

January 2022

Labor Market Analysis

Crop Science

POWERED BY

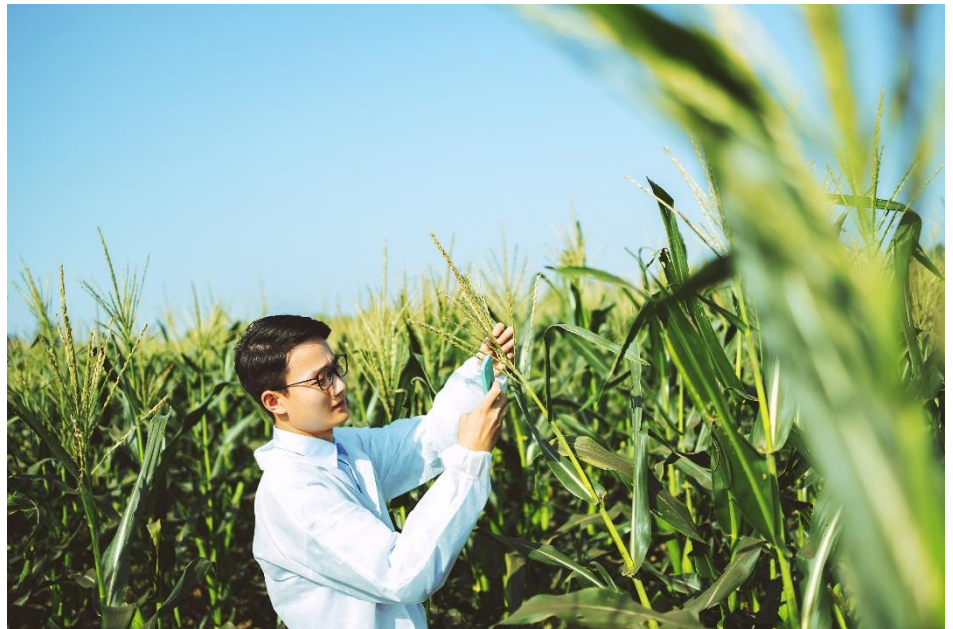


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Prepared by the Central Valley/Mother Lode Center of Excellence

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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.

If for any reason this document is not accessible or if you have specific needs for readability, please contact us and we will do our utmost to accommodate you with a modified version. To make a request, contact Nora Seronello by phone at (209) 575-6894 or by email seronellon@mjc.edu.

Summary

Please note the COVID-19 statement on page 2 when considering this report's findings.

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills, and postsecondary supply for crop science. Three occupations related to crop science were identified for Merced College:

- 11-9013, Farmers, Ranchers, and Other Agricultural Managers
- 37-3012, Pesticide Handlers, Sprayers, and Applicators, Vegetation
- 45-1011, First-Line Supervisors of Farming, Fishing, and Forestry Workers

Key findings:

- **Occupational demand** — Nearly 8,700 workers were employed in jobs related to crop science in 2020 in the North Central Valley/Northern Mother Lode (NCV/NML) subregion. The largest occupation is farmers, ranchers, and other agricultural managers with 7,155 workers in 2020, and is projected to contract by 6% over the next five years. However, the occupation has 669 projected annual openings.
- **Wages** — Pesticide handlers, sprayers, and applicators, vegetation earn the highest entry-level wage, \$16.45/hour in the subregion. Please note farmers, ranchers, and other agricultural managers earn less than the average living wage for NCV/NML subregion
- **Employers** — Employers with the most job postings in the subregion are Acrt Incorporated, Acrt Pacific, and Acrt Pacific, Llc.
- **Occupational titles** — The most common occupational title in job postings in the subregion is farm and ranch managers. The most common job title is vegetation management inspector.
- **Skills and certifications** — The top baseline skill is communication, the top specialized skill is customer service, and the top software skill is Microsoft Excel. The most in-demand certification is a driver's license.
- **Education** — A high school diploma or equivalent is typically required for the three occupations.
- **Supply** — Analysis of postsecondary completions shows that on average 143 awards were conferred in the Central Valley/Mother Lode region each year.

Based on a comparison of occupational demand and supply, there is an undersupply of 880 trained workers in the subregion and 2,923 workers in the region. The Center of Excellence recommends that Merced College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of crop science workers in the region.

