August 2023

Labor Market Analysis

Plant Science

Prepared by Central Valley/Mother Lode Center of Excellence

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Table of Contents

Summary 2

Key Findings 2

Recommendation 2

Introduction 3

Employment 4

Wages 5

Job Postings 6

Top Employers 6

Top Job Titles 6

Salaries 7

Education 7

Baseline, Specialized, and Software Skills 7

Certifications 8

Education, Work Experience, & Training 8

Supply 9

Student Outcomes 10

Recommendation 11

Appendix: Methodology & Data Sources 12

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Summary

The Central Valley/Mother Lode Center of Excellence developed this report for Bakersfield College to determine whether there is demand in the local labor market that is not being met by the supply from postsecondary programs. This report summarizes labor market demand, wages, skills, and postsecondary supply data for *Plant Science*, which includes:

- Farmers, Ranchers, and Other Agricultural Managers (SOC 11-9013)
- Agricultural Technicians (SOC 19-4012)
- First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)

Key Findings

- **Occupational Demand —** Occupations related to *Plant Science* have a labor market demand of 2,608 annual job openings in the South Central Valley/Southern Mother Lode (SCV/SML) subregion. Between 2021 and 2026, farmers, ranchers, and other agricultural managers are projected to have the most demand with 1,829 annual job openings.

- **Wages —** Average entry-level earnings of $14.53/hour for *Plant Science occupations* are higher than the living wage in the SCV/SML subregion, which is $11.91/hour for a single adult.[1] First-line supervisors of farming, fishing, and forestry workers earn the highest entry-level wage, $15.12/hour.

- **Employers and Job Titles —** Employers in the SCV/SML subregion include Cooperative Agricultural Support Services Authority, Sun World International, LLC., and Bee Sweet Citrus. The most common job title is food/agricultural technicians.

- **Skills and Certifications —** The top baseline skill is communications; the top specialized skill is agriculture, and the top software skill is Microsoft Excel. The most in-demand certification is 30-Hour OSHA General Industry Card.

- **Education —** A high school diploma or equivalent is typically required for farmers, ranchers, and other agricultural managers and first-line supervisors of farming, fishing, and forestry workers. An associate degree is typically required for agricultural technicians.

- **Supply and Demand Analysis —** Based on 2,608 annual openings (i.e., demand) and 228 postsecondary degrees awarded (i.e., supply), an analysis of supply and demand suggests there is an undersupply of 2,380 workers in the SCV/SML subregion. In the CVML region, 281 awards were conferred suggesting an undersupply of 3,409 workers – given the 3,690 annual openings in the CVML region.

Recommendation

Based on a comparison of demand and supply, there is an undersupply of trained workers in the SCV/SML subregion and the CVML region. The Center of Excellence recommends that Bakersfield College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of Plant Science workers.

[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/.

Introduction

The Central Valley/Mother Lode Center of Excellence developed this report to provide Bakersfield College with labor market information for *Plant Science*. The geographical focus for this report is the South Central Valley/Southern Mother Lode (SCV/SML) subregion, but regional demand and supply data are included for broader applicability and use. Analysis of the program and occupational data related to *Plant Science* is included in this report. The Standard Occupational Classification (SOC) System codes and occupational titles used in this report from the Bureau of Labor Statistics and O*NET OnLine are shown below.

Farmers, Ranchers, and Other Agricultural Managers (SOC 11-9013)

- **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

Agricultural Technicians (SOC 19-4012)

- **Job Description:** Work with agricultural scientists in plant, fiber, and animal research, or assist with animal breeding and nutrition. Set up or maintain laboratory equipment and collect samples from crops or animals. Prepare specimens or record data to assist scientists in biology or related life science experiments. Conduct tests and experiments to improve yield and quality of crops or to increase the resistance of plants and animals to disease or insects.
- **Knowledge:** Mathematics, Biology, Chemistry, Administration and Management, English Language
- **Skills:** Reading Comprehension, Active Listening, Complex Problem Solving, Critical Thinking, Writing

