3)	(1%)	23
Career/Technical Education Teachers, Secondary School	249	265	16	6%	22

Wages

Exhibit 41: Education wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Career/Technical Education Teachers, Secondary School	\$35.33	\$46.33
Kindergarten Teachers, Except Special Education	\$29.58	\$36.83
Education Administrators, Preschool and Childcare Center/Program	\$18.29	\$21.45
Training and Development Specialists	\$17.75	\$25.30
Library Technicians	\$14.42	\$18.41
Teacher Assistants	\$13.43	\$16.31
Self-Enrichment Education Teachers	\$12.47	\$16.14
Library Assistants, Clerical	\$12.40	\$16.52
Preschool Teachers, Except Special Education	\$11.89	\$16.14
Childcare Workers	\$11.00	\$12.07
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

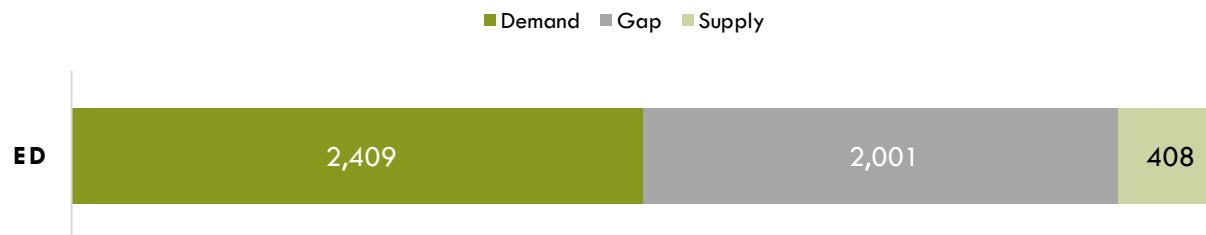
Community College Supply

Exhibit 42: Education community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
130500 - Child Development/Early Care and Education	6	339	417	462	408

Gap Analysis

Exhibit 43: Education annual demand and supply in the NCV/NML subregion



Global Trade

Summary

Several occupations make up the bulk of employment in the NCV/NML subregion's global trade sector. The largest occupations are general and operations managers, and sales representatives (wholesale and manufacturing, except technical and scientific products). General and operations managers is projected to undergo 8% growth and offer 729 annual openings. Sales representatives is expected to increase by 6% with 550 annual openings. General and operations managers earn the highest median wages, \$43.26/hour, followed by administrative services managers, \$43.21/hour. On average each year, community colleges in the subregion confer 249 awards related to global trade. The gap analysis reveals a shortage of 1,422 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 44: Global trade employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
General and Operations Managers	6,840	7,409	569	8%	729
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	4,560	4,824	264	6%	550
Cost Estimators	1,059	1,158	99	9%	129
Buyers and Purchasing Agents	1,231	1,251	20	2%	128
Administrative Services Managers	892	962	70	8%	90
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	381	394	13	3%	45

Wages

Exhibit 45: Global trade wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Administrative Services Managers	\$34.09	\$43.21
General and Operations Managers	\$30.31	\$43.26
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	\$26.16	\$33.96
Cost Estimators	\$23.11	\$31.23
Buyers and Purchasing Agents	\$21.67	\$29.32
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	\$17.98	\$28.44
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

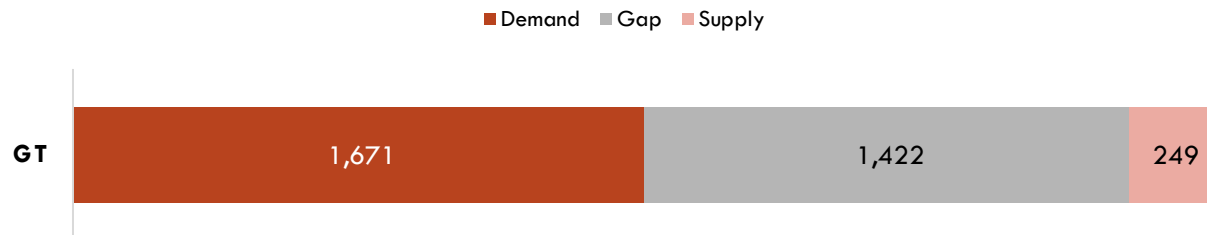
Community College Supply

Exhibit 46: Global trade community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
050100 - Business and Commerce, General	19	199	261	231	237
050800 - International Business and Trade		2	2	1	2
050900 - Marketing and Distribution		6	10	16	11
Total	19	207	273	248	249

Gap Analysis

Exhibit 47: Global trade annual demand and supply in the NCV/NML subregion



Health Care

Summary

In the NCV/NML subregion, the top three largest health care occupations are registered nurses, 10,890 workers in 2018, nursing assistants, 4,285 workers, and medical assistants, 3,825 workers. These occupations are projected to undergo 7% to 13% growth and offer substantial annual openings. One occupation to note is home health aides which is expected to grow by 57%, with 182 annual openings. However, this occupation is one of the lowest wages bearing in the sector and across the subregion with a median wage of \$12.84/hour. Registered nurses earn the highest median wage in the subregion, \$51.81/hour, followed by dental hygienists, \$49.47/hour. On average each year, community colleges in the subregion confer 1,665 awards related to health care. The gap analysis reveals a shortage of 2,838 health care workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 48: Health care employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Registered Nurses	10,890	11,679	789	7%	758
Nursing Assistants	4,285	4,629	344	8%	565
Medical Assistants	3,825	4,305	480	13%	539
Medical Secretaries	2,656	2,926	270	10%	365
Social and Human Service Assistants	1,658	1,948	290	17%	269
Dental Assistants	1,995	2,159	164	8%	266
Licensed Practical and Licensed Vocational Nurses	2,629	2,823	194	7%	245
Home Health Aides	727	1,142	415	57%	182
Pharmacy Technicians	1,379	1,403	24	2%	120
Emergency Medical Technicians and Paramedics	1,089	1,201	112	10%	102
Health Technologists and Technicians, All Other	816	936	120	15%	83
Massage Therapists	518	586	68	13%	78
Clinical Laboratory Technologists and Technicians	818	894	76	9%	77
Dental Hygienists	739	818	79	11%	68
Pharmacy Aides	558	496	(62)	(11%)	67
Phlebotomists	433	490	57	13%	60
Healthcare Support Workers, All Other	447	481	34	8%	59
Medical Records and Health Information Technicians	718	770	52	7%	58
Radiologic Technologists	622	677	55	9%	47
Psychiatric Technicians	541	516	(25)	(5%)	46

Wages

Exhibit 49: Health care wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Registered Nurses	\$42.73	\$51.81
Dental Hygienists	\$41.48	\$49.47
Radiologic Technologists	\$23.26	\$36.32
Licensed Practical and Licensed Vocational Nurses	\$22.63	\$26.76
Clinical Laboratory Technologists and Technicians	\$18.28	\$24.25
Healthcare Support Workers, All Other	\$18.20	\$21.85
Phlebotomists	\$18.10	\$22.02
Health Technologists and Technicians, All Other	\$17.44	\$20.80
Medical Records and Health Information Technicians	\$17.33	\$22.02
Social and Human Service Assistants	\$16.89	\$20.40
Psychiatric Technicians	\$15.15	\$32.70
Pharmacy Technicians	\$15.14	\$18.54
Medical Secretaries	\$15.01	\$18.43
Dental Assistants	\$14.88	\$17.37
Medical Assistants	\$14.39	\$16.84
Nursing Assistants	\$13.68	\$16.12
Pharmacy Aides	\$12.09	\$13.78
Emergency Medical Technicians and Paramedics	\$11.89	\$14.35
Home Health Aides	\$11.62	\$12.84
Massage Therapists	\$11.42	\$16.59
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

