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# Labor Market Analysis

## Data Science



**Prepared by Central Valley/Mother Lode Center of Excellence**



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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 for *Data Science* occupations, which includes:

- Computer Systems Analysts (SOC 15-1211)
- Information Security Analysts (SOC 15-1212)
- Computer Network Support Specialists (SOC 15-1231)
- Computer User Support Specialists (SOC 15-1232)
- Computer Programmers (SOC 15-1251)
- Software Quality Assurance Analysts and Testers (SOC 15-1253)

## Key Findings

- **Occupational Demand** — Occupations related to *Data Science* have a labor market demand of 500 annual job openings in the South Central Valley/Southern Mother Lode (SCV/SML) subregion. Between 2022 and 2027, *computer user support specialists* are projected to have the most demand with 217 annual job openings and jobs are projected to grow by 10%.
- **Wages** — Average entry-level earnings of \$32.47/hour for *Data Science* occupations are higher than the living wage in the SCV/SML subregion, which is \$11.91/hour for a single adult.<sup>1</sup> *Information security analysts* earn the highest entry-level wage, \$41.47/hour.
- **Employers and Occupational Titles** — Employers in the SCV/SML subregion include Delaware North, Deloitte, and Randstad. The most common job title is IT Specialists.
- **Skills and Certifications** — The top baseline skill is communication, the top specialized skill is computer science, and the top software skill is Microsoft Software. The most in-demand certification is CompTIA A+.
- **Education** — Some college, no degree is typically required for *Computer User Support Specialists*. An associate's degree is typically required for *Computer Network Support Specialists*. A bachelor's degree is typically required for *Computer Systems Analysts*, *Information Security Analysts*, *Computer Programmers*, and *Software Quality Assurance Analysts and Testers*
- **Supply and Demand Analysis** — An analysis of supply and demand reveals that there are 500 annual openings (i.e., demand) and 172 average annual postsecondary degrees awarded (i.e., supply) in the SCV/SML subregion. This suggests an undersupply of 328 workers. In the CVML region, there are 755 annual openings and 193 awards were conferred suggesting an undersupply of 562 workers.

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<sup>1</sup> 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://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

## 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 creation or expansion of programs to address the shortage of *Data Science* workers.

# Introduction

The Central Valley/Mother Lode Center of Excellence developed this report to provide Bakersfield College with labor market information for *Data Science* occupations. The geographical focus for this report is the South Central Valley/Southern Mother Lode (SCV/SML) subregion, but regional demand and supply data has been included for broader applicability and use. Analysis of the program and occupational data related to *Data Science* occupations are included in the 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.

## Computer Systems Analysts (SOC 15-1211)

- **Job Description:** Analyze science, engineering, business, and other data processing problems to develop and implement solutions to complex applications problems, system administration issues, or network concerns. Perform systems management and integration functions, improve existing computer systems, and review computer system capabilities, workflow, and schedule limitations. May analyze or recommend commercially available software.
- **Knowledge:** Computers and Electronics, Customer and Personal Service, English Language, Mathematics, Administration and Management
- **Skills:** Speaking, Reading Comprehension, Active Listening, Critical Thinking, Systems Analysis

## Information Security Analysts (SOC 15-1212)

- **Job Description:** Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. Assess system vulnerabilities for security risks and propose and implement risk mitigation strategies. May ensure appropriate security controls are in place that will safeguard digital files and vital electronic infrastructure. May respond to computer security breaches and viruses.
- **Knowledge:** Computers and Electronics, English Language, Administration and Management, Engineering and Technology, Telecommunications
- **Skills:** Reading Comprehension, Critical Thinking, Active Listening, Complex Problem Solving, Speaking

### **Computer Network Support Specialists (SOC 15-1231)**

- **Job Description:** Analyze, test, troubleshoot, and evaluate existing network systems, such as local area networks (LAN), wide area networks (WAN), cloud networks, servers, and other data communications networks. Perform network maintenance to ensure networks operate correctly with minimal interruption.
- **Knowledge:** Computers and Electronics, Telecommunications, Customer and Personal Service, Engineering and Technology, English Language
- **Skills:** Critical Thinking, Active Listening, Judgment and Decision Making, Reading Comprehension, Active Learning