Introduction

The Central Valley/Mother Lode Center of Excellence was asked by Merced College to provide labor market information for crop science. The geographical focus for this report is the North Central Valley/Northern Mother Lode (NCV/NML) subregion, but regional demand and supply data has been included for broader applicability and use. The average living wage for a single adult in the NCV/NML subregion is \$12.65/hour.¹ Analysis of the program and occupational data related to crop science resulted in the identification of applicable occupations. The Standard Occupational Classification (SOC) System codes and titles used in this report are:

- 11-9013, Farmers, Ranchers, and Other Agricultural Managers
- 37-3012, Pesticide Handlers, Sprayers, and Applicators, Vegetation
- 45-1011, First-Line Supervisors of Farming, Fishing, and Forestry Workers

The occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown below.

Farmers, Ranchers, and Other Agricultural Managers

Job Description: Plan, direct, or coordinate the management or operation of farms, ranches, greenhouses, aquacultural operations, nurseries, timber tracts, or other agricultural establishments. May hire, train, and supervise farm workers or contract for services to carry out the day-to-day activities of the managed operation. May engage in or supervise planting, cultivating, harvesting, and financial and marketing activities.

Knowledge: Administration and Management, Production and Processing, Biology, Mathematics, English Language

Skills: Critical Thinking, Speaking, Monitoring, Judgment and Decision Making, Time Management

Pesticide Handlers, Sprayers, and Applicators, Vegetation

Job Description: Mix or apply pesticides, herbicides, fungicides, or insecticides through sprays, dusts, vapors, soil incorporation, or chemical application on trees, shrubs, lawns, or crops. Usually requires specific training and state or federal certification.

Knowledge: Biology, Customer and Personal Service, Production and Processing, English Language, Administration and Management

Skills: Active Listening, Critical Thinking, Speaking, Time Management, Complex Problem Solving

First-Line Supervisors of Farming, Fishing, and Forestry Workers

Job Description: Directly supervise and coordinate the activities of agricultural, forestry, aquacultural, and related workers.

Knowledge: Administration and Management, Production and Processing, Mechanical, Education and training, English Language

Skills: Active Listening, Judgment and Decision Making, Monitoring, Critical Thinking, Management of Personal Resources

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/>.

Occupational Demand

The NCV/NML subregion employed 8,695 workers in crop science occupations in 2020 (Exhibit 1). The largest occupation is farmers, ranchers, and other agricultural managers with 7,155 workers in 2020. This occupation is projected to decrease by 6% over the next five years and has the greatest number of projected annual openings, 669.

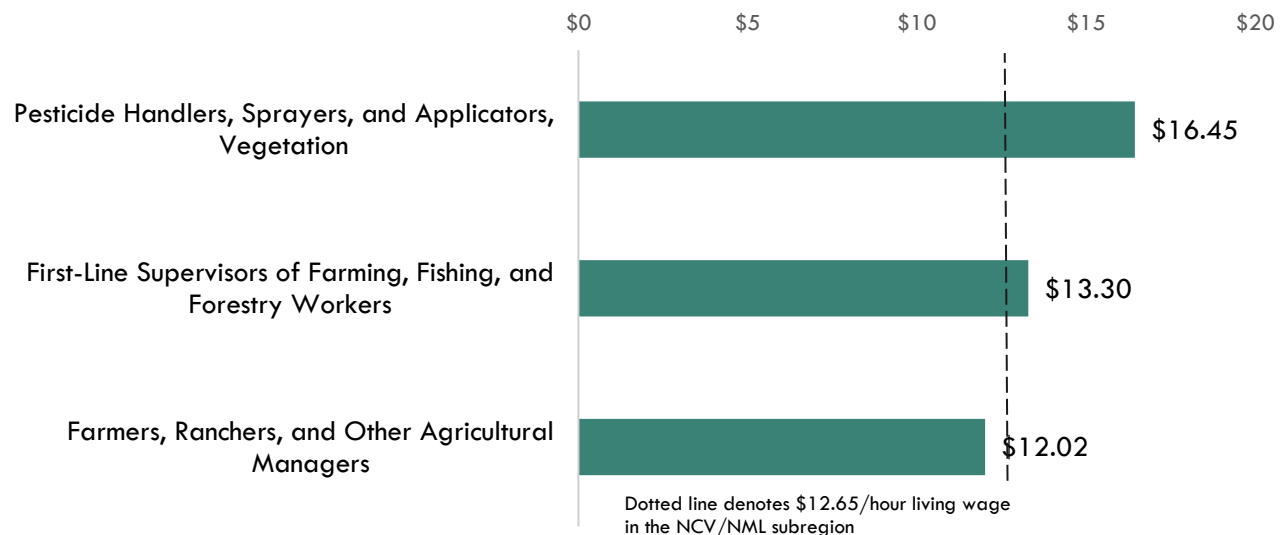
Exhibit 1. Crop science employment and occupational projections in the NCV/NML subregion

