



Labor Market Analysis for Program Recommendation Artificial Intelligence and Machine Learning Occupations Mid-Peninsula Subregion

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

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Recommendation

Based on all available data, there appears to be an “undersupply” of Artificial Intelligence and Machine Learning workers compared to the demand for this cluster of occupations in the Bay Region and in the Mid-Peninsula subregion (San Francisco, San Mateo counties). There is a projected annual gap of about 5,697 students in the Bay Region and 2,444 students in the Mid-Peninsula subregion.

Introduction

This report provides student outcomes data on employment and earnings for TOP 0702.00 - Computer Information Systems 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 subregion in the state and region.

This report includes middle-skill occupations that require a certificate, or an associate degree, or it may require a bachelor’s degree, but 33% or fewer of current workers in these roles hold one. |

This report profiles Artificial Intelligence and Machine Learning Occupations in the 12 county Bay Region and in the Mid-Peninsula subregion.

- **Computer Network Support Specialists (15-1231):** 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.
Typical Entry-Level Educational: Associate’s degree
Skill Level: Middle-Skill
Work Experience Required: None
Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 39%
- **Computer User Support Specialists (15-1232):** 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.
Typical Entry-Level Educational: Some college, no degree
Skill Level: Middle-Skill
Work Experience Required: None
Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 39%

- Web Developers (15-1254):** Develop and implement websites, web applications, application databases, and interactive web interfaces. Evaluate code to ensure that it is properly structured, meets industry standards, and is compatible with browsers and devices. Optimize website performance, scalability, and server-side code and processes. May develop website infrastructure and integrate websites with other computer applications.

Typical Entry-Level Educational: Bachelor's degree
Skill Level: Middle-Skill
Work Experience Required: None
Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 23%
- Web and Digital Interface Designers (15-1255):** Design digital user interfaces or websites. Develop and test layouts, interfaces, functionality, and navigation menus to ensure compatibility and usability across browsers or devices. May use web framework applications as well as client-side code and processes. May evaluate web design following web and accessibility standards, and may analyze web use metrics and optimize websites for marketability and search engine ranking. May design and test interfaces that facilitate the human-computer interaction and maximize the usability of digital devices, websites, and software with a focus on aesthetics and design. May create graphics used in websites and manage website content and links.

Typical Entry-Level Educational: Bachelor's degree
Skill Level: Middle-Skill
Work Experience Required: None
Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 23%
- Computer Occupations, All Other (15-1299):** All computer occupations not listed separately.

Typical Entry-Level Educational: Bachelor's degree
Skill Level: Above Middle-Skill
Work Experience Required: None
Percentage of individuals 25+ with an associate degree, certificate, or some postsecondary coursework as their highest level of education attainment: 35%

Occupational Demand

Table 1. Employment Outlook for Artificial Intelligence and Machine Learning Occupations in the Bay Region

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Wage	Median Hourly Wage
Computer Network Support Specialists	3,937	4,262	326	8%	1,713	343	\$33	\$42
Computer User Support Specialists	18,635	19,891	1,256	7%	7,796	1,559	\$29	\$38
Web Developers	4,953	5,233	281	6%	1,935	387	\$41	\$65
Web and Digital Interface Designers	11,849	12,194	345	3%	4,910	982	\$51	\$77
Computer Occupations, All Other	40,971	39,655	-1,316	-3%	13,337	2,667	\$47	\$70
Total	80,345	81,235	890	1%	29,691	5,938	\$42	\$62

Source: Lightcast 2025.1

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 and Machine Learning Occupations in the Mid-Peninsula Subregion

Occupation	2023 Jobs	2028 Jobs	5-yr Change	5-yr % Change	5-yr Total Openings	Annual Openings	25% Hourly Wage	Median Hourly Wage
Computer Network Support Specialists	1,528	1,695	167	11%	718	144	\$36	\$44
Computer User Support Specialists	7,010	7,726	716	10%	3,242	648	\$32	\$41
Web Developers	2,078	2,280	202	10%	907	181	\$46	\$69
Web and Digital Interface Designers	5,191	5,602	411	8%	2,436	487	\$52	\$80
Computer Occupations, All Other	13,193	13,625	433	3%	4,972	994	\$46	\$68
Total	29,000	30,928	1,928	7%	12,275	2,454	\$43	\$62