### **Computer User Support Specialists (SOC 15-1232)**

- **Job Description:** Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, via telephone, or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.
- **Knowledge:** Computer and Electronics, Customer and Personal Service, Telecommunications, English Language, Education and Training
- **Skills:** Active Listening, Reading Comprehension, Speaking, Critical Thinking, Complex Problem Solving

### **Computer Programmers (SOC 15-1251)**

- **Job Description:** Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.
- **Knowledge:** Computers and Electronics, Mathematics, Engineering and Technology, English Language, Customer and Personal Service
- **Skills:** Programming, Active Listening, Complex Problem Solving, Critical Thinking, Quality Control Analysis

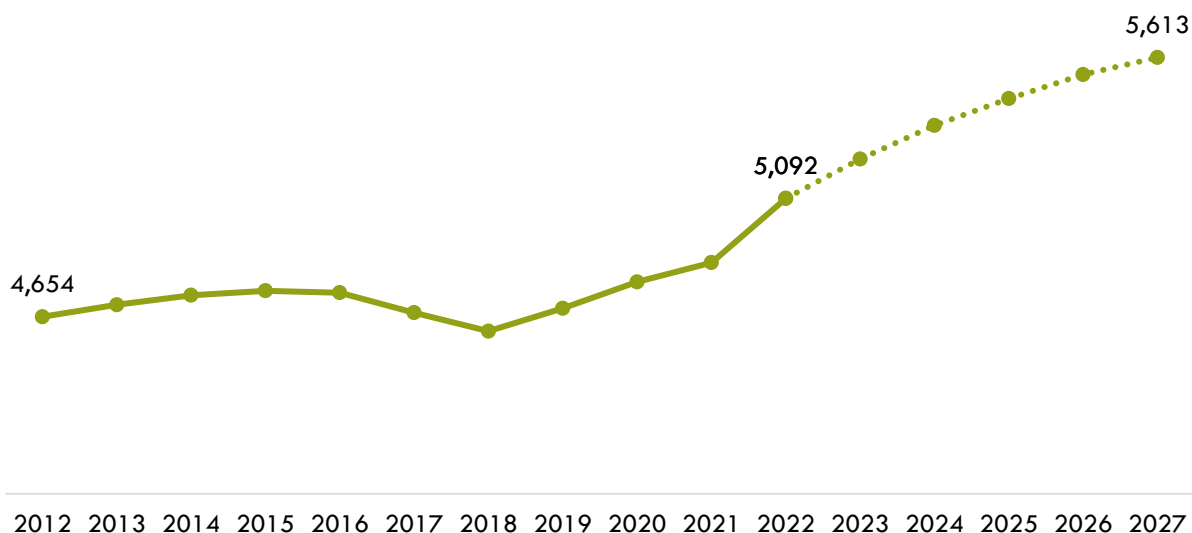
### **Software Quality Assurance Analysts and Testers (SOC 15-1253)**

- **Job Description:** Develop and execute software tests to identify software problems and their causes. Test system modifications to prepare for implementation. Document software and application defects using a bug tracking system and report defects to software or web developers. Create and maintain databases of known defects. May participate in software design reviews to provide input on functional requirements, operational characteristics, product designs, and schedules.
- **Knowledge:** Computers and Electronics, English Language, Engineering and Technology, Mathematics, Design
- **Skills:** Reading Comprehension, Active Listening, Critical Thinking, Speaking, Writing

# Employment

Exhibit 1a shows trends for *Data Science* occupations in the SCV/SML subregion. Between 2022 to 2027, the number of jobs for occupations related to *Data Science* is projected to increase by 521, growing by 10%.

**Exhibit 1a. Historical employment and projected occupational demand for occupations related to *Data Science* in the SCV/SML subregion, 2012-2027**



Occupations related to *Data Science* in the SCV/SML subregion employed 5,092 workers in 2022 (Exhibit 1b). *Computer User Support Specialists* are projected to have the most annual job openings, with 217 annual openings.

