# Labor Market Analysis for Program Recommendation
# Artificial Intelligence Occupations
# Laney College

**Prepared by the San Francisco Bay Center of Excellence for Labor Market Research**

**February 2023**

## Recommendation

Based on all available data, there appears to be an "undersupply" of Artificial Intelligence workers compared to the demand for this cluster of occupations in the Bay region and in the East Bay sub-region (Alameda, Contra Costa counties). There is a projected annual gap of about 20,197 students in the Bay region and 2,250 students in the East Bay Sub-Region.

## Introduction

This report provides student outcomes data on employment and earnings for TOP 0799.00 Other Information Technology 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 Laney College and in the region.

This report profiles Artificial Intelligence Occupations in the 12 county Bay region and in the East Bay sub-region for a proposed new program at Laney College.

- **Computer and Information Systems Managers (11-3021):** Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming. Excludes "Computer Occupations" (15-1111 through 15-1199).
  Entry-Level Educational Requirement: Bachelor's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%

- **Software Developers (15-1252):** Research, design, and develop computer and network software or specialized utility programs. Analyze user needs and develop software solutions, applying principles and techniques of computer science, engineering, and mathematical analysis. Update software or enhance existing software capabilities. May work with computer hardware engineers to integrate hardware and software systems, and develop specifications and performance requirements. May maintain databases within an application area, working individually or coordinating database development as part of a team.
  Entry-Level Educational Requirement: Bachelor's degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 11%

- **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: 11%

## Occupational Demand

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

| Occupation | 2021 Jobs | 2026 Jobs | 5-yr Change | 5-yr % Change | 5-yr Total Openings | Annual Openings | 25% Hourly Earning | Median Hourly Wage |
|---|---|---|---|---|---|---|---|---|
| Computer and Information Systems Managers | 47,580 | 50,330 | 2,750 | 6% | 20,825 | 4,165 | $79 | $101 |
| Software Developers | 136,241 | 158,805 | 22,564 | 17% | 75,436 | 15,087 | $62 | $79 |
| Data Scientists | 8,882 | 10,341 | 1,459 | 16% | 4,804 | 961 | $60 | $77 |
| **Total** | **192,703** | **219,476** | **26,773** | **14%** | **101,064** | **20,213** | | |

Source: Lightcast 2022.3

**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 Occupations in East Bay Sub-region**

| Occupation | 2021 Jobs | 2026 Jobs | 5-yr Change | 5-yr % Change | 5-yr Total Openings | Annual Openings | 25% Hourly Earning | Median Hourly Wage |
|---|---|---|---|---|---|---|---|---|
| Computer and Information Systems Managers | 8,045 | 7,902 | -143 | -2% | 2,918 | 584 | $70 | $88 |
| Software Developers | 17,365 | 18,526 | 1,160 | 7% | 7,602 | 1,520 | $55 | $70 |
| Data Scientists | 1,648 | 1,780 | 132 | 8% | 729 | 146 | $53 | $68 |
| **Total** | **27,059** | **28,208** | **1,149** | **4%** | **11,250** | **2,250** | | |

Source: Lightcast 2022.3

**East Bay Sub-Region includes:** Alameda, Contra Costa Counties

## Job Postings in Bay Region and East Bay Sub-Region

**Table 3. Number of Job Postings by Occupation for latest 12 months (Feb. 2022 - Jan. 2023)**

| Occupation | Bay Region | East Bay |
|---|---|---|
| Software Developers | 98,936 | 14,842 |
| Data Scientists | 18,738 | 2,754 |
| Computer and Information Systems Managers | 2,723 | 463 |

