**Artificial Intelligence Occupations**

**Labor Market Information Report**

**Las Positas College**

Prepared by the San Francisco Bay Center of Excellence

for Labor Market Research

October 2020

# 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 and Contra Costa Counties). There is a projected annual gap of about 3,882 students in the Bay region and 614 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 Las Positas 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 Las Positas College.

|  |
| --- |
| * **Computer Occupations, All Other (15-1199 /15-1299):** All computer occupations not listed separately. Excludes “Computer and Information Systems Managers” (11-3021), “Computer Hardware Engineers” (17-2061), “Electrical and Electronics Engineers” (17-2070), “Computer Science Teachers, Postsecondary” (25-1021), “Multimedia Artists and Animators” (27-1014), “Graphic Designers” (27-1024), “Computer Operators” (43-9011), and “Computer, Automated Teller, and Office Machine Repairs” (49-2011). |
| Entry-Level Educational Requirement: Bachelor's degree |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 35% |
|  |

**Occupational Demand**

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation | 2019 Jobs | 2024 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Average Annual Open-ings | 25% Hourly Wage | Median Hourly Wage |
| Computer Occupations, All Other | 38,974 | 42,324 | 3,350 | 9% | 19,456 | 3,891 | $41.02 | $56.51 |

*Source: EMSI 2020.3*

**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 | 2019 Jobs | 2024 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Average Annual Open-ings | 25% Hourly Wage | Median Hourly Wage |
| Computer Occupations, All Other | 7,618 | 7,631 | 13 | 0% | 3,072 | 614 | $35.28 | $47.58 |

*Source: EMSI 2020.3*

**East Bay Sub-Region includes:** Alameda and 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 (October 2019 - September 2020)**

| Occupation | Bay Region | East Bay Sub-Region |
| --- | --- | --- |
| Computer Systems Engineers/Architects | 21,659 | 7,724 |
| Information Technology Project Managers | 15,550 | 6,395 |
| Business Intelligence Analysts | 12,375 | 5,011 |
| Software Quality Assurance Engineers and Testers | 11,909 | 3,844 |
| Database Architects | 3,205 | 1,270 |
| Computer Occupations, All Other | 2,323 | 1,047 |
| Data Warehousing Specialists | 2,262 | 793 |
| Document Management Specialists | 1,475 | 503 |
| Video Game Designers | 1,095 | 613 |
| Search Marketing Strategists | 1,038 | 602 |
| Geospatial Information Scientists and Technologists | 738 | 297 |
| Web Administrators | 315 | 100 |
| Geographic Information Systems Technicians | 154 | 41 |
| **TOTAL** | **74,098** | **28,240** |

*Source: Burning Glass*

**Table 4a. Top Job Titles for Artificial** **Intelligence Occupations for latest 12 months (October 2019 - September 2020) Bay Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | Bay | Common Title | Bay |
| Data Analyst | 1,826 | Firmware Engineer | 234 |
| Project Manager | 793 | Business Data Analyst | 228 |
| Technical Project Manager | 718 | Automation Engineer | 225 |
| Solutions Architect | 648 | Business Intelligence Analyst | 209 |
| Quality Assurance Engineer | 628 | Cloud Architect | 206 |
| Scrum Master | 573 | Test Engineer | 190 |
| Systems Engineer | 556 | Quality Assurance Lead | 189 |
| Senior Systems Engineer | 466 | Java Architect | 180 |
| It Project Manager | 455 | Sap Fico Consultant | 177 |
| Senior Data Analyst | 361 | Enterprise Architect | 170 |
| Machine Learning Engineer | 351 | Technical Lead | 167 |
| It Manager | 250 | Infrastructure Project Manager | 163 |
| Data Architect | 243 | Test Automation Engineer | 153 |
| Quality Assurance Analyst | 234 | Infrastructure Engineer | 153 |

**Table 4b. Top Job Titles for Artificial** **Intelligence Occupations for latest 12 months (October 2019 - September 2020) East** **Bay Sub-Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | East Bay | Common Title | East Bay |
| Data Analyst | 729 | Quality Assurance Lead | 100 |
| Project Manager | 296 | Business Data Analyst | 96 |
| Technical Project Manager | 286 | Firmware Engineer | 95 |
| Solutions Architect | 279 | Business Intelligence Analyst | 95 |
| Scrum Master | 237 | Java Architect | 88 |
| Senior Data Analyst | 234 | Automation Engineer | 79 |
| Quality Assurance Engineer | 226 | Infrastructure Engineer | 77 |
| It Project Manager | 187 | Senior Consultant | 76 |
| Systems Engineer | 175 | Release Manager | 70 |
| Machine Learning Engineer | 163 | Senior Project Manager | 69 |
| Senior Systems Engineer | 155 | Senior Firmware Engineer | 67 |
| It Manager | 128 | Technical Lead | 63 |
| Data Architect | 121 | Agile Coach | 59 |
| Quality Assurance Analyst | 109 | Enterprise Architect | 58 |