**Exhibit 1b. Current employment and projected occupational demand for occupations related to *Data Science* in the SCV/SML subregion, 2022-2027**

Occupation	2022 Jobs	2027 Jobs	5-Year Change	5-Year % Change	Annual Openings
Computer Systems Analysts	1,216	1,348	133	11%	116
Information Security Analysts	250	305	56	22%	31
Computer Network Support Specialists	637	689	52	8%	61
Computer User Support Specialists	2,135	2,357	222	10%	217
Computer Programmers	382	386	4	1%	28
Software Quality Assurance Analysts and Testers	472	527	55	12%	46
<b>TOTAL</b>	<b>5,092</b>	<b>5,613</b>	<b>521</b>	<b>10%</b>	<b>500</b>

# Wages

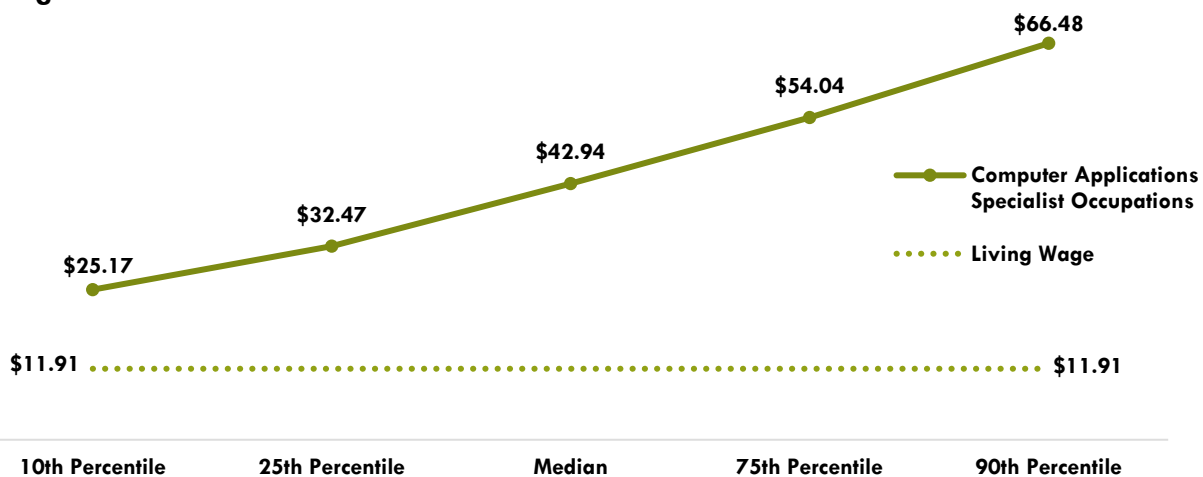
The average living wage for a single adult in the SCV/SML subregion is \$11.91/hour.<sup>2</sup> Exhibit 2a shows that the highest entry-level hourly wages are for *Information Security Analysts*, which has an entry-level wage of \$41.57/hour.<sup>3</sup>

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

Occupation	25 <sup>th</sup> Percentile Hourly Earnings	Median Hourly Earnings	75 <sup>th</sup> Percentile Hourly Earnings
Computer Systems Analysts	\$34.65	\$44.25	\$56.56
Information Security Analysts	\$41.57	\$58.97	\$75.10
Computer Network Support Specialists	\$26.71	\$31.58	\$38.88
Computer User Support Specialists	\$22.25	\$27.84	\$36.15
Computer Programmers	\$29.81	\$42.30	\$54.80
Software Quality Assurance Analysts and Testers	\$39.82	\$52.73	\$62.77

Exhibit 2b shows the average hourly wages for *Data Science* occupations; the average entry-level wage is well above the living wage for the SCV/SML subregion.

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



<sup>2</sup> 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://insightccd.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

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

# Job Postings

There were 1,049 unique job postings for occupations related to *Data Science* in the SCV/SML subregion in the last 12 months.<sup>4</sup>

## Top Employers

The top employers with the most job postings are listed in Exhibit 3. The top employers in online job postings were Delaware North, Deloitte, and Randstad.

### Exhibit 3. Top employers of *Data Science* occupations in job postings

Employer
Delaware North
Deloitte
Randstad
Leidos
Kern Community College District
CTG
Northrop Grumman
CalPortland
Naval Air Systems Command
DCS Corporation

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<sup>4</sup> 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.