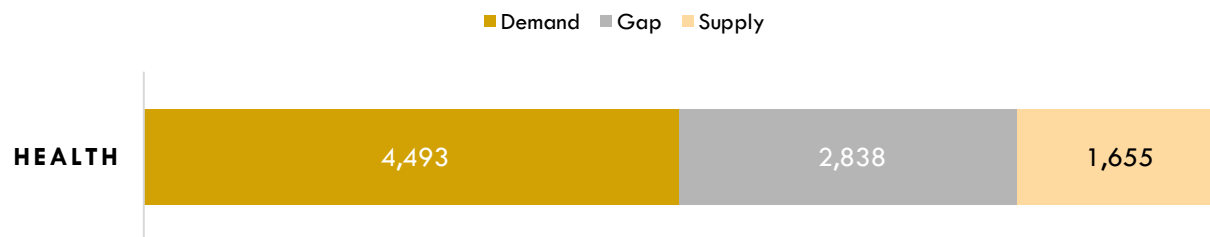
Community College Supply

Exhibit 50: Health care community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
043000 - Biotechnology and Biomedical Technology		5	7	1	4
120100 - Health Occupations, General	33	66	84	97	93
120800 - Medical Assisting	398	601	689	68	585
121000 - Respiratory Care/Therapy	45	62	56	22	62
122000 - Speech/Language Pathology and Audiology		15	17	16	16
122100 - Pharmacy Technology	64	55	70		63
122300 - Health Information Technology	1	-	-		0
122500 - Radiologic Technology		38	33	28	33
122700 - Diagnostic Medical Sonography		3	-	7	3
122800 - Athletic Training and Sports Medicine		20	14	9	14
123000 - Nursing	65	442	480	422	470
123900 - Psychiatric Technician		65	66	71	67
124000 - Dental Occupations	152	180	167		166
126000 - Health Professions, Transfer Core Curriculum		43	36	38	39
126200 - Massage Therapy	58	35	20		38
Total	816	1,630	1,739	779	1,655

Gap Analysis

Exhibit 51: Health care annual demand and supply in the NCV/NML subregion



ICT & Digital Media

Summary

ICT/digital media is the smallest sector analyzed in this report. The largest occupation in the NCV/NML subregion is computer user support specialists. This occupation employed 1,166 workers in 2018 and is projected to increase by 8% over the next five years, offering 120 annual openings. Computer occupations (all other), the second largest ICT/digital media occupation in the subregion, is projected to experience subdued growth, only 3%, but will still offer 69 annual openings. Network and computer systems administrators earn the highest median wage, \$40.50/hour. The lowest median wage is earned by computer, automated teller and office machine repairers, \$18.35/hour. On average each year, community colleges in the subregion confer 179 awards related to ICT and digital media. The gap analysis reveals a shortage of 232 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 52: ICT/digital media employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Computer User Support Specialists	1,166	1,262	96	8%	120
Computer Occupations, All Other	842	870	28	3%	69
Graphic Designers	554	575	21	4%	62
Network and Computer Systems Administrators	496	539	43	9%	45
Computer Network Support Specialists	295	313	18	6%	29
Web Developers	286	311	25	9%	28
Computer, Automated Teller, and Office Machine Repairers	204	199	(5)	(2%)	24
Medical Equipment Repairers	131	146	15	11%	18
Surveying and Mapping Technicians	123	124	1	1%	16

Wages

Exhibit 53: ICT/digital media wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Network and Computer Systems Administrators	\$32.06	\$40.50
Computer Network Support Specialists	\$24.63	\$32.66
Computer Occupations, All Other	\$23.75	\$30.43
Computer User Support Specialists	\$20.52	\$25.59
Surveying and Mapping Technicians	\$20.44	\$27.15
Web Developers	\$20.15	\$26.98
Medical Equipment Repairers	\$19.05	\$27.00
Graphic Designers	\$16.58	\$21.61
Computer, Automated Teller, and Office Machine Repairers	\$12.90	\$18.35

*Due to fluctuations in 10th percentile wages, 25th percentile wages have been used to describe entry-level wages.

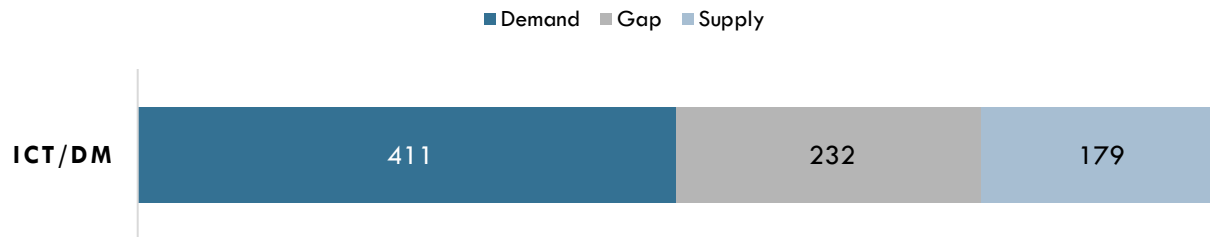
Community College Supply

Exhibit 54: ICT/digital media community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
060100 - Media and Communications, General		7	5	3	5
060400 - Radio and Television		10	16	13	13
061400 - Digital Media		19	33	34	29
070100 - Information Technology, General		-	1	2	1
070200 - Computer Information Systems		18	23	26	22
070600 - Computer Science (Transfer)		30	31	45	35
070700 - Computer Software Development		6	8	11	8
070800 - Computer Infrastructure and Support	52	45	36	54	62
070900 - World Wide Web Administration		-	-	1	0
079900 - Other Information Technology	1	3	3		2
Total	53	138	156	189	179

Gap Analysis

Exhibit 55: ICT/digital media annual demand and supply in the NCV/NML subregion



Logistics

Summary

In the NCV/NML subregion, heavy and tractor-trailer truck drivers comprise the largest logistics occupation. In 2018, 14,928 workers were employed in this occupation which is projected to grow by 7%, offering 1,951 annual openings. The second largest occupation, industrial truck and tractor operators, is projected to expand by 14% over the next five years, offering 924 annual openings. Shipping, receiving and traffic clerks will also offer substantial annual openings, 406. The highest median wage is earned by airline pilots, copilots, and flight engineers, \$82.79/hour. The lowest is earned by cargo and freight agents, \$16.64/hour. On average each year, community colleges in the subregion confer six certificates related to logistics. The gap analysis reveals a shortage of 4,468 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 56: Logistics employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Heavy and Tractor-Trailer Truck Drivers	14,928	15,917	989	7%	1,951
Industrial Truck and Tractor Operators	6,315	7,179	864	14%	924
Shipping, Receiving, and Traffic Clerks	3,245	3,592	347	11%	406
First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	2,604	2,991	387	15%	375
Bus Drivers, School or Special Client	1,579	1,937	358	23%	291
Bus Drivers, Transit and Intercity	511	677	166	32%	107
Transportation, Storage, and Distribution Managers	862	968	106	12%	93
Transportation Attendants, Except Flight Attendants	594	613	19	3%	83
Logisticians	540	584	44	8%	62
Painters, Transportation Equipment	290	313	23	8%	37
Commercial Pilots	221	244	23	10%	29
Aircraft Mechanics and Service Technicians	234	249	15	6%	24
Cargo and Freight Agents	145	169	24	17%	21
Railroad Conductors and Yardmasters	147	151	4	3%	15
Transportation Inspectors	101	108	7	7%	12
Locomotive Engineers	112	117	5	4%	12
Air Traffic Controllers	118	115	(3)	(3%)	11
Rail Car Repairers	94	95	1	1%	10
Airline Pilots, Copilots, and Flight Engineers	83	90	7	8%	10