Source: Lightcast

**Table 4a. Top Job Titles for Artificial Intelligence Occupations for latest 12 months (Feb. 2022 - Jan. 2023) Bay Region**

| Title | Bay | Title | Bay |
|---|---|---|---|
| Software Engineers | 10,327 | Full Stack Developers | 1,497 |
| DevOps Engineers | 3,316 | Software Developers | 1,427 |
| Data Scientists | 3,102 | Machine Learning Engineers | 1,249 |
| Full Stack Software Engineers | 2,540 | Full Stack Engineers | 1,236 |
| Java Developers | 2,292 | Android Developers | 1,220 |
| Data Analysts | 2,290 | Platform Software Engineers | 1,203 |
| Principal Software Engineers | 1,657 | Salesforce Developers | 1,189 |
| Staff Software Engineers | 1,541 | Software Development Engineers | 1,104 |
| Back End Software Engineers | 1,516 | Lead Software Engineers | 1,081 |

Source: Lightcast

**Table 4b. Top Job Titles for Artificial Intelligence Occupations for latest 12 months (Feb. 2022 - Jan. 2023) East Bay Sub-Region**

| Title | East Bay | Title | East Bay |
|---|---|---|---|
| Software Engineers | 1,617 | Lead Software Engineers | 202 |
| DevOps Engineers | 534 | Principal Software Engineers | 189 |
| Java Developers | 515 | Embedded Software Engineers | 186 |
| Data Analysts | 392 | Security Software Engineers | 179 |
| Full Stack Software Engineers | 379 | Android Developers | 171 |
| Data Scientists | 343 | Salesforce Developers | 154 |
| Software Developers | 339 | Software Development Engineers | 148 |
| Full Stack Developers | 294 | Full Stack Java Developers | 145 |
| .NET Developers | 220 | Application Engineers | 143 |

Source: Lightcast

## Industry Concentration

**Table 5. Industries hiring Artificial Intelligence Workers in Bay Region**

| Industry - 6 Digit NAICS (No. American Industry Classification) Codes | Jobs in Industry (2021) | Jobs in Industry (2026) | % Change (2021-26) | % Occupation Group in Industry (2022) |
|---|---|---|---|---|
| Custom Computer Programming Services | 37,729 | 45,020 | 19% | 20% |

| Industry - 6 Digit NAICS (No. American Industry Classification) Codes | Jobs in Industry (2021) | Jobs in Industry (2026) | % Change (2021-26) | % Occupation Group in Industry (2022) |
|---|---|---|---|---|
| Internet Publishing and Broadcasting and Web Search Portals | 26,184 | 32,281 | 23% | 13% |
| Software Publishers | 24,001 | 28,026 | 17% | 12% |
| Computer Systems Design Services | 20,260 | 22,147 | 9% | 10% |
| Electronic Computer Manufacturing | 10,959 | 12,767 | 16% | 6% |
| Data Processing, Hosting, and Related Services | 8,673 | 12,162 | 40% | 5% |
| Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) | 5,278 | 6,510 | 23% | 3% |
| Corporate, Subsidiary, and Regional Managing Offices | 5,580 | 5,464 | -2% | 3% |
| Other Computer Related Services | 4,640 | 5,410 | 17% | 2% |
| Research and Development in Biotechnology (except Nanobiotechnology) | 3,071 | 4,189 | 36% | 2% |

Source: Lightcast 2022.3

**Table 6. Top Employers Posting Artificial Intelligence Occupations in Bay Region and East Bay Sub-Region (Feb. 2022 - Jan. 2023)**

| Employer | Bay | Employer | East Bay |
|---|---|---|---|
| Jobot | 2,581 | Lucid Motors | 750 |
| Uber | 1,823 | Revature | 576 |
| Randstad | 1,428 | Workday | 482 |
| Apple | 1,413 | Robert Half | 290 |
| Motion Recruitment | 1,304 | Wells Fargo | 267 |
| Revature | 1,301 | Albertsons | 205 |
| Amazon | 1,263 | Jobot | 200 |
| Google | 1,203 | Kforce | 156 |
| Cynet Systems | 1,116 | Randstad | 142 |
| Lucid Motors | 1,074 | Siemens | 135 |

Source: Lightcast

## Educational Supply

There is one (1) community college in the Bay Region issuing 16 awards on average annually (last 3 years ending 2018-19) on TOP 0799.00 Other Information Technology. In the East Bay Sub-Region, there are no community colleges that issued awards on average annually (last 3 years) on this TOP code.