## Top Job Titles

Exhibit 4 shows the most common job titles for *Data Science* occupations in the SCV/SML subregion.

### Exhibit 4. Top job titles in job postings for *Data Science* occupations

Job Title
IT Specialists
IT Technicians
IT Support Technicians
Help Desk Specialists
Help Desk Technicians
IT Support Specialists
Technical Support Analysts
Support Technicians
Desktop Support Technicians
Business Systems Analysts

## Salaries

Exhibit 5 shows the “Market Salaries” for *Data Science* occupations. 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 *Data Science* occupations

Market Salary	Job Postings
\$30,000-\$35,999	16
\$36,000-\$41,999	62
\$42,000-\$47,999	64
\$48,000-\$53,999	74
\$54,000-\$59,999	89
\$60,000-\$65,999	73
\$66,000-\$71,999	77
\$72,000-\$77,999	56
\$78,000-\$83,999	48
\$84,000-\$89,999	20
\$90,000-\$225,000	64

## Education

Of the 1,049 unique job postings, 886 listed a preferred or minimum educational requirement for the position being filled. Among those, 26% requested a high school diploma or GED, 20% requested an associate degree, and 44% requested a bachelor's degree (Exhibit 6).

### Exhibit 6. Education levels requested in job postings for *Data Science* occupations

Education Level	Job Postings	% of Job Postings
High school or GED	227	26%
Associate degree	178	20%
Bachelor's degree	391	44%
Master's degree	79	9%
Ph.D. or professional degree	11	1%

## Baseline, Specialized, and Software Skills

Exhibit 7 depicts the top baseline, specialized, and software skills in job postings. The most requested baseline skill is communications. The most requested specialized skill is computer science. The most requested software skill is Microsoft Office.

### Exhibit 7. In-demand baseline, specialized, and software skills for *Data Science* occupations in job postings

Baseline Skills	Specialized Skills	Software Skills
Communications	Computer Science	Microsoft Office
Troubleshooting (Problem Solving)	Help Desk Support	Operating Systems
Management	Technical Support	Active Directory
Customer Service	Operating Systems	Apple iOS
Operations	Information Systems	SQL (Programming Language)

## Certifications

Of the job postings that listed a certification, 11% indicated a need for CompTIA A+, followed by 7% CompTIA Security+ (Exhibit 8).

### Exhibit 8. Top *Data Science* certifications requested in job postings

Certifications	% of Job Postings
CompTIA A+	11%
CompTIA Security+	7%
Secret Clearance	6%
CompTIA Network+	4%
Microsoft Certified Professional	4%

# Education, Work Experience, & Training

Some college, no degree is typically required for *Computer User Support Specialists*. An associate degree is typically required for *Computer Network Support Specialists*. A bachelor's degree is typically required for *Computer Systems Analysts*, *Information Security Analysts*, *Computer Programmers*, and *Software Quality Assurance Analysts and Testers* (Exhibit 9).

**Exhibit 9. Education, work experience, training, and Current Population Survey results for occupations related to *Data Science*<sup>5</sup>**

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	CPS
Computer Systems Analysts	Bachelor's degree	None	None	20.2%
Information Security Analysts	Bachelor's degree	Less than 5 years	None	26.5%
Computer Network Support Specialists	Associate degree	None	Moderate-term on-the-job training	39.2%
Computer User Support Specialists	Some college, no degree	None	Moderate-term on-the-job training	39.2%
Computer Programmers	Bachelor's degree	None	None	20.7%
Software Quality Assurance Analysts and Testers	Bachelor's degree	None	None	21.6%

<sup>5</sup> "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, 172 awards were conferred in the SCV/SML subregion (Exhibits 10 and 11).