Wages

Exhibit 57: Logistics wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Airline Pilots, Copilots, and Flight Engineers	\$47.03	\$82.79
Commercial Pilots	\$44.73	\$50.75
Transportation, Storage, and Distribution Managers	\$36.39	\$47.07
Railroad Conductors and Yardmasters	\$29.37	\$34.87
Locomotive Engineers	\$27.97	\$37.24
Logisticians	\$27.86	\$35.68
Bus Drivers, Transit and Intercity	\$26.06	\$32.02
Transportation Inspectors	\$24.98	\$33.37
Air Traffic Controllers	\$24.81	\$27.13
Rail Car Repairers	\$20.87	\$26.50
Aircraft Mechanics and Service Technicians	\$20.27	\$26.55
First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	\$19.93	\$27.70
Heavy and Tractor-Trailer Truck Drivers	\$16.77	\$20.83
Transportation Attendants, Except Flight Attendants	\$16.48	\$21.24
Bus Drivers, School or Special Client	\$15.43	\$18.92
Cargo and Freight Agents	\$14.82	\$16.64
Industrial Truck and Tractor Operators	\$14.29	\$16.96
Shipping, Receiving, and Traffic Clerks	\$13.82	\$17.27
Painters, Transportation Equipment	\$13.65	\$21.28

*Due to fluctuations in 10th percentile wages, 25th percentile wages have been used to describe entry-level wages.

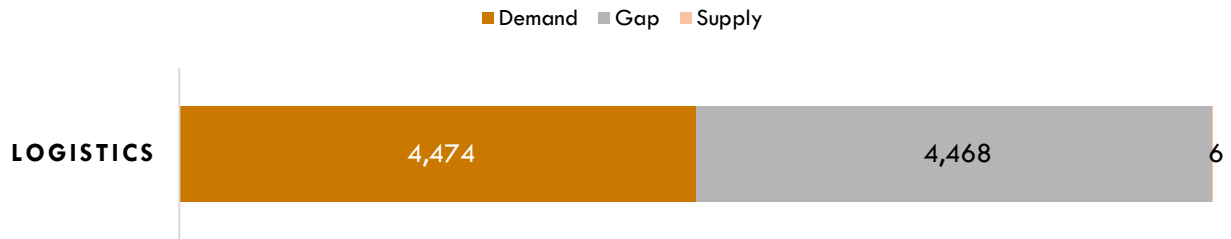
Community College Supply

Exhibit 58: Logistics community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
051000 - Logistics and Materials Transportation		4	3	10	6

Gap Analysis

Exhibit 59: Logistics annual demand and supply in the NCV/NML subregion



Mechanics & Welding

Summary

By far, the largest mechanics and welding occupation in the NCV/NML subregion is automotive service technicians and mechanics with 3,231 workers in 2018. This occupation is projected to expand by 2%, with 337 annual openings. With 1,718 workers in 2018, welders, cutters, solderers and brazers is the second largest occupation and is projected to undergo 4% growth, offering 208 annual openings. Structural metal fabricators and fitters is projected to contract by 6% through 2023, shedding 20 workers. First-line supervisors of mechanics, installers, and repairers earn the highest median wage, \$34.15/hour, followed by bus and truck mechanics and diesel engine specialists, \$24.38/hour. On average each year, community colleges in the subregion confer 285 awards related to mechanics and welding. The gap analysis reveals a shortage of 460 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 60: Mechanics and welding employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Automotive Service Technicians and Mechanics	3,231	3,309	78	2%	337
Welders, Cutters, Solderers, and Brazers	1,718	1,789	71	4%	208
Bus and Truck Mechanics and Diesel Engine Specialists	1,774	1,921	147	8%	200
First-Line Supervisors of Mechanics, Installers, and Repairers	1,661	1,789	128	8%	184
Machinists	740	788	48	6%	88
Automotive Body and Related Repairers	682	731	49	7%	78
Structural Metal Fabricators and Fitters	310	290	(20)	(6%)	32
Recreational Vehicle Service Technicians	152	156	4	3%	18
Outdoor Power Equipment and Other Small Engine Mechanics	110	120	10	9%	14

Wages

Exhibit 61: Mechanics and welding wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
First-Line Supervisors of Mechanics, Installers, and Repairers	\$27.03	\$34.15
Bus and Truck Mechanics and Diesel Engine Specialists	\$19.31	\$24.38
Automotive Body and Related Repairers	\$17.88	\$24.12
Recreational Vehicle Service Technicians	\$16.70	\$20.07
Welders, Cutters, Solderers, and Brazers	\$16.52	\$19.65
Machinists	\$16.28	\$20.21
Outdoor Power Equipment and Other Small Engine Mechanics	\$14.91	\$17.49
Structural Metal Fabricators and Fitters	\$14.74	\$18.18

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Automotive Service Technicians and Mechanics	\$12.60	\$18.76

*Due to fluctuations in 10th percentile wages, 25th percentile wages have been used to describe entry-level wages.

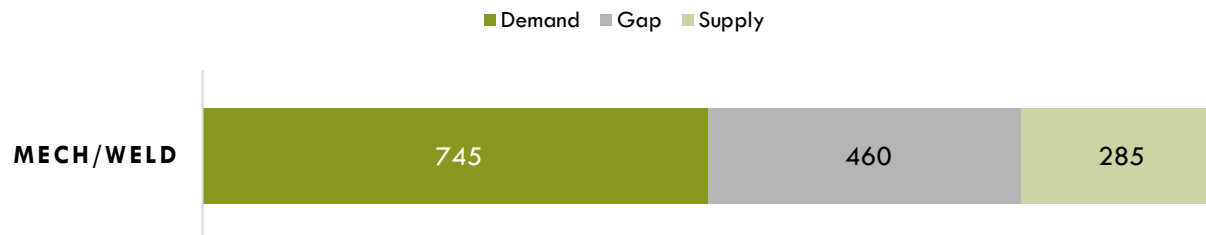
Community College Supply

Exhibit 62: Mechanics and welding community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
094700 - Diesel Technology		34	44	53	44
094800 - Automotive Technology		152	151	181	161
094900 - Automotive Collision Repair		37	68	56	54
095650 - Welding Technology		26	21	32	26
Total		249	284	322	285

Gap Analysis

Exhibit 63: Mechanics and welding annual demand and supply in the NCV/NML subregion



Protective Services

Summary

Correctional officers and jailers comprise the largest protective services occupation in the NCV/NML subregion, with 3,427 workers in 2018. With 6% growth projected, this occupation will offer 356 annual openings. The second largest occupation is protective service workers (all other), which is expected to undergo 10% growth, translating to 254 annual openings. The highest paid occupation is first-line supervisors of police and detectives, earning median wages of \$64.93/hour, followed by first-line supervisors of firefighting and prevention workers, \$42.29/hour. On average each year, community colleges in the subregion confer 667 awards related to protective services. The gap analysis reveals a shortage of 564 workers in the NCV/NML subregion.