Occupation	2020 Jobs	2025 Jobs	5-Year Change	5-Year % Change	Annual Openings
Farmers, Ranchers, and Other Agricultural Managers	7,155	6,735	(419)	(6%)	669
First-Line Supervisors of Farming, Fishing, and Forestry Workers	1,395	1,444	48	3%	212
Pesticide Handlers, Sprayers, and Applicators, Vegetation	145	151	6	4%	20
TOTAL	8,695	8,330	(365)	(4%)	901

Wages

Exhibit 2 shows the entry-level hourly wages of the crop science occupations. Pesticide handlers, sprayers, and applicators, vegetation earn the highest entry-level wage, \$16.45/hour in the subregion. Entry-level wages are derived from the 25th percentile. Please note farmers, ranchers, and other agricultural managers earn less than the average living wage for NCV/NML subregion

Exhibit 2. Crop science entry-level wages in the NCV/NML subregion



Job Postings

There were only 79 job postings for the three occupations in the NCV/NML subregion from July 2021 to December 2021.² The employers with the most job postings are listed in Exhibit 3.

Exhibit 3. Top employers of crop science by number of job postings

Employer	Job Postings	% Job Postings
Acrt Incorporated	6	12%
Acrt Pacific	6	12%
Acrt Pacific, Llc	3	6%
Applied Aerospace Structures	3	6%
Trugreen	3	6%
Crystal Creamery	2	4%
Holiday Inn	2	4%
Merced College	2	4%
Pacific States Marine Fisheries Commission	2	4%
Ac Foods	1	2%

Exhibit 4 shows how job postings for the targeted occupations in the NCV/NML subregion are distributed across eight O*NET OnLine occupations. The occupational title farm and ranch managers is listed in 33 job postings. Note how this occupational title dominates the job posting results. Common job titles in postings include Vegetation Management Inspector in 16 job postings, Farm Manager in nine job postings, and Cure Operator in seven job postings.

Exhibit 4. Top occupational titles in job postings for crop science

Occupational Title	Job Postings	% of Job Postings
Farm and Ranch Managers	33	42%
Pesticide Handlers, Sprayers, and Applicators, Vegetation	26	33%
Aquacultural Managers	9	11%
First-Line Supervisors of Agricultural Crop and Horticultural Workers	4	5%
Nursery and Greenhouse Managers	3	4%
First-Line Supervisors of Animal Husbandry and Animal Care Workers	2	3%
First-Line Supervisors of Aquacultural Workers	1	1%
First-Line Supervisors of Logging Workers	1	1%

² Other than occupation titles and job titles, the categories below can be counted one or multiple times per job posting, and across several areas in a single posting. For example, a skill can be counted in two different skill types, and an employer can indicate more than one education level.

Salaries

Exhibit 5 shows the “Market Salaries” for crop science occupations that are calculated by Burning Glass which uses a machine learning model built off of millions of job postings every year, and accounts for adjustments based on locations, industry, skills, experience, education requirements, among other variables.

Exhibit 5. Salaries for crop science occupations

Market Salary Percentile	Salary Amount
10th Percentile	\$26,898
25th Percentile	\$31,582
50th Percentile	\$34,574
75th Percentile	\$49,139
90th Percentile	\$71,235

Education

Of the 79 job postings, 45 listed an education level preferred for the positions being filled. Among those, 76% requested high school or vocational training, 31% requested a bachelor’s degree, and 18% requested an associate degree (Exhibit 6). A job posting can indicate more than one education level. Hence, the percentages shown in the chart below may total more than 100%.

