

LABOR MARKET ANALYSIS

FOR PROGRAM RECOMMENDATION



C·O·E

CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

ENGINEERING TECHNOLOGY IN THE FAR NORTH

Far North
Center of Excellence

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SUMMARY

The Far North Center of Excellence for Labor Market Research prepared this report to provide a labor market analysis of educational supply and occupational demand for middle-skilled career pathways in the Far North subregion. This report aims to determine if demand in the local labor market is unmet by the supply from existing community college programs and other postsecondary training providers.

This report primarily focuses on training that leads to jobs in middle-skilled occupations - jobs that typically require education beyond a high school diploma but less than a bachelor's degree - but may include higher-skilled occupations for training pathways that lead to a bachelor's degree. Lowered skilled occupations are rarely considered in this analysis due to the lessened barriers for entry-level work, such as no formal education and on-the-job training requirements.

Key findings include:

- The Far North held 1,253 engineering technology jobs in 2021. Engineering technology jobs are projected to increase by 8% over the next five years, adding 95 new jobs to the subregion by 2026.
- Over the next five years, engineering technology jobs are projected to have 159 annual openings in the Far North subregion.
- Wage data shows that entry-level engineering technology occupations earn \$4 to \$19 above the subregion's living wage of \$12.49 per hour.
- Awards data analysis shows that Far North training providers conferred an average of 4 awards (certificates and associate degrees) in engineering technology programs over the last three academic years.

Recommendations include:

- The Far North Center of Excellence recommends moving forward with the program.

INTRODUCTION

The Far North Center of Excellence (COE) was asked to provide labor market information for a proposed program at a regional community college. This report focuses on the following Standard Occupational Classification (SOC) occupations and codes:

- These middle-skill occupations require more education and training beyond a high school diploma but less than a four-year degree:
 - Mechanical Drafters (17-3013)
 - Aerospace Engineering and Operations Technologists and Technicians (17-3021)
 - Civil Engineering Technologists and Technicians (17-3022)
 - Electrical and Electronic Engineering Technologists and Technicians (17-3023)
 - Electro-Mechanical and Mechatronics Technologists and Technicians (17-3024)
 - Industrial Engineering Technologists and Technicians (17-3026)
 - Mechanical Engineering Technologists and Technicians (17-3027)
 - Calibration Technologists and Technicians (17-3028)
 - Industrial Machinery Mechanics (49-9041)
- Students who transfer and earn a four-year degree could pursue the following high-skill occupation:
 - Engineers, All Other (17-2199)

A review of related programs revealed the following Taxonomy of Programs (TOP) title(s) and code(s) are appropriate for inclusion in this report:

- Engineering Technology, General (requires Trigonometry) (0924.00)

The corresponding Classification of Instructional Program (CIP) title(s) and code(s) are:

- Applied Engineering (14.0103)*
- Engineering Technologies/Technicians, General (15.0000)*
- Applied Engineering Technologies/Technicians (15.0001)*
- Civil Engineering Technologies/Technicians (15.0201)*
- Mechanical/Mechanical Engineering Technology/Technicians (15.0805)*

* There were no programs offered in these CIP codes within the study region.

OCCUPATIONAL DEMAND

Exhibit 1 summarizes the five-year projected job growth for middle-skill and high-skill occupations in the Far North, North/Far North, and California.