Employment & Occupational Demand

Exhibit 64: Protective services employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Correctional Officers and Jailers	3,427	3,623	196	6%	356
Protective Service Workers, All Other	932	1,027	95	10%	254
Police and Sheriff's Patrol Officers	2,606	2,818	212	8%	232
Firefighters	1,867	1,984	117	6%	154
Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	244	266	22	9%	66
Police, Fire, and Ambulance Dispatchers	408	441	33	8%	47
First-Line Supervisors of Correctional Officers	441	474	33	7%	39
First-Line Supervisors of Protective Service Workers, All Other	205	236	31	15%	27
Private Detectives and Investigators	171	178	7	4%	17
First-Line Supervisors of Police and Detectives	154	179	25	16%	15
Detectives and Criminal Investigators	127	151	24	19%	13
First-Line Supervisors of Fire Fighting and Prevention Workers	120	133	13	11%	10

Wages

Exhibit 65: Protective services wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
First-Line Supervisors of Police and Detectives	\$49.75	\$64.93
First-Line Supervisors of Fire Fighting and Prevention Workers	\$35.69	\$42.29
Detectives and Criminal Investigators	\$34.53	\$41.37
Correctional Officers and Jailers	\$31.34	\$36.76
Police and Sheriff's Patrol Officers	\$31.19	\$40.85
First-Line Supervisors of Correctional Officers	\$27.17	\$40.68
Police, Fire, and Ambulance Dispatchers	\$25.04	\$29.23
Private Detectives and Investigators	\$21.64	\$32.27
Firefighters	\$17.21	\$27.45
First-Line Supervisors of Protective Service Workers, All Other	\$16.61	\$25.84
Protective Service Workers, All Other	\$13.93	\$16.58
Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	\$11.63	\$12.79
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

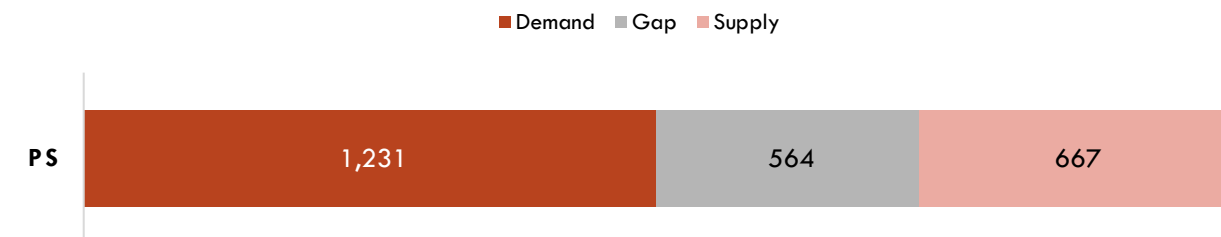
Community College Supply

Exhibit 66: Protective services community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
125000 - Emergency Medical Services		43	77	43	54
210500 - Administration of Justice	49	269	764	444	509
213300 - Fire Technology		95	80	65	80
219900 - Other Public and Protective Services	12	23	38		24
Total	61	430	959	552	667

Gap Analysis

Exhibit 67: Protective services annual demand and supply in the NCV/NML subregion



Retail, Hospitality, Tourism & Entertainment

Summary

The analysis of the retail, hospitality, tourism and entertainment sector broke the sector into two subsectors: retail as the first sector, and hospitality, tourism, and entertainment as the second sector. The largest retail occupation in the NCV/NML subregion is customer service representatives with 6,048 workers in 2018. This occupation is projected to increase by 3%, offering 861 annual openings. The largest occupation in hospitality, tourism and entertainment is cooks (restaurant) with 3,935 workers in 2018. With a strong growth projection of 12%, this occupation will offer 680 annual openings. The highest paid retail occupation is interior designers with a median wage of \$23.98/hour. The highest paid hospitality, tourism and entertainment occupation is chefs and head cooks with a median wage of \$22.36/hour. On average each year, community colleges in the subregion confer 654 awards related to retail. By comparison, community colleges in the subregion confer on average 117 awards each year related to hospitality, tourism and entertainment. The combined gap in supply totals 5,414 workers.

Employment & Occupational Demand

Exhibit 68: Retail employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Customer Service Representatives	6,048	6,242	194	3%	861
First-Line Supervisors of Retail Sales Workers	6,003	6,094	91	2%	701
Hairdressers, Hairstylists, and Cosmetologists	2,547	2,782	235	9%	379
Insurance Sales Agents	2,622	2,884	262	10%	326
Sales Representatives, Services, All Other	2,178	2,373	195	9%	326
Manicurists and Pedicurists	1,713	1,877	164	10%	237
First-Line Supervisors of Personal Service Workers	1,005	1,125	120	12%	127
Demonstrators and Product Promoters	639	665	26	4%	118
Merchandise Displayers and Window Trimmers	712	738	26	4%	78
Security and Fire Alarm Systems Installers	301	331	30	10%	47
Advertising Sales Agents	314	284	(30)	(10%)	43
Barbers	253	287	34	13%	37
Funeral Attendants	118	128	10	8%	21
Home Appliance Repairers	167	170	3	2%	20
Skincare Specialists	127	149	22	17%	20
Floral Designers	129	134	5	4%	15
Designers, All Other	135	136	1	1%	14
Interior Designers	82	91	9	11%	10

Exhibit 69: Hospitality, tourism and entertainment employment and occupational projections

Occupation	2018	2023	5-Year Change	5-Year % Change	Annual Openings
Cooks, Restaurant	3,935	4,420	485	12%	680
First-Line Supervisors of Food Preparation and Serving Workers	3,121	3,472	351	11%	569
Fitness Trainers and Aerobics Instructors	1,346	1,418	72	5%	249
Food Service Managers	1,651	1,738	87	5%	212
Cooks, Institution and Cafeteria	1,234	1,328	94	8%	199
Bakers	772	799	27	3%	113
Gaming Dealers	649	694	45	7%	113
Butchers and Meat Cutters	794	818	24	3%	105
First-Line Supervisors of Housekeeping and Janitorial Workers	697	768	71	10%	97
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	590	636	46	8%	76
Chefs and Head Cooks	475	513	38	8%	72
Audio and Video Equipment Technicians	409	434	25	6%	51
Meeting, Convention, and Event Planners	311	335	24	8%	42
Interpreters and Translators	314	346	32	10%	39
Photographers	352	333	(19)	(5%)	37
Gaming Service Workers, All Other	221	229	8	4%	37
Tour and Travel Guides	164	171	7	4%	27
Lodging Managers	226	224	(2)	(1%)	25
Gaming and Sports Book Writers and Runners	114	119	5	4%	19
Travel Agents	98	114	16	16%	19

Wages

Exhibit 70: Retail wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Security and Fire Alarm Systems Installers	\$17.06	\$22.20
Sales Representatives, Services, All Other	\$15.60	\$21.98
Insurance Sales Agents	\$15.28	\$21.00
Home Appliance Repairers	\$15.17	\$21.37
First-Line Supervisors of Retail Sales Workers	\$14.58	\$18.47
First-Line Supervisors of Personal Service Workers	\$13.98	\$18.26
Interior Designers	\$13.83	\$23.98
Advertising Sales Agents	\$13.72	\$17.11
Customer Service Representatives	\$13.18	\$17.66