**Table 7. Community College Awards on TOP 0799.00 - Other Information Technology in Bay Region**

| College | Subregion | Low unit Certificate | Total |
|---------|-----------|----------------------|-------|
| Santa Rosa | North Bay | 16 | 16 |
| **Total** | | **16** | **16** |

Source: Data Mart

Note: The annual average for awards is 2017-18 to 2019-20.

## Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 20,213 annual openings for the Artificial Intelligence occupational cluster and 16 annual (3-year average) awards for an annual undersupply of 20,197 students. In the East Bay Sub-Region, there is also a gap with 2,250 annual openings and no annual (3-year average) awards for an annual undersupply of 2,250 students.

## Student Outcomes

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0799.00 - Other Information Technology**

| Metric Outcomes | Bay All CTE Programs | Laney All CTE Program | State 0799.00 | Bay 0799.00 | East Bay 0799.00 | Laney 0799.00 |
|-----------------|----------------------|-----------------------|---------------|-------------|------------------|---------------|
| Students with a Job Closely Related to Their Field of Study | 74% | 73% | 71% | 78% | N/A | N/A |
| Median Annual Earnings for SWP Exiting Students | $48,926 | $41,990 | $43,308 | $43,704 | $33,638 | N/A |
| Median Change in Earnings for SWP Exiting Students | 23% | 15% | 13% | 18% | 18% | N/A |
| Exiting Students Who Attained the Living Wage | 50% | 48% | 56% | 46% | 44% | N/A |

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

## Skills, Certifications and Education

**Table 9. Top Skills for Artificial Intelligence Occupations in Bay Region (Feb. 2022 - Jan. 2023)**

| Skill | Posting | Skill | Posting |
|-------|---------|-------|---------|
| Computer Science | 46,901 | Application Programming Interface (API) | 21,883 |
| Software Engineering | 43,349 | C++ (Programming Language) | 19,177 |
| Python | 41,166 | Automation | 18,119 |
| Java | 39,012 | Debugging | 17,891 |
| Software Development | 29,768 | Machine Learning | 15,420 |
| SQL | 29,040 | Docker (Software) | 15,296 |
| Amazon Web Services | 23,153 | Algorithms | 15,254 |

| Skill | Posting | Skill | Posting |
|---|---|---|---|
| JavaScript | 23,089 | Linux | 14,806 |
| Agile Methodology | 22,999 | Git (Version Control System) | 14,482 |
| Scalability | 22,827 | Kubernetes | 13,786 |

Source: Lightcast

**Table 10. Certifications for Artificial Intelligence Occupations in Bay Region (Feb. 2022 - Jan. 2023)**

| Certification | Posting | Certification | Posting |
|---|---|---|---|
| Software Development Engineer in Test | 1,229 | Secret Clearance | 235 |
| Master Of Business Administration (MBA) | 1,159 | Functional Skills Qualification | 221 |
| Security Clearance | 1,141 | Salesforce Certified Platform Developer I | 205 |
| Certified Power Quality Professional | 822 | Salesforce Certified Platform Developer II | 198 |
| Enterprise Desktop Administrator (Microsoft Certified IT Professional) | 675 | Microsoft Certified Professional | 164 |
| Salesforce Certification | 594 | Cisco Certified Network Associate | 160 |
| Top Secret-Sensitive Compartmented Information (TS/SCI Clearance) | 317 | American Medical Billing Association | 143 |
| Salesforce Certified Administrator | 299 | ITIL Certifications | 140 |
| Certified Information Systems Security Professional | 278 | GIAC Certifications | 137 |
| Project Management Professional Certification | 275 | CompTIA Security+ | 132 |

Source: Lightcast

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

| Education Level | Job Postings | % of Total |
|---|---|---|
| High school or GED | 814 | 1% |
| Associate degree | 2,227 | 2% |
| Bachelor's degree & higher | 103,713 | 97% |

Source: Lightcast

Note: 42% 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
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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