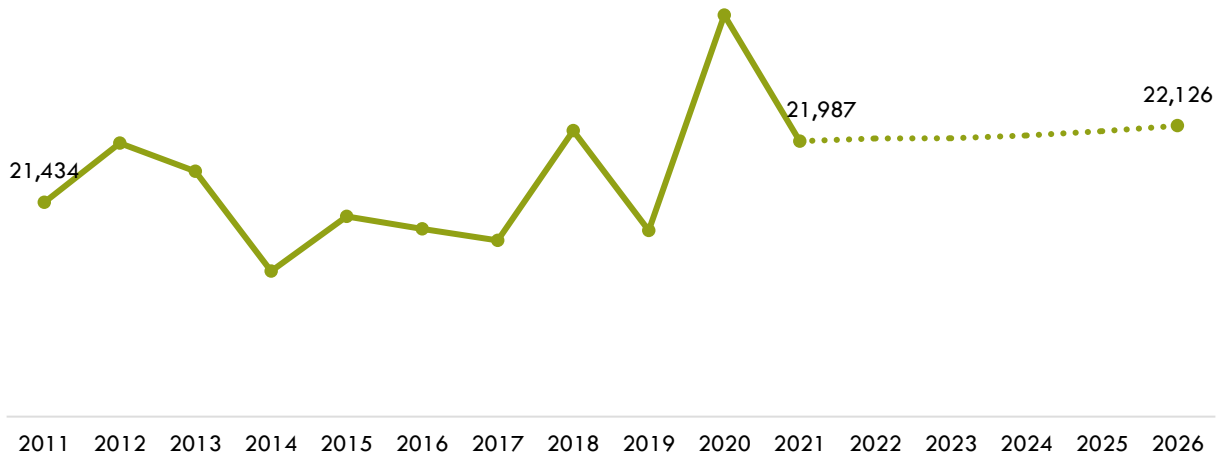
First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)

- **Job Description:** Directly supervise and coordinate the activities of agricultural, forestry, aquacultural, and related workers.
- **Knowledge:** Administration and Management, Production and Processing, Customer and Personal Service, English Language, Mechanical
- **Skills:** Coordination, Critical Thinking, Monitoring, Speaking, Management of Personnel Resources

Employment

Exhibit 1a shows trends for *Plant Science* in the SCV/SML subregion. Between 2021 to 2026, the number of jobs for occupations related to *Plant Science* is projected to increase by 139; growing by 1%.

Exhibit 1a. Historical employment and projected occupational demand for occupations related to *Plant Science* in the SCV/SML subregion, 2011-2026



Occupations related to *Plant Science* in the SCV/SML subregion employed 21,987 workers in 2021 (Exhibit 1b). There is a labor market demand of 2,608 annual job openings in the subregion. Farmers, ranchers, and other agricultural managers are projected to decrease by 1% over the next five years and have projected annual openings of 1,829.

Exhibit 1b. Current employment and projected occupational demand for occupations related to *Plant Science* in the SCV/SML subregion, 2021-2026

Occupation	2021 Jobs	2026 Jobs	5-Year Change	5-Year % Change	Annual Openings
Farmers, Ranchers, and Other Agricultural Managers	17,157	16,974	(183)	(1%)	1,829
First-Line Supervisors of Farming, Fishing, and Forestry Workers	4,389	4,699	310	7%	713
Agricultural Technicians	441	453	12	3%	66
TOTAL	**21,987**	**22,126**	**139**	**1%**	**2,608**