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Merchandise Displayers and Window Trimmers	\$13.01	\$15.10
Funeral Attendants	\$12.93	\$14.98
Floral Designers	\$11.92	\$13.46
Demonstrators and Product Promoters	\$11.73	\$13.71
Designers, All Other	\$11.24	\$22.77
Manicurists and Pedicurists	\$11.18	\$11.98
Hairdressers, Hairstylists, and Cosmetologists	\$10.86	\$14.16
Skincare Specialists	\$9.93	\$16.18
Barbers	\$7.92	\$11.67
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

Exhibit 71: Hospitality, tourism and entertainment wages

Occupation	25th Percentile Hourly Wages*	Median Hourly Wages
Interpreters and Translators	\$17.22	\$21.35
Chefs and Head Cooks	\$17.20	\$22.36
Food Service Managers	\$15.15	\$20.16
Travel Agents	\$15.15	\$20.16
Tour and Travel Guides	\$15.06	\$17.58
Meeting, Convention, and Event Planners	\$14.94	\$19.63
First-Line Supervisors of Housekeeping and Janitorial Workers	\$14.66	\$20.70
Cooks, Institution and Cafeteria	\$13.36	\$16.53
Gaming Service Workers, All Other	\$13.35	\$15.62
First-Line Supervisors of Food Preparation and Serving Workers	\$13.03	\$15.16
Gaming and Sports Book Writers and Runners	\$13.03	\$15.16
Butchers and Meat Cutters	\$11.98	\$14.72
Fitness Trainers and Aerobics Instructors	\$11.79	\$18.45
Gaming Dealers	\$11.78	\$13.25
Audio and Video Equipment Technicians	\$11.62	\$24.00
Photographers	\$11.62	\$19.95
Bakers	\$11.56	\$13.82
Cooks, Restaurant	\$11.55	\$13.02
Lodging Managers	\$11.55	\$13.02
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	\$11.50	\$18.01
*Due to fluctuations in 10 th percentile wages, 25 th percentile wages have been used to describe entry-level wages.		

Community College Supply

Exhibit 72: Retail community college supply

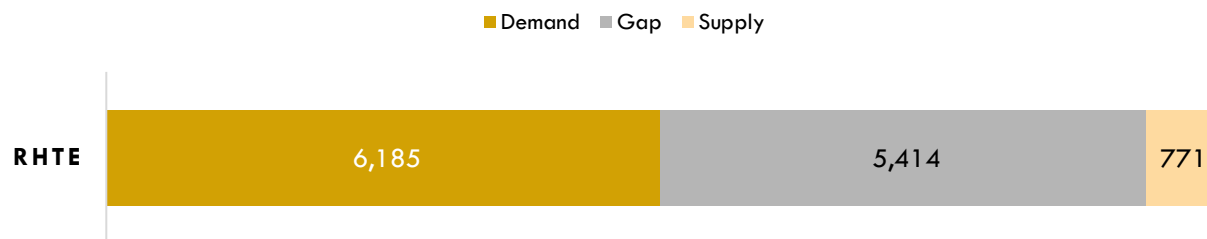
TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
300700 - Cosmetology and Barbering	671	669	622		654

Exhibit 73: Hospitality, tourism and entertainment community college supply

TOP4 or CIP Code and Program Title	2014-15	2015-16	2016-17	2017-18	Latest 3-Year Average
100500 - Commercial Music		2	1	2	2
100600 - Technical Theater		3	4	4	4
101200 - Applied Photography		-	1	2	1
103000 - Graphic Art and Design	1	8	10	11	10
130200 - Interior Design and Merchandising		9	11	7	9
130300 - Fashion		7	17	10	11
130600 - Nutrition, Foods, and Culinary Arts		66	52	67	62
130700 - Hospitality		32	13	10	18
Total	1	127	109	113	117

Gap Analysis

Exhibit 74: Retail annual supply and demand in the NCV/NML subregion



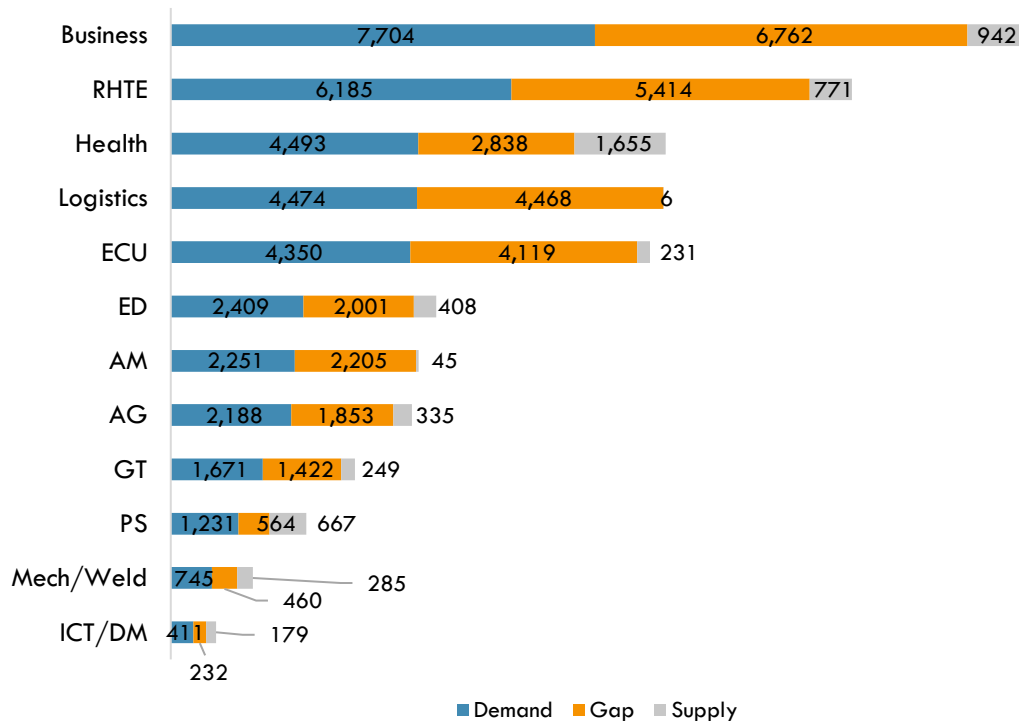
Gap Analysis Summary

Annual openings for the 12 sectors total 38,111. Overall, there is a supply gap of 32,340 workers in the NCV/NML region. The sectors with the largest supply gaps are business; retail, hospitality, trade, and entertainment; and logistics (Exhibits 75 and 76).

Exhibit 75: Gap analysis for all 12 sectors

Sector	Demand	Gap	Supply
Business	7,704	6,762	942
Retail, Hospitality, Trade, and Entertainment	6,185	5,414	771
Logistics	4,474	4,468	6
Energy, Construction, and Utilities	4,350	4,119	231
Health Care	4,493	2,838	1,655
Advanced Manufacturing	2,251	2,205	45
Education	2,409	2,001	408
Agriculture, Water, and Environmental Technologies	2,188	1,853	335
Global Trade	1,671	1,422	249
Protective Services	1,231	564	667
Mechanics and Welding	745	460	285
ICT/Digital Media	411	232	179
Total	38,111	32,340	5,772

Exhibit 76: Chart representing gap analysis for all 12 sectors



Conclusion & Recommendations

In the NCV/NML subregion, the 12 sectors detailed in this study are projected to offer 38,111 job openings each year for middle-skill occupations. By comparison, community colleges in the subregion are conferring 5,772 awards on average each year.