*Source: Burning Glass*

# Industry Concentration

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Industry – 6 Digit NAICS (No. American Industry Classification) Codes | Jobs in Industry (2019) | Jobs in Industry (2024) | % Change (2019-24) | % Occupation Group in Industry (2019) |
| Custom Computer Programming Services (541511) | 8,108 | 9,293 | 15% | 21% |
| Computer Systems Design Services (541512) | 4,634 | 5,070 | 9% | 12% |
| Software Publishers (511210) | 2,635 | 3,124 | 19% | 7% |
| Federal Government, Civilian, Excluding Postal Service (901199) | 2,448 | 2,369 | -3% | 6% |
| Internet Publishing and Broadcasting and Web Search Portals (519130) | 2,359 | 2,847 | 21% | 6% |
| Data Processing, Hosting, and Related Services (518210) | 1,863 | 2,283 | 23% | 5% |
| Corporate, Subsidiary, and Regional Managing Offices (551114) | 1,392 | 1,407 | 1% | 4% |
| Other Computer Related Services (541519) | 1,166 | 1,391 | 19% | 3% |
| Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715) | 654 | 668 | 2% | 2% |
| Administrative Management and General Management Consulting Services (541611) | 506 | 603 | 19% | 1% |
| Colleges, Universities, and Professional Schools (State Government) (902612) | 477 | 490 | 3% | 1% |
| Local Government, Excluding Education and Hospitals (903999) | 473 | 478 | 1% | 1% |
| Colleges, Universities, and Professional Schools (611310) | 450 | 484 | 8% | 1% |
| Electronic Computer Manufacturing (334111) | 449 | 477 | 6% | 1% |
| Temporary Help Services (561320) | 434 | 432 | 0% | 1% |
| Research and Development in Biotechnology (except Nanobiotechnology) (541714) | 407 | 499 | 23% | 1% |

*Source: EMSI 2020.3*

**Table 6. Top Employers Posting Artificial Intelligence Occupations in Bay Region and East Bay Sub-Region (October 2019 - September 2020)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Employer** | **Bay** | **Employer** | **Bay** | **Employer** | **East Bay** |
| Apple Inc. | 1,108 | Xoriant Inc | 176 | Deloitte | 558 |
| Deloitte | 977 | Lockheed Martin Corp | 170 | Amazon | 510 |
| Amazon | 938 | Infobahn Softworld Inc | 164 | Facebook | 359 |
| Cisco Systems Inc | 558 | Tesla | 163 | Wells Fargo | 336 |
| Nvidia Corporation | 555 | Pacific Gas and Electric Co | 156 | Accenture | 252 |
| Wells Fargo | 541 | Blue Cross Blue Shield of CA | 155 | Salesforce | 188 |
| Facebook | 528 | Ascent Technology Services | 150 | Anthem Blue Cross | 153 |
| Anthem Blue Cross | 520 | Genentech | 147 | Microsoft Corporation | 135 |
| Google Inc. | 424 | PricewaterhouseCoopers | 146 | Cisco Systems Inc | 134 |
| Accenture | 423 | Workday, Inc | 140 | Genentech | 111 |
| Microsoft Corporation | 403 | Intuit | 139 | Visa | 106 |
| IBM | 350 | Western Digital | 138 | PricewaterhouseCoopers | 101 |
| Infosys | 299 | Intelliswift Software | 138 | Pacific Gas and Electric Co | 97 |
| Vmware Inc | 281 | NTT Data | 132 | Blue Cross Blue Shield of CA | 88 |
| Wipro | 231 | Samsung America, Inc. | 130 | KPMG | 87 |
| The Save Mart Co | 201 | Osi Engineering | 127 | Twitter | 80 |
| Salesforce | 200 | Paypal | 124 | Infosys | 78 |

*Source: Burning Glass*

# Educational Supply

There is one (1) community college in the Bay Region issuing 9 awards on average annually (last 3 years ending 2018-19) on TOP 0799.00-Other Information Technology. There are no colleges in the East Bay Sub-Region issuing 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 | Sub-Region | Certificate Low Unit | Total |
| Santa Rosa | North Bay | 9 | 9 |
| **Total Bay Region** | | **9** | **9** |
| **Total East** **Bay Sub-Region** | | **0** | **0** |

# Source: Data Mart

Note: The annual average for awards is 2016-17 to 2018-19.

# Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 3,891 annual openings for the Artificial Intelligence occupational cluster and 9 annual (3-year average) awards for an annual undersupply of 3,882 students. In the East Bay Sub-Region, there is also a gap with 614 annual openings and no annual (3-year average) awards for an annual undersupply of 614 students.