Source: Lightcast 2025.1

Mid-Peninsula subregion includes: San Francisco, San Mateo Counties

Job Postings in the Bay Region and Mid-Peninsula Subregion

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

Occupation	Bay Region	Mid-Peninsula
Computer Occupations, All Other	21,064	6,240
Web Developers	7,521	2,725
Web and Digital Interface Designers	6,543	2,760
Computer User Support Specialists	4,782	1,460
Computer Network Support Specialists	586	130

Source: Lightcast 2025.3; "Job Posting Analytics." Oct. 2024 - Sep. 2025

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

Title	Bay	Title	Bay
Back End Software Engineers	1,342	UX Researchers	428
Platform Software Engineers	1,209	Software Engineers/Front End Developers	362
Back End Engineers	1,157	Platform Engineers	358
Systems Engineers	665	Front End Software Engineers	345
Front End Engineers	623	Security Engineers	329
Firmware Engineers	528	Google Cloud Architects	269
Product Designers	526	Infrastructure Software Engineers	266

Title	Bay	Title	Bay
UX Designers	496	Back End Developers	264
Front End Developers	455	User Experience Designers	262

Source: Lightcast 2025.3; "Job Posting Analytics." Oct. 2024 - Sep. 2025

Table 4b. Top Job Titles in Job Posting for Artificial Intelligence and Machine Learning Occupations in the Mid-Peninsula Subregion

Title	Mid-Peninsula	Title	Mid-Peninsula
Back End Engineers	555	Security Engineers	142
Back End Software Engineers	493	User Experience Designers	125
Platform Software Engineers	427	Systems Engineers	119
Front End Engineers	314	Front End Software Engineers	114
Product Designers	240	Front End Developers	107
UX Researchers	212	Platform Engineering Managers	93
UX Designers	196	Full Stack Engineers	81
Software Engineers/Front End Developers	152	Technical Support Engineers	79
Platform Engineers	151	UI/UX Designers	75

Source: Lightcast 2025.3; "Job Posting Analytics." Oct. 2024 - Sep. 2025

Industry Concentration

Table 5. Industries Hiring for Artificial Intelligence and Machine Learning 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	14,964	15,578	4%	18%
Computer Systems Design Services	6,676	7,670	15%	10%
Software Publishers	5,780	5,995	4%	7%
Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services	4,934	5,458	11%	6%
Web Search Portals and All Other Information Services	3,500	4,214	20%	5%
Corporate, Subsidiary, and Regional Managing Offices	1,896	3,754	98%	4%
Federal Government, Civilian, Excluding Postal Service	2,462	2,790	13%	3%

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)
Media Streaming Distribution Services, Social Networks, and Other Media Networks and Content Providers	2,594	2,544	-2%	3%
Colleges, Universities, and Professional Schools	1,178	1,421	21%	2%
Temporary Help Services	1,380	1,194	-13%	2%

Source: Lightcast 2025.3

Table 6. Top Employers Posting Artificial Intelligence and Machine Learning Occupations in the Bay Region and the Mid-Peninsula Subregion

Employer	Bay	Employer	Mid-Peninsula
Google	1,753	Google	403
Apple	1,556	Meta	349
Tiktok	726	Amazon	230
Amazon	610	Uber	198
Palo Alto Networks	582	Salesforce	190
Meta	458	Tbwa Chiat/Day	163

Source: Lightcast 2025.3; "Job Posting Analytics." Oct. 2024 - Sep. 2025

Educational Supply

There are sixteen community colleges in the Bay Region issuing 238 awards on average annually (last 3 years ending 2023-24) on TOP 0702.00 - Computer Information Systems. In the Mid-Peninsula subregion, there is one community college that issued 8 awards on average annually (last 3 years) on this TOP code.

There are two other CTE educational institutions in the Bay Region issuing 3 awards on average annually (last 3 years ending 2022-23) on CIP 11.0101- Computer and Information Sciences, General. There is one other CTE educational institution in the Mid-Peninsula subregion issuing 2 awards on average annually (last 3 years) on this CIP code.