The business sector has the largest number of middle-skill annual job openings in the NCV/NML subregion, 7,704. Regionally, the business sector accounts for 21% of the current five-year gap in supply. When global trade and retail, which are subsets of the business sector, are added to the total business percentage, the gap jumps to 25% in the region. Business occupations in high demand are office clerks (general); secretaries and administrative assistants (except legal, medical, and executive); bookkeeping, accounting, and auditing clerks; and first-line supervisors of office and administrative support workers. Community colleges are strongly encouraged to increase the completion rates of business students and agriculture business students.

Another area of need is the retail, hospitality, trade, and entertainment sector. In the NCV/NML subregion, the retail, hospitality, trade, and entertainment sector has the second largest supply gap in the subregion, an undersupply of 5,414 workers. This sector is projected to have 6,185 annual openings. By comparison, community colleges confer 771 awards on average each year. Occupations with strong demand for workers include customer service representatives, first-line supervisors of retail sales workers, cooks (restaurant), and first-line supervisors of food preparation and serving workers. The first two occupations have more than 700 projected annual openings and the last has more than 500.

Two other sectors that also warrant attention are logistics; and energy, construction, and utilities. Each of these sectors have more than 4,000 annual openings, and supply gaps that are substantial. Logistics has an undersupply of 4,468 workers. By comparison, community colleges in the subregion, confer only six awards on average each year related to logistics. Energy, construction, and utilities has an undersupply of 4,119 workers. The community college supply is slightly larger than logistics, with 231 awards conferred on average each year. Given the large supply gaps in these sectors, the community colleges are encouraged to expand existing programs or develop new programs to meet employer demand.

Within the logistics sector, there are three occupations with a high number of annual openings, which community colleges may want to target for programs:

- Heavy and Tractor-Trailer Truck Drivers, 7% growth, 1,951 annual openings
- Industrial Truck and Tractor Operators, 14% growth, 924 annual openings
- Shipping, Receiving, and Traffic Clerks, 11% growth, 406 annual openings

Within the energy, construction, and utilities sector, occupations worth noting are:

- Maintenance and repair workers (general), 7% growth, 644 annual openings
- Carpenters, 7% growth, 504 annual openings
- Electricians, 14% growth, 353 annual openings

Future planning efforts by community colleges also should take into consideration occupations with the most annual openings in the NCV/NML subregion:

- Heavy and tractor-trailer truck drivers, 1,951 annual openings
- Office clerks (general), 1,556 annual openings
- Teacher assistants, 985 annual openings.
- Secretaries and administrative assistants, except legal, medical, and executive, 957 annual openings

Appendix A: Methodology & Data Sources

Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor’s Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: economicmodeling.com .
Living Wage	A living wage calculator that estimates the cost of living in a specific community or subregion: livingwage.mit.edu .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: www.bls.gov/emp/ep_education_tech.htm .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division, labormarketinfo.edd.ca.gov
Job Posting and Skills Data	Burning Glass, http://www.burning-glass.com/
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledges, work activities and interests associated with specific occupations: www.onetonline.org

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

Living Wage: The cost of living in a specific community or subregion for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.

Wages Family Compositions: The living wage calculator estimates the living wage needed to support families. For single adult families, the adult is assumed to be employed full time. For two adult families where both adults are in the labor force, both adults are assumed to be employed full time. For two adult families where one adult is not in the labor force, one of the adults is assumed to be employed full time while the other non-wage-earning adult provides full-time child care for the family's children. Full-time work is assumed to be year-round, 40 hours per week for 52 weeks, per adult. Families with one child are assumed to have a 'young child' (4 years old). Families with two children are assumed to have a 'young child' and a 'child' (9 years old). Families with three children are assumed to have a 'young child,' a 'child,' and a 'teenager' (15 years old).

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Appendix B: Typical Education, Training & Experience for Occupations in All Industries

Exhibit 1B: Agriculture, water and environmental technologies educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Farmers, Ranchers, and Other Agricultural Managers	High school diploma or equivalent	5 years or more	None	28.90
Agricultural Equipment Operators	No formal educational credential	None	Moderate-term	12.70
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	22.80
Mobile Heavy Equipment Mechanics, Except Engines	High school diploma or equivalent	None	Long-term	37.00
Veterinary Assistants and Laboratory Animal Caretakers	High school diploma or equivalent	None	Short-term	47.10
Farm Equipment Mechanics and Service Technicians	High school diploma or equivalent	None	Long-term	37.00
Water and Wastewater Treatment Plant and System Operators	High school diploma or equivalent	None	Long-term	45.40
Compliance Officers	Bachelor's degree	None	Moderate-term	28.30
Forest and Conservation Technicians	Associate degree	None	None	33.90
Agricultural and Food Science Technicians	Associate degree	None	Moderate-term	36.30
Pest Control Workers	High school diploma or equivalent	None	Moderate-term	39.00
Veterinary Technologists and Technicians	Associate degree	None	None	56.40
Animal Trainers	High school diploma or equivalent	None	Moderate-term	35.40
Forest and Conservation Workers	High school diploma or equivalent	None	Moderate-term	31.30
Pesticide Handlers, Sprayers, and Applicators, Vegetation	High school diploma or equivalent	None	Moderate-term	19.70
Logging Equipment Operators	High school diploma or equivalent	None	Moderate-term	14.90
Agricultural Inspectors	Bachelor's degree	None	Moderate-term	28.70
Life, Physical, and Social Science Technicians, All Other	Associate degree	None	None	33.90
Animal Breeders	High school diploma or equivalent	None	Short-term	12.70
Food Scientists and Technologists	Bachelor's degree	None	None	18.90

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Fishers and Related Fishing Workers	No formal educational credential	None	Moderate-term	28.40

Exhibit 2B: Advanced manufacturing educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Packaging and Filling Machine Operators and Tenders	High school diploma or equivalent	None	Moderate-term	18.60
First-Line Supervisors of Production and Operating Workers	High school diploma or equivalent	Less than 5 years	None	35.30
Inspectors, Testers, Sorters, Samplers, and Weighers	High school diploma or equivalent	None	Moderate-term	37.70
Industrial Machinery Mechanics	High school diploma or equivalent	None	Long-term	41.70
Production, Planning, and Expediting Clerks	High school diploma or equivalent	None	Moderate-term	40.10
Production Workers, All Other	High school diploma or equivalent	None	Moderate-term	26.70
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	40.70
Mixing and Blending Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	27.10
Industrial Production Managers	Bachelor's degree	5 years or more	None	32.70
Sawing Machine Setters, Operators, and Tenders, Wood	High school diploma or equivalent	None	Moderate-term	18.70
Maintenance Workers, Machinery	High school diploma or equivalent	None	Long-term	34.50
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	High school diploma or equivalent	None	Moderate-term	16.60
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	27.90
Engineering Technicians, Except Drafters, All Other	Associate degree	None	None	55.10
Conveyor Operators and Tenders	No formal educational credential	None	Short-term	27.30
Grinding and Polishing Workers, Hand	No formal educational credential	None	Moderate-term	26.80
Molders, Shapers, and Casters, Except Metal and Plastic	High school diploma or equivalent	None	Long-term	24.40
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	High school diploma or equivalent	None	Moderate-term	25.80

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Electrical and Electronics Engineering Technicians	Associate degree	None	None	55.10
Computer-Controlled Machine Tool Operators, Metal and Plastic	High school diploma or equivalent	None	Moderate-term	43.60

