



Labor Market Analysis for Program Recommendation Artificial Intelligence for Business Occupations Foothill College

Prepared by the Bay Region Center of Excellence for Labor Market Research

November 2024

Recommendation

Based on all available data, there appears to be an “undersupply” of Artificial Intelligence for Business workers compared to the demand for this cluster of occupations in the Bay Region and in the Silicon Valley Sub-Region (Santa Clara County). There is a projected annual gap of about 13,575 students in the Bay Region and 4,511 students in the Silicon Valley Sub-Region.

Introduction

This report provides student outcomes data on employment and earnings for TOP 0707.00 - Computer Software Development programs in the state and region. It is recommended that these data be reviewed to better understand how outcomes for students taking courses on this TOP code compare to potentially similar programs at colleges in the state and region, as well as to outcomes across all CTE programs at Foothill College and in the region.

This report profiles Artificial Intelligence for Business Occupations in the 12 county Bay Region and in the Silicon Valley Sub-Region for New certificate or degree development (for credit) at Foothill College.

- **Marketing Managers (11-2021):** Plan, direct, or coordinate marketing policies and programs, such as determining the demand for products and services offered by a firm and its competitors, and identify potential customers. Develop pricing strategies with the goal of maximizing the firm’s profits or share of the market while ensuring the firm’s customers are satisfied. Oversee product development or monitor trends that indicate the need for new products and services.
Entry-Level Educational Requirement: Bachelor’s degree
Training Requirement: None
Percentage of Community College Award Holders or Some Postsecondary Coursework: 13%
- **Sales Managers (11-2022):** Plan, direct, or coordinate the actual distribution or movement of a product or service to the customer. Coordinate sales distribution by establishing sales territories, quotas, and goals and establish training programs for sales representatives. Analyze sales statistics gathered by staff to determine sales potential and inventory requirements and monitor the preferences of customers.
Entry-Level Educational Requirement: Bachelor’s degree
Training Requirement: None
Percentage of Community College Award Holders or Some Postsecondary Coursework: 28%
- **Market Research Analysts and Marketing Specialists (13-1161):** Research conditions in local, regional, national, or online markets. Gather information to determine potential sales of a product or service, or plan a marketing or advertising campaign. May gather information on competitors, prices, sales, and methods of marketing and distribution. May employ search marketing tactics, analyze web metrics, and develop recommendations to increase search engine ranking and visibility to target markets.

Entry-Level Educational Requirement: Bachelor's degree

Training Requirement: None

Percentage of Community College Award Holders or Some Postsecondary Coursework: 15%

- **Computer Occupations, All Other (15-1299):** All computer occupations not listed separately.
Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Percentage of Community College Award Holders or Some Postsecondary Coursework: 35%
- **Data Scientists (15-2051):** Develop and implement a set of techniques or analytics applications to transform raw data into meaningful information using data-oriented programming languages and visualization software. Apply data mining, data modeling, natural language processing, and machine learning to extract and analyze information from large structured and unstructured datasets. Visualize, interpret, and report data findings. May create dynamic data reports.
Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Percentage of Community College Award Holders or Some Postsecondary Coursework: 10%

Occupational Demand

Table 1. Employment Outlook for Artificial Intelligence for Business Occupations in the Bay Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Marketing Managers	23,858	24,830	971	4%	10,520	2,104	\$74	\$99
Sales Managers	34,110	34,970	860	3%	13,502	2,700	\$52	\$82
Market Research Analysts and Marketing Specialists	40,047	43,466	3,419	9%	22,153	4,431	\$36	\$56
Computer Occupations, All Other	40,872	43,182	2,309	6%	15,348	3,070	\$47	\$70
Data Scientists	13,963	16,433	2,470	18%	6,914	1,383	\$60	\$79
Total	152,850	162,881	10,031	7%	68,437	13,688	\$51	\$74

Source: Lightcast 2024.3

The Bay Region includes: Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma Counties