Exhibit 6. Education levels requested in job postings for crop science

Education Level	Job Postings	% of Job Postings
High school or vocational training	34	76%
Bachelor's degree	14	31%
Associate's degree	8	18%
Master's degree	1	2%
Doctoral degree	1	2%

Baseline and Specialized Skills

Exhibit 7 depicts the top baseline and specialized skills for the targeted occupations. The three most important baseline skills are communication, 55% of job postings, energetic, 37%, and written communication, 37%. The top three specialized skills are customer service, 41% of job postings, forklift operation, 37%, and contractor safety, 33%.

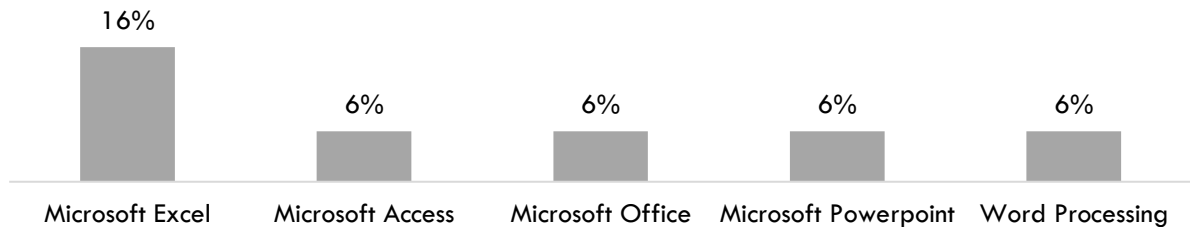
Exhibit 7. In-demand crop science baseline and specialized skills



Software Skills

Analysis also included the software skills most in demand by employers. Microsoft Excel and Microsoft Access were the top two software skills identified in job postings (Exhibit 8).

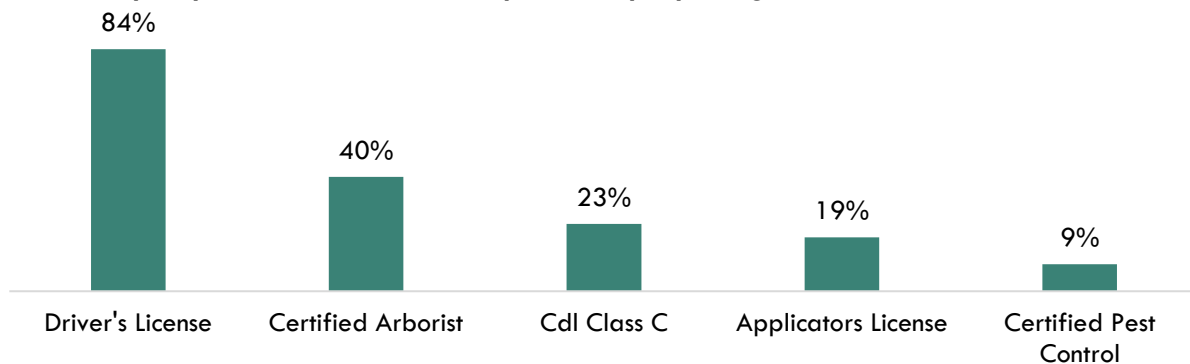
Exhibit 8. In-demand crop science software skills



Certifications

Of the 79 job postings, 43 contained certification data. Among those, 84% indicated a need for a driver's license. The next top certifications are certified arborist and cdl Class C (Exhibit 9).

Exhibit 9. Top crop science certifications requested in job postings



Education, Work Experience & Training

A high school diploma or equivalent is typically required for the two occupations (Exhibit 10).

Exhibit 10. Education, work experience, training, and Current Population Survey results for crop science occupations³

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	30.2%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	21.9%
Pesticide Handlers, Sprayers, and Applicators, Vegetation	High school diploma or equivalent	None	Moderate-term	32.8%

³ "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, <https://www.bls.gov/cps/>.