Wages

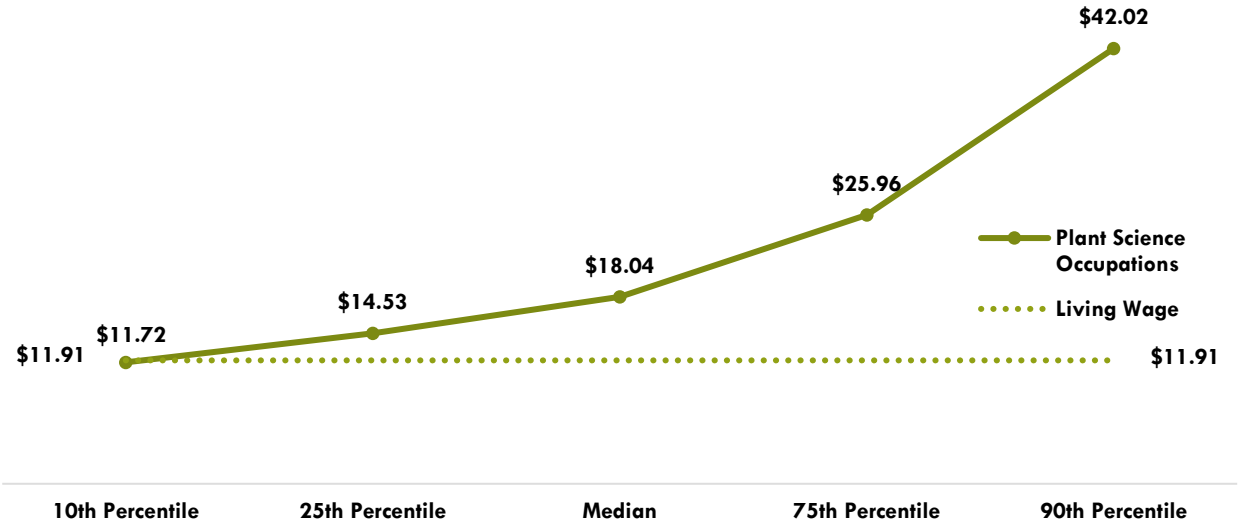
The average living wage for a single adult in the SCV/SML subregion is $11.91/hour.[2] Exhibit 2a shows that the occupation with the highest entry-level hourly wage is first-line supervisors of farming, fishing, and forestry workers – entry-level wage of $15.12/hour.[3]

Exhibit 2a. Hourly wages for occupations related to *Plant Science* in the SCV/SML subregion

Occupation	25th Percentile Hourly Earnings	Median Hourly Earnings	75th Percentile Hourly Earnings
First-Line Supervisors of Farming, Fishing, and Forestry Workers	$15.12	$20.25	$25.09
Agricultural Technicians	$14.47	$16.75	$22.17
Farmers, Ranchers, and Other Agricultural Managers	$14.00	$17.12	$30.61

Exhibit 2b shows the average hourly wages for *Plant Science* occupations; the average entry-level wage (25th percentile) is higher than the living wage for the SCV/SML subregion.

Exhibit 2b. Average hourly wages for occupations related to *Plant Science* in the SCV/SML subregion



[2] 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/.
[3] Note: 10th and 25th percentiles are considered entry-level wages while 75th and 90th are considered experienced wages, which may be obtained through long-term employment or extra training, etc.

Job Postings

There were 52 unique job postings for occupations related to *Plant Science* in the SCV/SML subregion from January 2023 to June 2023.[4]

Top Employers

The top employers with the most job postings are listed in Exhibit 3. The top employers in online job postings were Cooperative Agricultural Support Services Authority, Sun World International, LLC, and Bee Sweet Citrus.

Exhibit 3. Top employers of *Plant Science* workers

Employer
Cooperative Agricultural Support Services Authority
Sun World International, LLC
Bee Sweet Citrus
Belmont Nursery
Prudential Financial
Kingdom Incorporated Limited
Foster Farms
Fresno Metro Ministry
MISTRAS Group
7 Points

Top Job Titles

Exhibit 4 shows the most common job titles for *Plant Science* in the SCV/SML subregion. Common job titles in postings include Food/Agricultural Technicians, Farm/Ranch Managers, and Farm/Nursery/Greenhouse Workers.

Exhibit 4. Top job titles in job postings for *Plant Science*

Job Title
Food/Agricultural Technicians
Farm/Ranch Managers
Farm/Nursery/Greenhouse Workers

[4] Other than occupational 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 *Plant Science*. These are calculated by Lightcast using a machine learning model built from millions of job postings every year. This accounts for adjustments based on location, industry, skills, experience, education, among other variables.