## Exhibit 10. TOP and CIP codes for Computer Information Systems (0702.00)

TOP Titles	CIP Titles
0702.00 - Computer Information Systems	11.0101 Computer and Information Sciences, General
	11.0103 Information Technology
	11.0501 Computer Systems Analysis/Analyst
	30.7001 Data Science, General

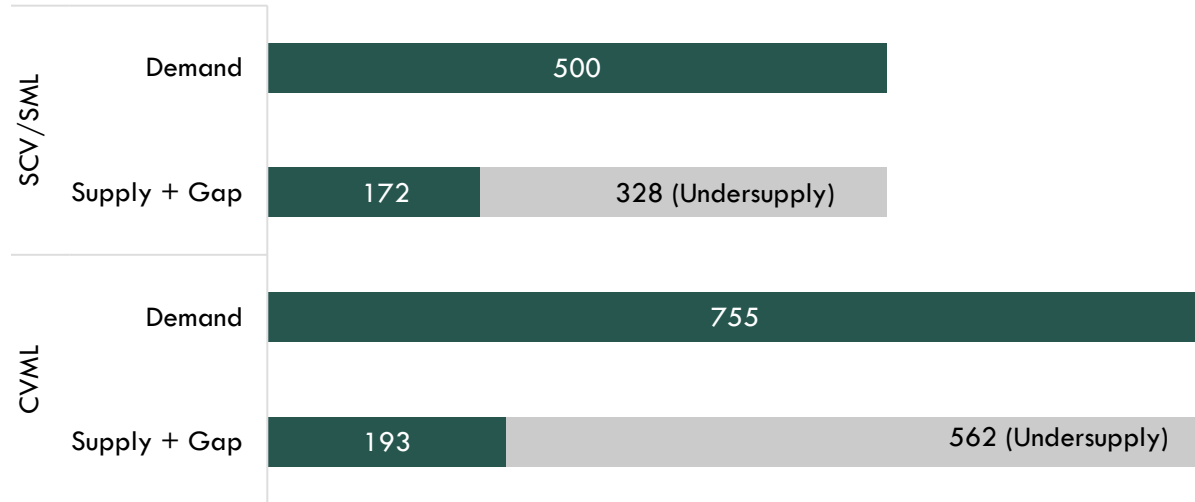
## Exhibit 11. Postsecondary supply for Computer Information Systems and related Programs, Academic Years 2019-20 through 2021-22

TOP/CIP Code-Title	College	Associate Degree	Noncredit Award < 48 Hours	Certificate 30 < 60 Semester Units	Certificate 16 < 30 Semester Units	Certificate 8 < 16 Semester Units	Total	
0702.00 - Computer Information Systems	Bakersfield	0					0	
	Cerro Coso	23		19	23		65*	
	Clovis College				1		1*	
	Fresno City	10			12		22*	
	Merced	3		2			5	
	Porterville	6					6*	
	Reedley College					18	0	18*
	San Joaquin Delta	16					16	
	Sequoias	6		2			8*	
11.0101 - Computer and Information Sciences, General	Milan Institute-Visalia				9		9*	
11.0103 - Information Technology	San Joaquin Valley College-Visalia	16		22	5		43*	
<b>SCV/SML TOTAL</b>		<b>61</b>	<b>0</b>	<b>43</b>	<b>68</b>	<b>0</b>	<b>172</b>	
<b>CVML TOTAL</b>		<b>80</b>	<b>0</b>	<b>45</b>	<b>68</b>	<b>0</b>	<b>193</b>	

\*SCV/SML awards

There is an undersupply of 328 *Data Science* workers in the SCV/SML subregion and an undersupply of 562 workers in the region (Exhibit 12).