Table 2. Employment Outlook for Artificial Intelligence for Business Occupations in the Silicon Valley Sub-Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Earning	Median Hourly Wage
Marketing Managers	7,799	8,087	288	4%	3,386	677	\$81	\$103
Sales Managers	10,591	10,864	272	3%	4,138	828	\$67	\$100
Market Research Analysts and Marketing Specialists	11,632	12,495	863	7%	6,278	1,256	\$39	\$63
Computer Occupations, All Other	18,032	18,927	895	5%	6,619	1,324	\$60	\$81
Data Scientists	4,889	5,650	761	16%	2,303	461	\$68	\$82
Total	52,943	56,023	3,080	6%	22,724	4,546	\$61	\$84

Source: Lightcast 2024.3

Silicon Valley Sub-Region includes: Santa Clara County

Job Postings in the Bay Region and Silicon Valley Sub-Region

Table 3. Number of Job Postings by Occupation for the latest 12 months

Occupation	Bay Region	Silicon Valley
Computer Occupations, All Other	23,209	10,612
Marketing Managers	18,867	7,123
Data Scientists	16,733	7,851
Sales Managers	10,452	2,855
Market Research Analysts and Marketing Specialists	7,342	2,096

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Table 4a. Top Job Titles in Job Postings for Artificial Intelligence for Business Occupations in the Bay Region

Title	Bay	Title	Bay
Machine Learning Engineers	1,978	Marketing Managers	591
Product Managers	1,906	Product Marketing Managers	546
Data Scientists	1,741	Site Reliability Engineers	516
Data Analysts	868	Directors of Product Management	486
Platform Software Engineers	853	Firmware Engineers	485
Sales Managers	780	Systems Engineers	474
Business Development Managers	765	Marketing Product Managers	410
Machine Learning Software Engineers	751	Directors of Business Development	402
Principal Product Managers	695	Territory Sales Managers	327

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Table 4b. Top Job Titles in Job Posting for Artificial Intelligence for Business Occupations in the Silicon Valley Sub-Region

Title	Silicon Valley	Title	Silicon Valley
Machine Learning Engineers	1,193	Google Cloud Architects	255
Product Managers	846	Business Development Managers	244
Data Scientists	754	Directors of Product Management	234
Machine Learning Software Engineers	524	Systems Engineers	218
Platform Software Engineers	398	Sales Managers	216
Firmware Engineers	394	Product Marketing Managers	184
Data Analysts	343	Marketing Managers	169
Site Reliability Engineers	330	Technical Product Managers	165

Title	Silicon Valley	Title	Silicon Valley
Principal Product Managers	317	Deep Learning Engineers	159

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Industry Concentration

Table 5. Industries Hiring for Artificial Intelligence for Business Occupations in the Bay Region

Industry - 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2023)	Jobs in Industry (2028)	% Change (2023-28)	% Occupation Group in Industry (2023)
Custom Computer Programming Services	15,140	17,419	15%	10%
Software Publishers	9,483	10,534	11%	6%
Electronic Computer Manufacturing	8,309	9,144	10%	5%
Corporate, Subsidiary, and Regional Managing Offices	6,834	6,328	-7%	4%
Computer Systems Design Services	6,648	6,507	-2%	4%
Data Processing, Hosting, and Related Services	6,598	7,947	20%	4%
Web Search Portals and All Other Information Services	5,885	6,115	4%	4%
Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers	4,708	5,016	7%	3%
Administrative Management and General Management Consulting Services	4,261	4,901	15%	3%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	3,487	3,923	13%	2%

Source: Lightcast 2024.4

Table 6. Top Employers Posting Artificial Intelligence for Business Occupations in the Bay Region and the Silicon Valley Sub-Region

Employer	Bay	Employer	Silicon Valley
Google	2,075	Apple	2,015
Apple	2,058	Google	1,753
Meta	1,546	Tiktok	1,126
Amazon	1,338	Nvidia	866
Tiktok	1,172	Amazon	773
Nvidia	866	Palo Alto Networks	441

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Educational Supply

There are four community colleges in the Bay Region issuing 64 awards on average annually (last 3 years ending 2021-23) on TOP 0707.00 - Computer Software Development. In the Silicon Valley Sub-Region, there is one community college that issued 28 awards on average annually (last 3 years) on this TOP code.

There are two other CTE educational institutions in the Bay Region issuing 49 awards on average annually (last 3 years ending 2020-22) on CIP 11.0201- Computer Programming/Programmer, General There is one other CTE educational institution in the Silicon Valley Sub-Region issuing 7 awards on average annually (last 3 years) on this CIP code.