Exhibit 3B: Business educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Office Clerks, General	High school diploma or equivalent	None	Short-term	45.60
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	High school diploma or equivalent	None	Short-term	47.50
Bookkeeping, Accounting, and Auditing Clerks	Some college, no degree	None	Moderate-term	48.80
First-Line Supervisors of Office and Administrative Support Workers	High school diploma or equivalent	Less than 5 years	None	40.80
Receptionists and Information Clerks	High school diploma or equivalent	None	Short-term	46.10
Business Operations Specialists, All Other	Bachelor's degree	None	None	27.90
Billing and Posting Clerks	High school diploma or equivalent	None	Moderate-term	49.60
Office and Administrative Support Workers, All Other	High school diploma or equivalent	None	Short-term	42.70
Tellers	High school diploma or equivalent	None	Short-term	44.50
Executive Secretaries and Executive Administrative Assistants	High school diploma or equivalent	Less than 5 years	None	47.50
Real Estate Sales Agents	High school diploma or equivalent	None	Moderate-term	37.90
Information and Record Clerks, All Other	High school diploma or equivalent	None	Short-term	51.50
Dispatchers, Except Police, Fire, and Ambulance	High school diploma or equivalent	None	Moderate-term	47.60
First-Line Supervisors of Non-Retail Sales Workers	High school diploma or equivalent	Less than 5 years	None	32.20
Interviewers, Except Eligibility and Loan	High school diploma or equivalent	None	Short-term	49.50
Insurance Claims and Policy Processing Clerks	High school diploma or equivalent	None	Moderate-term	46.50
Payroll and Timekeeping Clerks	High school diploma or equivalent	None	Moderate-term	51.30
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	High school diploma or equivalent	None	Short-term	33.90
Property, Real Estate, and Community Association Managers	High school diploma or equivalent	Less than 5 years	None	36.70

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Order Clerks	Some college, no degree	None	Short-term	39.00

Exhibit 4B: Energy, construction and utilities educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Maintenance and Repair Workers, General	High school diploma or equivalent	None	Moderate-term	38.20
Carpenters	High school diploma or equivalent	None	Apprenticeship	25.90
Electricians	High school diploma or equivalent	None	Apprenticeship	47.30
First-Line Supervisors of Construction Trades and Extraction Workers	High school diploma or equivalent	5 years or more	None	32.80
Painters, Construction and Maintenance	No formal educational credential	None	Moderate-term	20.50
Operating Engineers and Other Construction Equipment Operators	High school diploma or equivalent	None	Moderate-term	24.30
Plumbers, Pipefitters, and Steamfitters	High school diploma or equivalent	None	Apprenticeship	31.40
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Postsecondary nondegree award	None	Long-term	43.90
Installation, Maintenance, and Repair Workers, All Other	High school diploma or equivalent	None	Moderate-term	35.00
Construction Managers	Bachelor's degree	None	Moderate-term	32.80
Cement Masons and Concrete Finishers	No formal educational credential	None	Moderate-term	15.20
Roofers	No formal educational credential	None	Moderate-term	13.70
Drywall and Ceiling Tile Installers	No formal educational credential	None	Moderate-term	15.40
Telecommunications Equipment Installers and Repairers, Except Line Installers	Postsecondary nondegree award	None	Moderate-term	52.80
Structural Iron and Steel Workers	High school diploma or equivalent	None	Apprenticeship	31.20
Brickmasons and Blockmasons	High school diploma or equivalent	None	Apprenticeship	20.00
Solar Photovoltaic Installers	High school diploma or equivalent	None	Moderate-term	28.00
Cabinetmakers and Bench Carpenters	High school diploma or equivalent	None	Moderate-term	25.70
Highway Maintenance Workers	High school diploma or equivalent	None	Moderate-term	27.10

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Tile and Marble Setters	No formal educational credential	None	Long-term	18.80

Exhibit 5B: Educational attainment in the education sector

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Teacher Assistants	Some college, no degree	None	None	43.70
Childcare Workers	High school diploma or equivalent	None	Short-term	36.70
Preschool Teachers, Except Special Education	Associate degree	None	None	37.80
Self-Enrichment Education Teachers	High school diploma or equivalent	Less than 5 years	None	26.70
Training and Development Specialists	Bachelor's degree	Less than 5 years	None	33.70
Library Technicians	Postsecondary nondegree award	None	None	26.10
Kindergarten Teachers, Except Special Education	Bachelor's degree	None	None	37.80
Library Assistants, Clerical	High school diploma or equivalent	None	Short-term	37.60
Education Administrators, Preschool and Childcare Center/Program	Bachelor's degree	Less than 5 years	None	13.00
Career/Technical Education Teachers, Secondary School	Bachelor's degree	Less than 5 years	None	4.80

Exhibit 6B: Global trade educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
General and Operations Managers	Bachelor's degree	5 years or more	None	34.80
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	High school diploma or equivalent	None	Moderate-term	31.60
Cost Estimators	Bachelor's degree	None	Moderate-term	40.80
Buyers and Purchasing Agents	Bachelor's degree	None	Moderate-term	32.97
Administrative Services Managers	Bachelor's degree	Less than 5 years	None	42.00
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Bachelor's degree	None	Moderate-term	31.60

Exhibit 7B: Health care educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Registered Nurses	Bachelor's degree	None	None	42.10
Nursing Assistants	Postsecondary nondegree award	None	None	41.70
Medical Assistants	Postsecondary nondegree award	None	None	65.00
Medical Secretaries	High school diploma or equivalent	None	Moderate-term	47.50
Social and Human Service Assistants	High school diploma or equivalent	None	Short-term	40.00
Dental Assistants	Postsecondary nondegree award	None	None	58.30
Licensed Practical and Licensed Vocational Nurses	Postsecondary nondegree award	None	None	74.10
Home Health Aides	High school diploma or equivalent	None	Short-term	41.70
Pharmacy Technicians	High school diploma or equivalent	None	Moderate-term	56.40
Emergency Medical Technicians and Paramedics	Postsecondary nondegree award	None	None	68.30
Health Technologists and Technicians, All Other	Postsecondary nondegree award	None	None	45.40
Massage Therapists	Postsecondary nondegree award	None	None	54.00
Clinical Laboratory Technologists and Technicians	Bachelor's degree	None	None	39.30
Dental Hygienists	Associate degree	None	None	60.80
Pharmacy Aides	High school diploma or equivalent	None	Short-term	50.30
Phlebotomists	Postsecondary nondegree award	None	None	61.10
Healthcare Support Workers, All Other	High school diploma or equivalent	None	None	38.10
Medical Records and Health Information Technicians	Postsecondary nondegree award	None	None	54.90
Radiologic Technologists	Associate degree	None	None	66.10
Psychiatric Technicians	Postsecondary nondegree award	Less than 5 years	Short-term	56.40