Exhibit 1. Employment and projected demand, 2021-2026

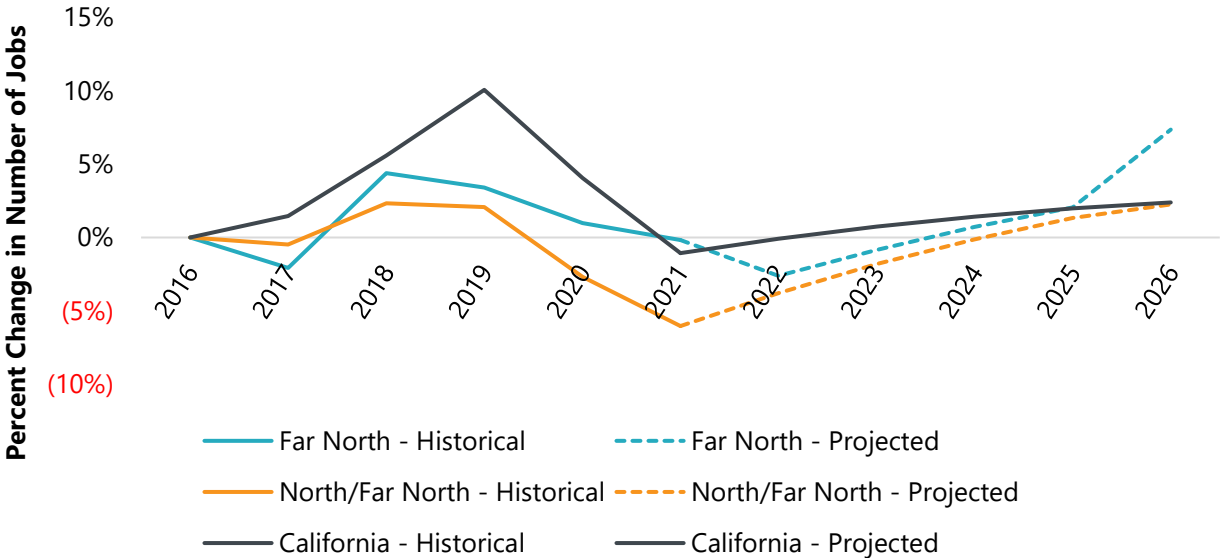
Occupation	2021 Jobs	2026 Jobs	2021-2026 Change	2021-2026 % Change	2021-2026 Annual Openings
Engineers, All Other	224	230	6	3%	26
Mechanical Drafters	42	41	(1)	(2%)	6
Aerospace Engineering and Operations Technologists and Technicians	30	30	0	0%	2
Civil Engineering Technologists and Technicians	243	244	1	0%	28
Electrical and Electronic Engineering Technologists and Technicians	131	140	8	6%	19
Electro-Mechanical and Mechatronics Technologists and Technicians	25	25	0	0%	3
Industrial Engineering Technologists and Technicians	15	20	5	35%	6
Mechanical Engineering Technologists and Technicians	11	11	(1)	(5%)	2
Calibration Technologists and Technicians	0	0	0	0%	0
Industrial Machinery Mechanics	532	607	75	14%	66
Far North	1,253	1,348	95	8%	159
Engineers, All Other	1,393	1,456	63	5%	142

Occupation	2021 Jobs	2026 Jobs	2021-2026 Change	2021-2026 % Change	2021-2026 Annual Openings
Mechanical Drafters	295	307	11	4%	34
Aerospace Engineering and Operations Technologists and Technicians	45	51	5	12%	10
Civil Engineering Technologists and Technicians	915	948	33	4%	101
Electrical and Electronic Engineering Technologists and Technicians	818	863	44	5%	112
Electro-Mechanical and Mechatronics Technologists and Technicians	54	55	1	3%	9
Industrial Engineering Technologists and Technicians	106	134	28	26%	19
Mechanical Engineering Technologists and Technicians	140	155	15	11%	19
Calibration Technologists and Technicians	41	47	6	15%	7
Industrial Machinery Mechanics	1,629	1,902	273	17%	200
North/Far North	5,436	5,916	480	9%	654
Engineers, All Other	31,489	32,231	742	2%	3,163
Mechanical Drafters	4,943	4,895	(48)	(1%)	573
Aerospace Engineering and Operations Technologists and Technicians	1,274	1,346	72	6%	212
Civil Engineering Technologists and Technicians	6,729	6,946	216	3%	817