Table 7a. Community College Awards on TOP 0707.00 - Computer Software Development in the Bay Region

College	Subregion	Associate Degree	High unit Certificate	Low unit Certificate	Total
Foothill	Silicon Valley	0	0	28	28
San Francisco	Mid-Peninsula	0	0	14	14
San Mateo	Mid-Peninsula	7	2	9	18
Solano	North Bay	0	0	4	4
Total	-	7	2	55	64

Source: Data Mart

Note: The annual average for awards is 2020-21 to 2022-23.

Table 7b. Other CTE Institutions Awards on CIP 11.0201- Computer Programming/Programmer, General in the Bay Region

College	Subregion	Bachelor's degree	Certificates of less than 1 year	Total
Dominican University of California	North Bay	42	0	42
University of Silicon Valley	Silicon Valley	6	1	7
Total	-	48	1	49

Source: Data Mart

Note: The annual average for awards is 2019-20 to 2021-22.

Gap Analysis

Based on the data included in this report, there is a labor market gap in the Bay Region with 13,688 annual openings for the Artificial Intelligence for Business occupational cluster and 113 annual (3-year average) awards for an annual undersupply of 13,575 students. In the Silicon Valley Sub-Region, there is also a gap with 4,546 annual openings and 35 annual (3-year average) awards for an annual undersupply of 4,511 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0707.00 - Computer Software Development

Metric Outcomes	Bay All CTE Program	Foothill College All CTE Program	State 0707.00	Bay 0707.00	Silicon Valley 0707.00	Foothill College 0707.00
Students with a Job Closely Related to Their Field of Study	74%	88%	64%	61%	83%	83%
Median Annual Earnings for SWP Exiting Students	\$53,090	\$73,174	\$50,797	\$62,806	\$87,006	\$88,366

Metric Outcomes	Bay All CTE Program	Foothill College All CTE Program	State 0707.00	Bay 0707.00	Silicon Valley 0707.00	Foothill College 0707.00
Median Change in Earnings for SWP Exiting Students	24%	42%	20%	21%	22%	21%
Exiting Students Who Attained the Living Wage	54%	66%	60%	65%	70%	70%

Source: Launchboard Strong Workforce Program Median of 2018 to 2021.

Skills, Certifications and Education

Table 9. Top Skills in Job Postings for Artificial Intelligence for Business Occupations in the Bay Region

Skill	Posting	Skill	Posting
Marketing	22,227	Data Science	8,203
Computer Science	18,144	Scalability	8,065
Python (Programming Language)	14,327	Business Development	7,267
Project Management	13,296	Finance	7,130
Product Management	12,718	Software Engineering	6,993
Machine Learning	12,196	Automation	6,798
Data Analysis	10,861	Workflow Management	6,346
New Product Development	9,396	Amazon Web Services	6,103
Artificial Intelligence	9,111	Agile Methodology	6,011
SQL (Programming Language)	9,037	Software Development	5,930

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Table 10. Certifications in Job Postings for Artificial Intelligence for Business Occupations in the Bay Region

Certification	Posting	Certification	Posting
Project Management Professional Certification	915	Epic EMR Certification	196
GIAC Certifications	273	Project Management Certification	151

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Table 11. Education Requirements for Artificial Intelligence for Business Occupations in the Bay Region

Education Level	Job Postings	% of Total
High school or GED	2,608	3%
Associate degree	1,714	2%
Bachelor's degree & higher	71,448	94%

Source: Lightcast 2024.4; "Job Posting Analytics." Nov. 2023 - Oct. 2024

Note: 36% of records have been excluded because they do not include a degree level. As a result, the chart above may not be representative of the full sample.

Methodology

Occupations for this report were identified by use of job descriptions and skills listed in O*Net. Labor demand data is sourced from Lightcast occupation and job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CCCC Data Mart and CTE Launchboard.

Sources

O*Net Online

Lightcast

CTE LaunchBoard www.calpassplus.org

Launchboard

Statewide CTE Outcomes Survey

Employment Development Department Unemployment Insurance Dataset

Living Insight Center for Community Economic Development

Chancellor's Office MIS system

Contacts

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