Exhibit 8B: Hospitality, tourism and entertainment educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Cooks, Restaurant	No formal educational credential	Less than 5 years	Moderate-term	23.40
First-Line Supervisors of Food Preparation and Serving Workers	High school diploma or equivalent	Less than 5 years	None	37.90
Food Service Managers	High school diploma or equivalent	Less than 5 years	None	37.70
Cooks, Institution and Cafeteria	No formal educational credential	None	Short-term	23.40
Bakers	No formal educational credential	None	Long-term	27.80
Gaming Dealers	High school diploma or equivalent	None	Short-term	39.70
Butchers and Meat Cutters	No formal educational credential	None	Long-term	20.50
First-Line Supervisors of Housekeeping and Janitorial Workers	High school diploma or equivalent	Less than 5 years	None	35.20
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	High school diploma or equivalent	Less than 5 years	None	32.90
Chefs and Head Cooks	High school diploma or equivalent	5 years or more	None	39.40
Audio and Video Equipment Technicians	Postsecondary nondegree award	None	Short-term	44.60
Meeting, Convention, and Event Planners	Bachelor's degree	None	None	24.90
Interpreters and Translators	Bachelor's degree	None	None	36.00
Photographers	High school diploma or equivalent	None	Moderate-term	33.00
Gaming Service Workers, All Other	High school diploma or equivalent	None	Short-term	39.70
Tour and Travel Guides	High school diploma or equivalent	None	Moderate-term	36.90
Lodging Managers	High school diploma or equivalent	Less than 5 years	None	33.40
Gaming and Sports Book Writers and Runners	High school diploma or equivalent	None	Short-term	39.70
Travel Agents	High school diploma or equivalent	None	Moderate-term	44.20
Fitness Trainers and Aerobics Instructors	High school diploma or equivalent	None	Short-term	34.10

Exhibit 9B: ICT/digital media educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Computer User Support Specialists	Some college, no degree	None	None	45.20
Computer Occupations, All Other	Bachelor's degree	None	None	36.90
Graphic Designers	Bachelor's degree	None	None	30.30
Network and Computer Systems Administrators	Bachelor's degree	None	None	39.50
Computer Network Support Specialists	Associate degree	None	None	45.20
Web Developers	Associate degree	None	None	27.20
Computer, Automated Teller, and Office Machine Repairers	Some college, no degree	None	Short-term	53.10
Medical Equipment Repairers	Associate degree	None	Moderate-term	54.40
Surveying and Mapping Technicians	High school diploma or equivalent	None	Moderate-term	58.50

Exhibit 10B: Logistics educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Heavy and Tractor-Trailer Truck Drivers	Postsecondary nondegree award	None	Short-term	28.30
Industrial Truck and Tractor Operators	No formal educational credential	None	Short-term	24.20
Shipping, Receiving, and Traffic Clerks	High school diploma or equivalent	None	Short-term	32.90
First-line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	High school diploma or equivalent	Less than 5 years	None	38.10
Bus Drivers, School or Special Client	High school diploma or equivalent	None	Short-term	36.10
Bus Drivers, Transit and Intercity	High school diploma or equivalent	None	Moderate-term	36.10
Transportation, Storage, and Distribution Managers	High school diploma or equivalent	5 years or more	None	34.50
Transportation Attendants, Except Flight Attendants	High school diploma or equivalent	None	Short-term	35.60
Logisticians	Bachelor's degree	None	None	38.80
Painters, Transportation Equipment	High school diploma or equivalent	None	Moderate-term	27.10
Commercial Pilots	High school diploma or equivalent	None	Moderate-term	20.50
Aircraft Mechanics and Service Technicians	Postsecondary nondegree award	None	None	60.00

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Cargo and Freight Agents	High school diploma or equivalent	None	Short-term	46.00
Railroad Conductors and Yardmasters	High school diploma or equivalent	None	Moderate-term	48.40
Transportation Inspectors	High school diploma or equivalent	None	Moderate-term	46.70
Locomotive Engineers	High school diploma or equivalent	Less than 5 years	Moderate-term	48.20
Air Traffic Controllers	Associate degree	None	Long-term	49.60
Rail Car Repairers	High school diploma or equivalent	None	Long-term	37.00
Airline Pilots, Copilots, and Flight Engineers	Bachelor's degree	Less than 5 years	Moderate-term	20.50

Exhibit 11B: Mechanics and welding educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Welders, Cutters, Solderers, and Brazers	High school diploma or equivalent	None	Moderate-term	28.20
Bus and Truck Mechanics and Diesel Engine Specialists	High school diploma or equivalent	None	Long-term	34.80
First-Line Supervisors of Mechanics, Installers, and Repairers	High school diploma or equivalent	Less than 5 years	None	42.90
Machinists	High school diploma or equivalent	None	Long-term	38.80
Structural Metal Fabricators and Fitters	High school diploma or equivalent	None	Moderate-term	34.70
Recreational Vehicle Service Technicians	High school diploma or equivalent	None	Long-term	21.80
Outdoor Power Equipment and Other Small Engine Mechanics	High school diploma or equivalent	None	Moderate-term	34.50
Automotive Service Technicians and Mechanics	Postsecondary nondegree award	None	Short-term	33.40
Automotive Body and Related Repairers	High school diploma or equivalent	None	Long-term	26.10

Exhibit 12B: Protective services educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Correctional Officers and Jailers	High school diploma or equivalent	None	Moderate-term	52.40
Protective Service Workers, All Other	High school diploma or equivalent	None	Short-term	36.40
Police and Sheriff's Patrol Officers	High school diploma or equivalent	None	Moderate-term	51.60
Firefighters	Postsecondary nondegree award	None	Long-term	63.60
Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	No formal educational credential	None	Short-term	36.40
Police, Fire, and Ambulance Dispatchers	High school diploma or equivalent	None	Moderate-term	47.60
First-Line Supervisors of Correctional Officers	High school diploma or equivalent	Less than 5 years	None	46.30
First-Line Supervisors of Protective Service Workers, All Other	High school diploma or equivalent	Less than 5 years	None	43.10
Private Detectives and Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	32.10
First-Line Supervisors of Police and Detectives	High school diploma or equivalent	Less than 5 years	Moderate-term	43.40
Detectives and Criminal Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	35.20
First-Line Supervisors of Fire Fighting and Prevention Workers	Postsecondary nondegree award	Less than 5 years	Moderate-term	59.20

Exhibit 13B: Retail educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Customer Service Representatives	High school diploma or equivalent	None	Short-term	43.70
First-Line Supervisors of Retail Sales Workers	High school diploma or equivalent	Less than 5 years	None	38.10
Hairdressers, Hairstylists, and Cosmetologists	Postsecondary nondegree award	None	None	41.60
Insurance Sales Agents	High school diploma or equivalent	None	Moderate-term	35.60
Sales Representatives, Services, All Other	High school diploma or equivalent	None	Moderate-term	34.30
Manicurists and Pedicurists	Postsecondary nondegree award	None	None	30.20

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
First-Line Supervisors of Personal Service Workers	High school diploma or equivalent	Less than 5 years	None	37.60
Demonstrators and Product Promoters	No formal educational credential	None	Short-term	36.40
Merchandise Displayers and Window Trimmers	High school diploma or equivalent	None	Short-term	30.30
Security and Fire Alarm Systems Installers	High school diploma or equivalent	None	Moderate-term on-the-job training	47.20
Advertising Sales Agents	High school diploma or equivalent	None	Moderate-term	30.10
Barbers	Postsecondary nondegree award	None	None	34.00
Funeral Attendants	High school diploma or equivalent	None	Short-term	51.90
Home Appliance Repairers	High school diploma or equivalent	None	Moderate-term	37.60
Skincare Specialists	Postsecondary nondegree award	None	None	30.20
Floral Designers	High school diploma or equivalent	None	Moderate-term	30.30
Designers, All Other	Bachelor's degree	None	None	30.30
Interior Designers	Bachelor's degree	None	None	30.30