Table 7a. Community College Awards on TOP 0702.00 - Computer Information Systems in the Bay Region

College	Subregion	Associate Degree	High unit Certificate	Low unit Certificate	Total
Alameda	East Bay	2	0	1	3
Berkeley City	East Bay	1	1	0	2
Chabot	East Bay	18	0	0	18
Diablo Valley	East Bay	4	0	25	29
Gavilan	Silicon Valley	2	0	2	4
Laney	East Bay	4	0	0	4
Las Positas	East Bay	6	0	1	7
Marin	North Bay	2	0	1	3
Merritt	East Bay	11	2	15	28
Mission	Silicon Valley	29	0	40	69

College	Subregion	Associate Degree	High unit Certificate	Low unit Certificate	Total
Monterey	SC-Monterey	2	0	0	2
Napa	North Bay	1	0	0	1
Ohlone	East Bay	0	0	13	13
San Jose City	Silicon Valley	0	0	45	45
Skyline	Mid-Peninsula	8	0	0	8
West Valley	Silicon Valley	0	0	2	2
Total	-	90	3	145	238

Source: Data Mart

Note: The annual average for awards is 2021-22 to 2023-24.

Table 7b. Other CTE Institutions Awards on CIP 11.0101- Computer and Information Sciences, General in the Bay Region

College	Subregion	Bachelor's degree	Total
Northeastern University Oakland	East Bay	1	1
Notre Dame de Namur University	Mid-Peninsula	2	2
Total	-	3	3

Source: Data Mart

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

Gap Analysis

Based on the data included in this report, there is a labor market gap in the Bay Region with 5,938 annual openings for the Artificial Intelligence and Machine Learning occupational cluster and 241 annual (3-year average) awards for an annual undersupply of 5,697 students. In the Mid-Peninsula subregion, there is also a gap with 2,454 annual openings and 10 annual (3-year average) awards for an annual undersupply of 2,444 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0702.00 - Computer Information Systems

Metric Outcomes	Bay All CTE Program	State 0702.00	Bay 0702.00	Mid-Peninsula 0702.00
Students with a Job Closely Related to Their Field of Study	74%	65%	69%	NA
Median Annual Earnings for SWP Exiting Students	\$53,090	\$36,818	\$48,433	\$45,674
Median Change in Earnings for SWP Exiting Students	24%	22%	15%	1%
Exiting Students Who Attained the Living Wage	54%	51%	51%	36%

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

Skills, Certifications and Education

Table 9. Top Skills in Job Postings for Artificial Intelligence and Machine Learning Occupations in the Bay Region

Skill	Posting	Skill	Posting
Computer Science	13,609	Software Development	5,448
Python (Programming Language)	9,829	Project Management	5,248
Scalability	9,342	JavaScript (Programming Language)	5,208
Software Engineering	8,212	Agile Methodology	4,880
Artificial Intelligence	6,609	React.js (Javascript Library)	4,583
Amazon Web Services	6,538	Java (Programming Language)	4,433
Automation	5,884	Microsoft Azure	4,374
Application Programming Interface (API)	5,870	Kubernetes	4,309
Workflow Management	5,828	Debugging	4,261
User Experience (UX)	5,516	Machine Learning	4,072

Source: Lightcast 2025.3; "Job Posting Analytics." Oct. 2024 - Sep. 2025

Table 10. Certifications in Job Postings for Artificial Intelligence and Machine Learning Occupations in the Bay Region

Certification	Posting	Certification	Posting
Project Management Professional Certification	791	GIAC Certifications	385

Source: Lightcast 2025.3; "Job Posting Analytics." Oct. 2024 - Sep. 2025

Table 11. Education Requirements for Artificial Intelligence and Machine Learning Occupations in the Bay Region

Education Level	Job Postings	% of Total
High school or GED	826	2%
Associate degree	1,112	3%
Bachelor's degree & higher	32,186	94%

Source: Lightcast 2025.3; "Job Posting Analytics." Oct. 2024 - Sep. 2025

Note: 45% 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 CCCCO Data Mart and CTE Launchboard.

Sources

O*Net Online

Lightcast

CTE LaunchBoard www.calpassplus.org

Contacts

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