Occupation	2021 Jobs	2026 Jobs	2021-2026 Change	2021-2026 % Change	2021-2026 Annual Openings
Electrical and Electronic Engineering Technologists and Technicians	19,853	19,573	(280)	(1%)	2,203
Electro-Mechanical and Mechatronics Technologists and Technicians	1,498	1,483	(16)	(1%)	203
Industrial Engineering Technologists and Technicians	3,302	3,620	318	10%	454
Mechanical Engineering Technologists and Technicians	4,408	4,531	122	3%	520
Calibration Technologists and Technicians	702	724	22	3%	94
Industrial Machinery Mechanics	25,708	28,047	2,339	9%	2,862
California	102,422	102,986	3,488	3%	11,102

Exhibit 2 compares the percent change in jobs between 2016 through 2021 and the projected changes through 2026. The rate of change is indexed to the total number of jobs in 2016.

Exhibit 2. Changes in employment, 2016-2026



WAGES

Exhibit 3 compares the entry-level wages for the selected occupations to the Far North living wage for a single adult (\$12.74 per hour) and a small family¹ (\$24.66 per hour).

Exhibit 3. Comparison of wages by occupation, 2021



JOB POSTINGS

This section analyzes recent data from online job postings (real-time LMI). Online job postings may provide additional insight into recent changes in the labor market that are not captured by historical trends.

The Far North COE identified 573 online job postings for the selected occupations in the 15-county Far North subregion. Job posting data comes from Burning Glass Labor Insights and represents new listings posted online within the last year, from November 1, 2021, to October 31, 2022.

¹ A small family is defined as a single adult and one school aged child (between the ages of 5 and 12 years).

Occupations and Job Titles

Exhibit 4 details the number of online job postings for the selected occupations.

Exhibit 4. Number of job postings by occupation

Occupation	Job Postings	Share of Job Postings
Industrial Engineering Technicians	288	50%
Industrial Machinery Mechanics	104	18%
Electronics Engineering Technicians	41	7%
Engineers, All Other	38	7%
Civil Engineering Technicians	34	6%
Electro-Mechanical Technicians	26	5%
Validation Engineers	16	3%
Mechanical Drafters	11	2%
Mechanical Engineering Technicians	8	1%
Manufacturing Engineers	7	1%
Total Job Postings	573	100%

Exhibit 5 shows the top 10 job titles with the most job postings and the share. All job postings included a job title.

Exhibit 5. Top jobs titles

Job Title	Job Postings	Share of Job Postings
Mechanic	39	7%
Maintenance Technician	30	5%
Maintenance Aide Seasonal	21	4%
Caltrans Highway Maintenance Worker	14	2%
Millwright - Maintenance Technician	13	2%

Job Title	Job Postings	Share of Job Postings
Assembly Technician	12	2%
Machine Calibration Technician	12	2%
Maintenance Technician II	12	2%
Manufacturing Engineering Technician	11	2%
Maintenance Worker, Department Of The Highway Patrol	10	2%

Employers

Exhibit 6 shows the top 10 employers with the most job postings for the selected occupations. Forty-eight percent (n= 275) of job postings did not include an employer.

Exhibit 6. Employers with the most job postings

Employer	Job Postings	Share of Job Postings
State of California	57	19%
Sierra Pacific Industries	14	5%
Pape Machinery Incorporated	12	4%
Forest Service	7	2%
Bureau of Reclamation	7	2%
Pacific Gas and Electric Company	6	2%
Sierra Nevada Brewing Company	5	2%
Recology Inc	5	2%
Pacific Coast Producers	5	2%
Department of Veterans Affairs	5	2%

Certifications, Skills, and Experience

Exhibit 7 shows the most relevant certifications requested by employers for the selected occupations. Fifty-eight percent (n= 334) of job postings did not include certification information.