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



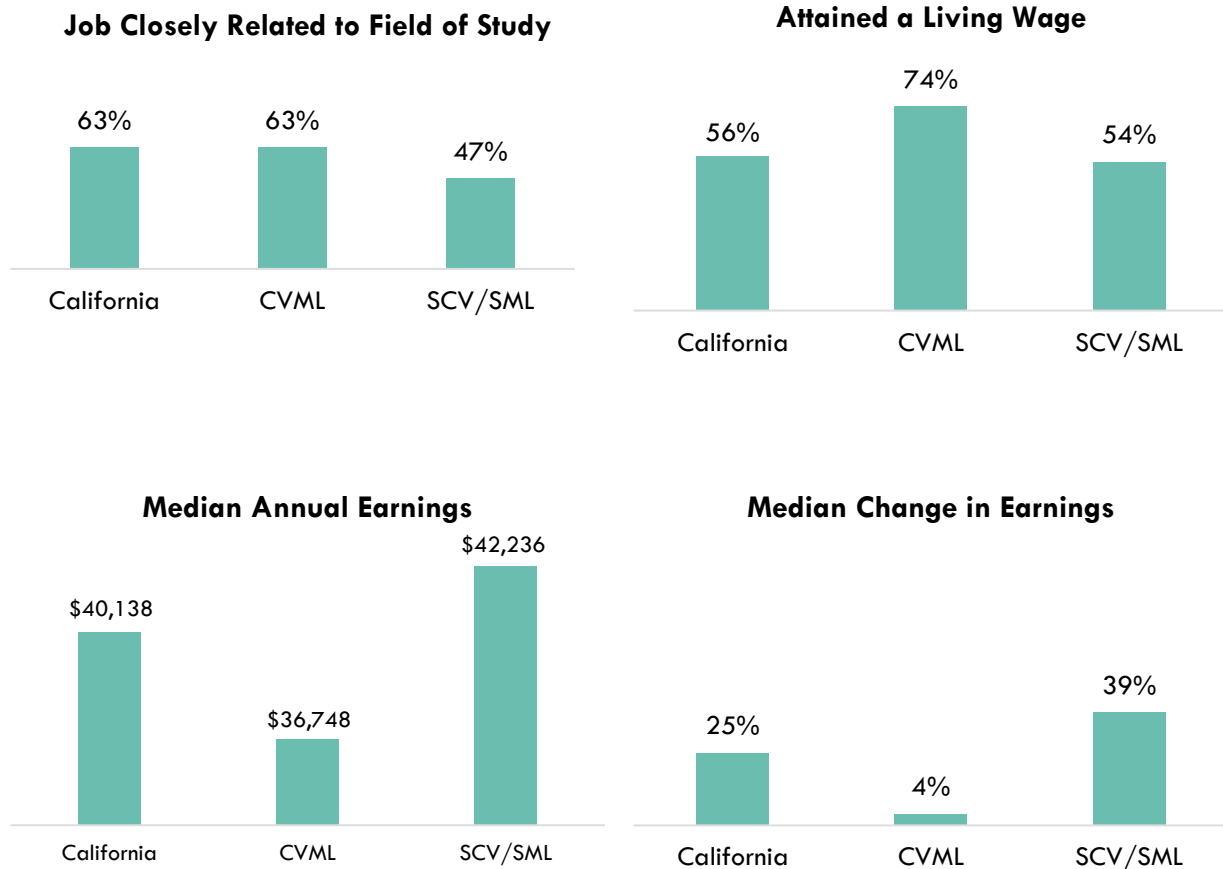
# Student Outcomes

Exhibits 13a-13b summarize outcomes from California Community College Chancellor's LaunchBoard for TOP codes related to *Computer Information Systems*. Notably, 47% of students obtained a job closely related to their field of study and 54% of students attained a living wage in the subregion.

**Exhibit 13a. LaunchBoard Metrics for TOP 0702.00 - Computer Information Systems in the subregion**

Metric	
Students Who Got a Degree or Certificate or Attained Apprenticeship Journey Status	26

**Exhibit 13b. LaunchBoard Metrics for TOP 0702.00 - Computer Information Systems in California, CVML region, and SCV/SML subregion**



# Recommendation

This report suggests there is a shortage of 328 workers in the SCV/SML subregion and a shortage of 562 workers in the CVML region for *Data 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 creation or expansion of programs to address the shortage of *Data 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: <a href="http://economicmodeling.com">economicmodeling.com</a> .
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: <a href="https://www.bls.gov/emp/tables/educational-attainment.htm">https://www.bls.gov/emp/tables/educational-attainment.htm</a> .
LaunchBoard	Chancellor’s LaunchBoard. <a href="https://www.calpassplus.org/LaunchBoard/SWP.aspx">https://www.calpassplus.org/LaunchBoard/SWP.aspx</a>
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division: <a href="http://labormarketinfo.edd.ca.gov">labormarketinfo.edd.ca.gov</a> .
Job Posting and Skills Data	Lightcast: <a href="https://lightcast.io/">https://lightcast.io/</a> .
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: <a href="http://onetonline.org">onetonline.org</a> .



## 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, 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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