Exhibit 5. Market salaries for *Plant Science*

Market Salary	Job Postings
$35,000-$39,999	12
$50,000-$54,999	8
$30,000-$34,999	7
$70,000-$124,000	6
$45,000-$49,999	4

Education

Of the 52 unique job postings, 24 listed a preferred or minimum educational requirement for the position being filled. Among those, 46% requested a bachelor's degree, 21% requested a high school diploma or GED, and 17% requested an associate degree (Exhibit 6).

Exhibit 6. Education levels requested in job postings for *Plant Science*

Education Level	Job Postings	% of Job Postings
Bachelor's degree	11	46%
High school diploma or GED	5	21%
Associate degree	4	17%
Master's degree	2	8%
Ph.D. or professional degree	2	8%

Baseline, Specialized, and Software Skills

Exhibit 7 depicts the top baseline, specialized, and software skills in job postings. The most reported baseline skill is communications. The most reported specialized skill is agriculture. The most important software skill is Microsoft Excel.

Exhibit 7. In-demand baseline, specialized, and software skills for *Plant Science* occupations

Baseline Skills	Specialized Skills	Software Skills
Communications	Agriculture	Microsoft Excel
Operations	Irrigation	Application Programming Interface (API)
Management	Soil Science	Microsoft Outlook
Coordinating	Environmental Science	Microsoft Access
Good Driving Record	Pesticides	Geographic Information Systems

Certifications

Of the 52 job postings, 30 listed one or more certifications. Among those, 5% indicated a need for a 30-Hour OSHA General Industry Card (Exhibit 8).

Exhibit 8. Top *Plant Science* certifications requested in job postings

Certifications	% of Job Postings
30-Hour OSHA General Industry Card	5%
Pesticide Applicator License	3%

Education, Work Experience, & Training

A high school diploma or equivalent is typically required for 1) farmers, ranchers, and other agricultural managers, and 2) first-line supervisors of farming, fishing, and forestry workers. An associate degree is typically required for agricultural technicians (Exhibit 9).

Exhibit 9. Education, work experience, training, and Current Population Survey results for occupations related to *Plant Science*[5]

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	31%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	21%
Agricultural Technicians	Associate degree	None	Moderate-term	36%

[5] "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, https://www.bls.gov/cps/.

Supply

An analysis of program data from the Integrated Postsecondary Education Data System (IPEDS) for the last three program years shows that, on average, 228 awards were conferred in the SCV/SML subregion (Exhibits 10 and 11).

Exhibit 10. TOP and CIP codes for *Plant Science*

TOP Titles	CIP Titles
010200 - Animal Science	01.0505 - Animal Training 01.0302 - Animal/Livestock Husbandry and Production
010230 - Dairy Science	01.0306 - Dairy Husbandry and Production
010300 - Plant Science	01.0304 - Crop Production
010400 - Viticulture, Enology, and Wine Business	01.0309 - Viticulture and Enology 12.0510 - Wine Steward/Sommelier