Exhibit 7. Most in-demand certifications

Certification	Job Postings	Share of Job Postings
CDL Class C	28	5%
CDL Class B	18	3%
Security Clearance	13	2%
CDL Class A	11	2%
Air Brake Certified	8	1%

Exhibit 8 shows the top 10 skills across three categories for the studied occupations: specialized, human-centered, and technical skills.

Exhibit 8. Most in-demand specialized skills

Top 10 Specialized Skills	Top 10 Human-Centered Skills	Top 10 Technical Skills
Repair	Troubleshooting	Microsoft Office
Machinery	Physical Abilities	Microsoft Excel
Hand Tools	Preventive Maintenance	AutoCAD
Welding	Communication Skills	Microsoft Word
Predictive / Preventative Maintenance	Editing	Computer Aided Drafting/Design (CAD)
Vaccination	Problem Solving	SAP
Forklift Operation	Computer Literacy	SCADA
Cleaning	English	Python
Customer Service	Writing	Microsoft Powerpoint
Scheduling	Microsoft Office	Extensible Markup Language

Exhibit 9 shows employers' minimum level of education for job postings for the selected occupations. Sixty-two percent (n= 356) of job postings did not include a preferred education level.

Exhibit 9. Employer-preferred minimum education levels

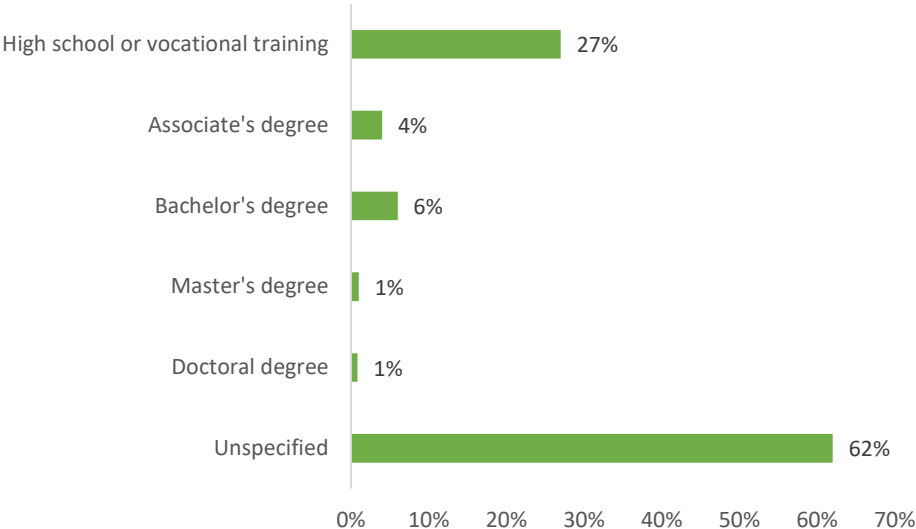
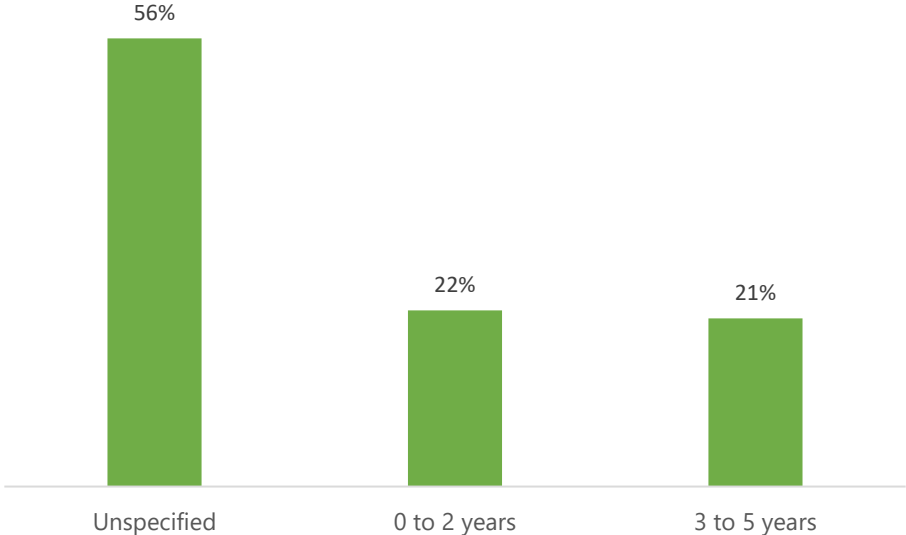