# Student Outcomes

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **2017-18** | **Bay**  All CTE Programs | **Las Positas College** All CTE Programs | **State** 0799.00 | **Bay** 0799.00 | **East Bay** 0799.00 | **Las Positas College** 0799.00 |
| % Employed Four Quarters After Exit | 74% | 70% | 59% | 54% | 68% | n/a |
| Median Quarterly Earnings Two Quarters After Exit | $10,550 | $11,069 | $10,093 | $10,149 | n/a | n/a |
| Median % Change in Earnings | 46% | 30% | 14% | 34% | 15% | n/a |
| % of Students Earning a Living Wage | 63% | 52% | 59% | 45% | n/a | n/a |

*Source: Launchboard Pipeline (version available on (9/30/20)*

# Skills, Certifications and Education

**Table 9. Top Skills for Artificial Intelligence Occupations in Bay Region (October 2019 - September 2020)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Skill** | **Postings** | **Skill** | **Postings** | **Skill** | **Postings** |
| Python | 16,298 | Atlassian JIRA | 5,605 | Data Warehousing | 3,962 |
| SQL | 14,844 | Business Process | 5,335 | Extraction Transformation and Loading (ETL) | 3,941 |
| Project Management | 14,676 | Scheduling | 5,271 | Big Data | 3,894 |
| Quality Assurance and Control | 11,018 | C++ | 5,098 | Selenium | 3,751 |
| Java | 10,972 | Systems Engineering | 4,938 | Product Management | 3,602 |
| Software Development | 10,012 | JavaScript | 4,789 | Data Science | 3,601 |
| Data Analysis | 8,343 | Tableau | 4,731 | Git | 3,565 |
| Linux | 8,218 | Customer Service | 4,571 | Product Development | 3,452 |
| Software Engineering | 6,804 | Debugging | 4,535 | Salesforce | 3,451 |
| SAP | 6,575 | DevOps | 4,288 | Data Management | 3,441 |
| Scrum | 6,554 | Machine Learning | 4,126 | Business Intelligence | 3,436 |
| Budgeting | 6,289 | UNIX | 4,046 | Information Systems | 3,366 |
| Oracle | 6,070 | Project Planning and Development Skills | 3,979 | Apache Hadoop | 3,215 |

*Source: Burning Glass*

**Table 10. Certifications for Artificial** **Intelligence Occupations in Bay Region (October 2019 - September 2020)**

Note: 88% of records have been excluded because they do not include a certification. As a result, the chart below may not be representative of the full sample.

|  |  |  |  |
| --- | --- | --- | --- |
| **Certification** | **Postings** | **Certification** | **Postings** |
| Project Management Certification | 3,064 | TOGAF Certification | 267 |
| Project Management Professional (PMP) | 2,160 | Certified Information Security Manager (CISM) | 234 |
| Certified ScrumMaster (CSM) | 970 | SAP Certification | 212 |
| IT Infrastructure Library (ITIL) Certification | 940 | Agile Certification | 192 |
| Security Clearance | 707 | Certified Scrum Professional (CSP) | 178 |
| Driver's License | 614 | PMI Agile Certified Practitioner (PMI-ACP) | 177 |
| Certified Information Systems Security Professional (CISSP) | 552 | Microsoft Certified Solutions Expert (MCSE) | 156 |
| Cisco Certified Network Associate (CCNA) | 363 | Six Sigma Certification | 144 |
| Certified Information Systems Auditor (CISA) | 334 | Information Systems Certification | 140 |
| Cisco Certified Network Professional (CCNP) | 315 | Microsoft Certified Solutions Associate (MCSA) | 137 |
| Cisco Certified Internetwork Expert (CCIE) | 292 | Certified in Risk and Information Systems Control | 125 |
| Certified Public Accountant (CPA) | 282 | Microsoft Certified Professional (MCP) | 115 |

*Source: Burning Glass*

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

Note: 44% of records have been excluded because they do not include a degree level. As a result, the chart below may not be representative of the full sample.

|  |  |  |
| --- | --- | --- |
| **Education (minimum advertised)** | **Latest 12 Mos. Postings** | **Percent 12 Mos. Postings** |
| High school or vocational training | 1,629 | 4% |
| Associate Degree | 585 | 1% |
| Bachelor’s Degree or Higher | 35,554 | 95% |

*Source: Burning Glass*

# Methodology

Occupations for this report were identified by use of skills listed in O\*Net descriptions and job descriptions in Burning Glass. Labor demand data is sourced from Economic Modeling Specialists International (EMSI) occupation data and Burning Glass job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CTE Launchboard and CCCCO Data Mart.

# Sources

O\*Net Online

Labor Insight/Jobs (Burning Glass)

Economic Modeling Specialists International (EMSI)

CTE LaunchBoard [www.calpassplus.org/Launchboard/](http://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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