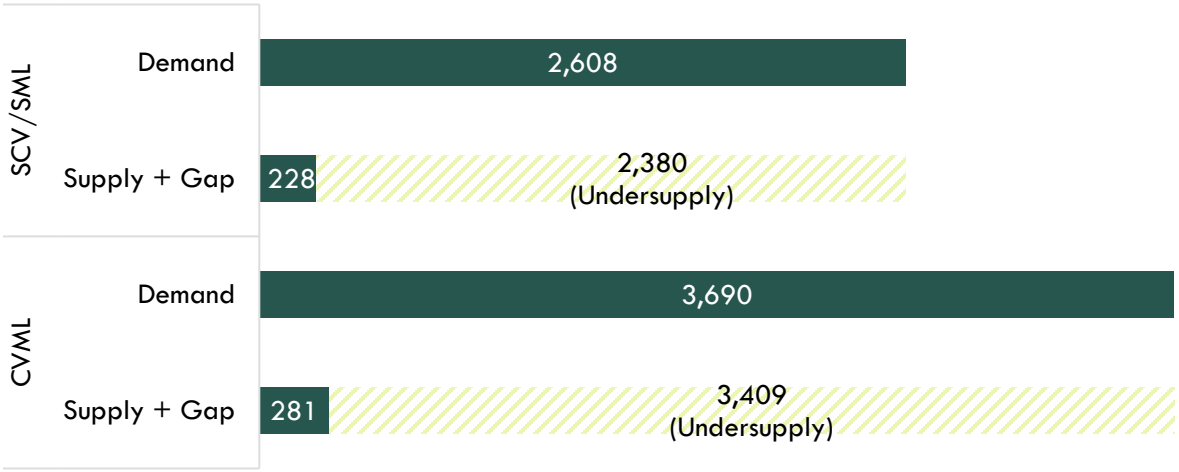
Exhibit 11. Postsecondary supply for *Plant Science* for Program Years 2019-20 through 2021-22

TOP/ CIP Code- Title	College	Associate Degree	Associate for Transfer Degree	Certificate 30 < 60 semester units	Certificate 18 < 30 semester units	Certificate 16 < 30 semester units	Certificate 12 < 18 semester units	Certificate 6 < 18 semester units	Total
010200 - Animal Science	Bakersfield	14	14	1					29*
	Merced	8		1					9
	Modesto	14	11						25
	Reedley College	2	20			7	0		29*
	Sequoias	3	21		0	3			27*
010230 - Dairy Science	Modesto	4							4
	Sequoias							0	0*
010300 - Plant Science	Bakersfield	13	6	1					20*
	Merced	5			0	0			5
	Modesto	8	1						9
	Reedley College	1	32	5	3	26			67*
	San Joaquin Delta		1						1
	Sequoias	2	8					3	13*
	West Hills Coalinga		42						42*
010400 - Viticulture, Enology, and Wine Business	Reedley College					1			1*
SCV/SML TOTAL		**35**	**143**	**7**	**3**	**37**	**0**	**3**	**228**
CVML TOTAL		**72**	**156**	**8**	**3**	**37**	**0**	**3**	**281**

*SCV/SML awards

There is an undersupply of 2,380 *Plant Science* workers in the SCV/SML subregion and an undersupply of 3,409 workers in the region (Exhibit 12).

Exhibit 12. *Plant Science* workforce demand (annual job openings), postsecondary awards (supply), and additional students needed to fill gap in the SCV/SML subregion and region



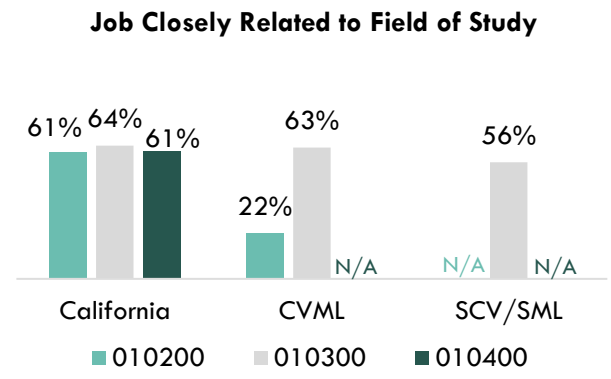
Student Outcomes

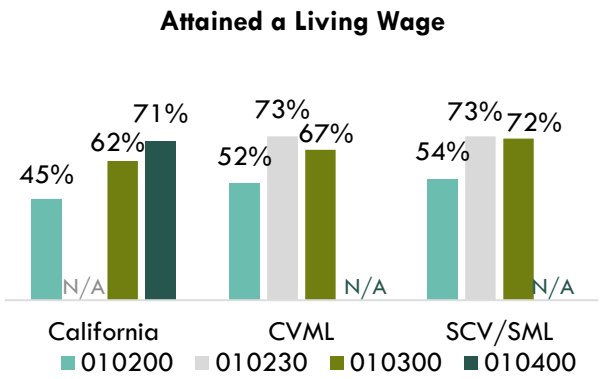
Exhibits 13a-13b summarize outcomes from California Community College Chancellor's LaunchBoard for TOP codes related to *Plant Science*.