Exhibit 10 shows the experience levels required by employers for job postings for the selected occupations. Fifty-six percent (n= 321) of job postings did not include a preferred experience level.

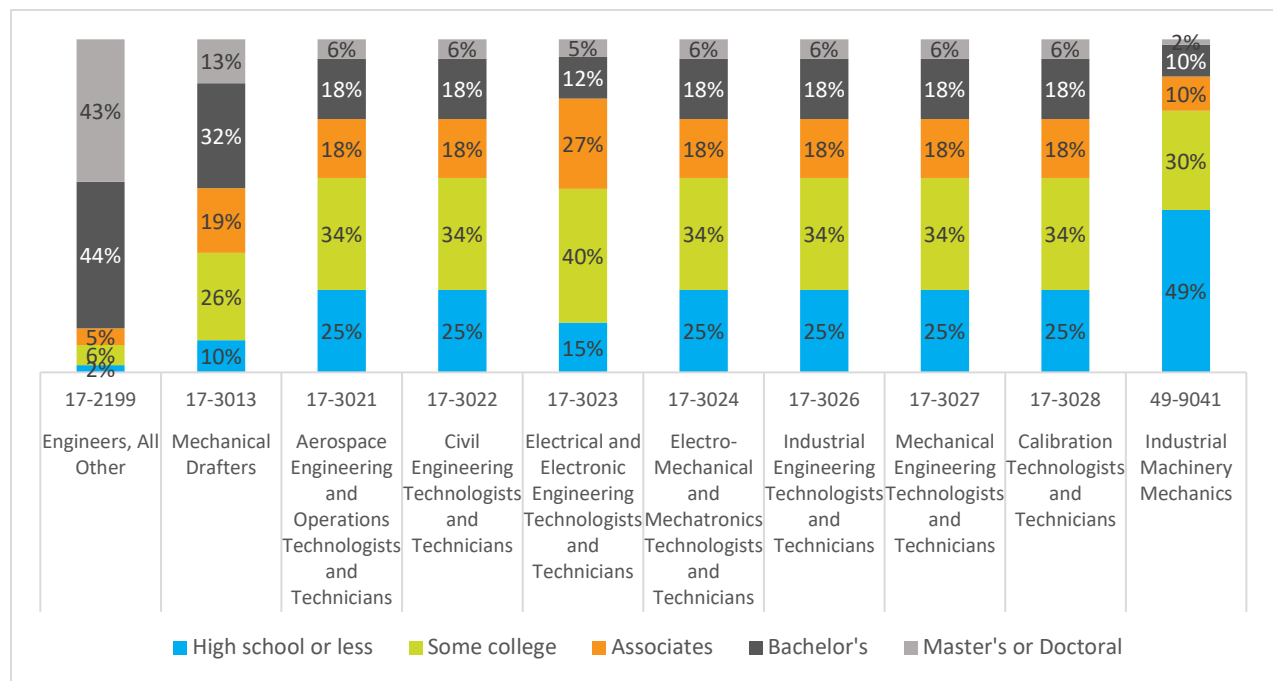
Exhibit 10. Employer-preferred experience levels



EDUCATION AND TRAINING

The U.S. Census Bureau collects data on education achieved by workers employed in occupations. Exhibit 11 shows the state-level educational attainment of the current workforce in the selected occupations.

Exhibit 11. California worker educational attainment for selected occupations, 2019



The Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education, work experience in a related occupation, and typical on-the-job training to each occupation for which the BLS publishes projections data. Exhibit 12 shows the selected occupations' entry-level job requirements.