Supply

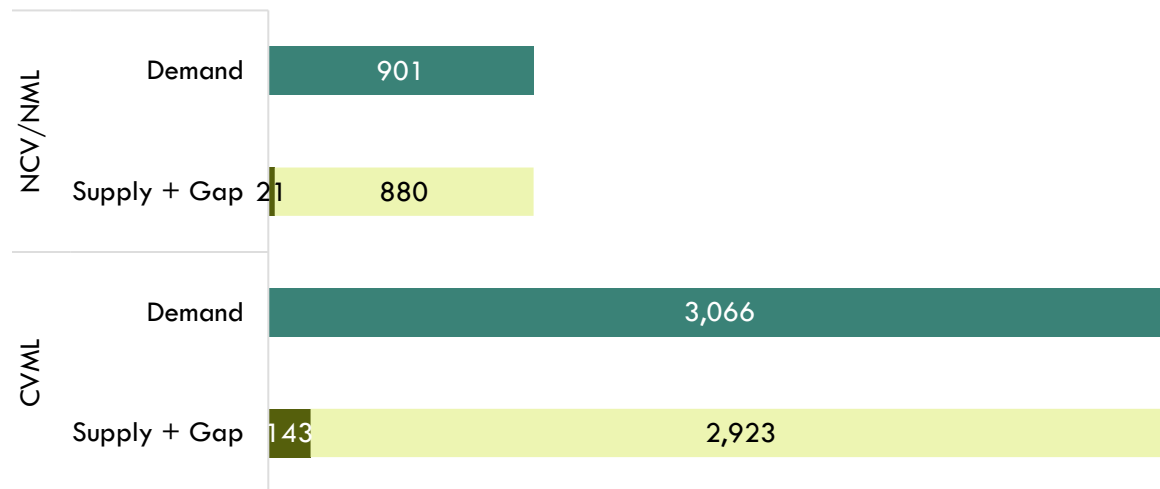
Analysis of program data from the California Community Colleges Chancellor's Office Data Mart included the TOP and CIP codes and titles: 010300 - Plant Science. Analysis of the last three years of data shows that, on average, 143 awards were conferred in the Central Valley/Mother Lode region each year (Exhibit 11).

Exhibit 11. Postsecondary supply for crop science occupations in the region

TOP/CIP Code- Title	College	Associate Degree	Associate for Transfer Degree	Certificate 12 < 18 Semester Units	Certificate 16 < 30 Semester Units	Certificate 18 < 30 Semester Units	Certificate 30 < 60 Semester Units	Certificate 6 < 18 Semester Units	Subtotal
010300 - Plant Science	Bakersfield	8	2				1		11
	Merced	3				1			4
	Modesto	16	1						17
	Reedley College	1	26	10	9	15	3		63
	San Joaquin Delta		1						1
	Sequoias	2	8			1		2	13
	West Hills Coalinga		34						34
TOTAL		30	71	10	9	17	5	2	143

There is an undersupply of 880 crop science workers in the NCV/NML subregion and 2,923 workers in the region (Exhibit 12).

Exhibit 12. Crop science workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill gap in the NCV/NML subregion and region



Student Outcomes

Exhibit 13 summarizes employment and wage outcomes from the California Community College Chancellor's Cal-PASS Plus LaunchBoard for the TOP code related to crop science. Of note, 106 plant science students received a degree or certificate or attained apprenticeship journey status; 419 students transferred; 76% of students obtained a job closely related to their field of study; 38% had a median change in earnings; and 60% of students attained a living wage.

Exhibit 13. Regional metrics for the TOP code related to crop science

Metric	Plant Science 010300
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	106
Number of Students Who Transferred	419
Job Closely Related to Field of Study	76%
Median Change in Earnings	38%
Attained a Living Wage	60%
* denotes data not available.	

Conclusion

The entry-level wages of the three occupations exceed the NCV/NML subregion's average living wage. There were 79 job postings in the past six months for occupations related to crop science in the subregion. Analysis of skills and certification requirements in job postings indicates:

- The top baseline skill is communication, and the top specialized skill is customer service.
- The top software skill is Microsoft Excel.
- The top certification is a driver's license.

There is an undersupply of trained workers, a shortage of 880 in the NCV/NML subregion and 2,923 in the region.

Recommendation

Based on these findings, it is recommended that Merced College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of crop science workers in the region.

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 .
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: https://www.bls.gov/emp/tables/educational-attainment.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: 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, knowledge, work activities and interests associated with specific occupations: 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 region 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.