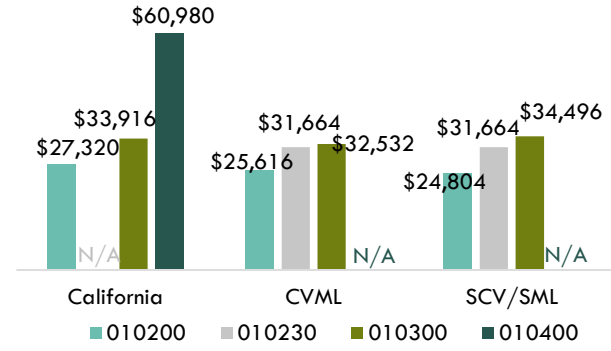
Exhibit 13a. LaunchBoard Metrics for TOP 010200 - Animal Science, 010230 - Dairy Science, 010300 - Plant Science, and 010400 - Viticulture, Enology, and Wine Business in the subregion

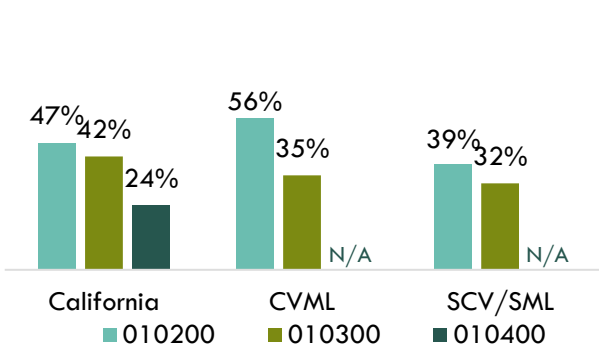
Metric	010200 - Animal Science	010230 - Dairy Science	010300 - Plant Science	010400 - Viticulture, Enology, and Wine Business
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	82	54	55	56

Exhibit 13b. LaunchBoard Metrics for TOP 010200 - Animal Science, 010230 - Dairy Science, 010300 - Plant Science, and 010400 - Viticulture, Enology, and Wine Business in California, CVML region, and SCV/SML subregion









Recommendation

This report suggests there is a shortage of 2,380 workers in the SCV/SML subregion and a shortage of 3,409 workers in the CVML region for *Plant Science*. Based on these findings, it is recommended that Bakersfield College work with the regional directors, the college's advisory board, and local industry in the expansion of programs to address the shortage of *Plant Science* workers in the region.

Appendix: 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. (LIGHTCAST). LIGHTCAST occupational employment data are based on final LIGHTCAST industry data and final LIGHTCAST 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 LIGHTCAST 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.
LaunchBoard	Chancellor's LaunchBoard. https://www.calpassplus.org/LaunchBoard/SWP.aspx
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: labormarketinfo.edd.ca.gov.
Job Posting and Skills Data	Lightcast: https://lightcast.io/.
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 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. (LIGHTCAST) formula that includes historical employment and economic indicators along with national, state and local trends.

LaunchBoard (Attained the Living Wage): Among SWP students who exited college and did not transfer to any postsecondary institution, the proportion who attained the district county living wage for a single adult measured immediately following academic year of exit.

LaunchBoard (Median Annual Earnings): Among SWP students who exited the community college system and who did not transfer to any postsecondary institution, median earnings following the academic year of exit.

LaunchBoard (Median Change in Earnings): Among SWP students who exited and who did not transfer to any postsecondary institution, median change in earnings between the second quarter prior to the beginning of the academic year of entry and the second quarter after the end of the academic year of exit from the last college attended.

LaunchBoard (Job Closely Related to Field of Study): Among SWP students who responded to the CTE Outcomes Survey and did not transfer to any postsecondary institution, the proportion who reported that they are working in a job very closely or closely related to their field of study.

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, the 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.

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