Exhibit 12. Typical education, work experience, and on-the-job training requirements

Occupation	Typical Entry-level Education	Work Experience Required	On-the-job Training Required
Engineers, All Other	Bachelor's degree	None	None
Mechanical Drafters	Associate's degree	None	None
Aerospace Engineering and Operations Technologists and Technicians	Associate's degree	None	None

Occupation	Typical Entry-level Education	Work Experience Required	On-the-job Training Required
Civil Engineering Technologists and Technicians	Associate's degree	None	None
Electrical and Electronic Engineering Technologists and Technicians	Associate's degree	None	None
Electro-Mechanical and Mechatronics Technologists and Technicians	Associate's degree	None	None
Industrial Engineering Technologists and Technicians	Associate's degree	None	None
Mechanical Engineering Technologists and Technicians	Associate's degree	None	None
Calibration Technologists and Technicians	Associate's degree	None	None
Industrial Machinery Mechanics	High school diploma or equivalent	None	Long-term on-the-job training

EDUCATIONAL SUPPLY

Educational supply for an occupation can be estimated by analyzing the number of awards issued in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes. Exhibit 13 shows the TOP and CIP codes for educational programs related to the selected occupations.

Exhibit 13. TOP and CIP codes for training programs related to the selected occupations

TOP Program and Code	Aligned CIP Programs and Codes
Engineering Technology, General (requires Trigonometry) (0924.00)	Applied Engineering (14.0103)*
	Engineering Technologies/Technicians, General (15.0000)*
	Applied Engineering Technologies/Technicians (15.0001)*

Civil Engineering Technologies/Technicians
(15.0201)*

Mechanical/Mechanical Engineering
Technology/Technicians (15.0805)*

* There were no programs offered in these CIP codes within the study region.

Community College Supply

Exhibit 14 displays the average number of certificates and degrees from selected Far North community college programs over the last three academic years.

Exhibit 14. Annual average community college awards by program, 2018-19 through 2020-21

Program - TOP Code	College	Annual Awards 2018-19	Annual Awards 2019-20	Annual Awards 2020-21	3-Yr Annual Awards Average
Engineering Technology, General (requires Trigonometry) (0924.00)	Butte	6	2	3	4
	Total	6	2	3	4

Other Postsecondary Supply

There were no programs offered in related CIP codes within the study region.

FINDINGS

- This report focuses on ten occupations in the engineering technology occupational pathway.
- The Far North subregion held 1,253 engineering technology jobs in 2021. These jobs are projected to increase by 8% over the next five years, adding 95 new jobs to the subregion by 2026.
- Jobs for engineering technology are projected to grow faster in the Far North subregion than in California.
- Over the next five years, engineering technology jobs are projected to have 159 annual openings across the Far North.
- Wage data shows that engineering technology occupations earn \$4 to \$19 above the single adult living wage of \$12.74 per hour.
- According to real-time labor market information, there were 573 online job postings for engineering technology occupations between November 1, 2021, and October 31, 2022. Half of all job postings were for Industrial Engineering Technicians.
- Between 11% and 67% of incumbent workers in the studied occupations have educational attainment levels consistent with community college offerings (some college or associate degrees). Another 10% to 44% of workers in these occupations hold a bachelor's degree.
- One Far North community college offers degrees and certificates in programs related to engineering technology. This program conferred an average of 4 awards (certificates and associate degrees) in engineering technology programs over the last three academic years (2018-19 through 2020-21).
- There are no other postsecondary training providers offering training related to the studied occupations. Please note that non-community college awards data often lags by one year.

RECOMMENDATIONS

- Based on a three-year average of annual awards in the Far North, engineering technology programs and projected yearly openings, the supply gap analysis shows that the region seems to have room for additional training.
 - Community colleges and other postsecondary training providers issued an average of 4 awards over the last three years.
 - There are 159 projected annual openings for engineering technology jobs.
- The Far North Center of Excellence recommends moving forward with the program.

New Program Recommendation		
Move forward with the new program	Proceed with caution	A new program is not recommended
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX A. METHODOLOGY AND SOURCES

This report identified Occupations using the Center of Excellence TOP-to-CIP-to-SOC crosswalk and O*Net OnLine. This report's findings were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi, and jobs posting data from Burning Glass.

Lightcast (Formerly EMSI/Burning Glass) 2022.4; QCEW Employees, Non-QCEW Employees, and Self-Employed. <https://www.economicmodeling.com/>. *Note: 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).*

Integrated Postsecondary Education Data System (IPEDS). National Center for Education Statistics. U.S. Department of Education. <https://nces.ed.gov/ipeds/>.

Labor Market Information Division. California Employment Development Department. <https://labormarketinfo.edd.ca.gov/>.

Management Information Systems (MIS) Data Mart. California Community Colleges Chancellor's Office. <https://datamart.cccco.edu/>.

O*NET OnLine. U.S. Department of Labor/Employment and Training Administration (DOL ETA). <https://www.onetonline.org/>.

Public Use Microdata Sample (PUMS). U.S. Census Bureau American Community Survey (ACS). <https://www.census.gov/programs-surveys/acs/microdata.html>

Self-Sufficiency Standard Tool for California. The University of Washington. <http://www.selfsufficiencystandard.org/>

"Taxonomy of Programs." California Community Colleges Chancellor's Office. June 2012, 6th Edition. <https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Educational-Services-and-Support/Academic-Affairs/What-we-do/Curriculum-and-Instruction-Unit/Files/TOPmanual6200909corrected12513pdf.ashx>

"TOP-CIP-SOC Crosswalk." Centers of Excellence for Labor Market Research. June 2021 Edition. <http://coecc.net/>

APPENDIX B. GLOSSARY OF KEY TERMS

Key Terms	Definition
Occupation	Occupation refers to professions, or careers, in the workforce. Occupations differ from jobs in that jobs show the number of positions held in a given occupation.
Jobs	<p>A job is any position where a worker provides labor for monetary compensation.</p> <p>Job numbers include employees (those who work for businesses) and proprietors (those who work for themselves). Full- and part-time jobs are included and counted equally (i.e., not adjusted to full-time equivalents). Data for jobs, or employment, are annual averages.</p>
Job Change	Job change is the net increase or decrease of jobs over a given timeframe.
Job Openings	<p>Job openings are the projected number of positions available for workers entering an occupation.</p> <p>Openings include growth and replacement jobs. Growth jobs are the positive change in the total number of workers employed. Replacement jobs are the estimates of new workers needed to replace workers permanently leaving the occupation.</p>
Wages	Wages, or compensation, show workers' percentile and average earnings in a given occupation. The 25th-percentile and 75th-percentile hourly wages are used as a proxy for entry-level and experienced-level wages.
Living Wage	The living wage is the level of income a single adult with no children must earn to meet basic needs. The living wage is calculated using basic levels of allowances for food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs.
Educational Attainment	Educational attainment is the level of education achieved by workers in a given occupation. The data includes workers aged 25 years and older.
Typical Entry-level Education	The education level generally required for employment in an occupation. It may differ from the actual educational levels attained by workers in any given occupation.
Work Experience Required	The level of prior experience a worker needs to enter a job in a given occupation.
On-the-job Training Required	The level of on-the-job training a worker needs to obtain competency in a given occupation.
Awards	Awards are the number of certificates and degrees conferred for a specific course of study in a given year. Awards counts "papers" and, as a result, may be greater than the actual number of students who complete a program.

COVID-19 Statement: This report includes employment projection data by EMSI. EMSI's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

Important Disclaimer: All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

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Centers of Excellence for Labor Market Research, Economic and
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