

# Cybersecurity Occupations

# Labor Market Information Report

# Ohlone College

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

**May 2021**

## Recommendation

Based on all available data, there appears to be an “undersupply” of Cybersecurity 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 5,012 students in the Bay region and 753 students in the East Bay Sub-Region.

## Introduction

This report provides student outcomes data on employment and earnings for TOP 0708.10 - Computer Networking 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 Ohlone College and in the region.

This report profiles Cybersecurity Occupations in the 12 county Bay region and in the East Bay sub-region for a proposed new program at Ohlone College. Labor market information (LMI) is not available at the eight-digit SOC Code level for Information Security Engineers (15-1299.05), therefore, the data shown in Tables 1 and 2 is for Computer Occupations, All Other (at the six digit SOC level) and likely overstates demand for Information Security Engineers. Tables 3, 4, 6, 9, 10 and 11 use job postings data from Burning Glass at the eight-digit SOC Code level for Information Security Engineers (15-1299.05).

* **Information Security Analysts (15-1212):** Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. 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. Excludes “Computer Network Architects” (15-1143).  
    Entry-Level Educational Requirement: Bachelor’s degree  
    Training Requirement: None  
    Percentage of Community College Award Holders or Some Postsecondary Coursework: 27%
* **Network and Computer Systems Administrators (15-1244):** Install, configure, and support an organization’s local area network (LAN), wide area network (WAN), and Internet systems or a segment of a network system. Monitor network to ensure network availability to all system users and may perform necessary maintenance to support network availability. May monitor and test Web site performance to ensure Web sites operate correctly and without interruption. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software. May supervise computer user support specialists and computer network support specialists. May administer network security measures. Excludes “Information Security Analysts”(15-1122), “Computer User Support Specialists” (15-1151), and “Computer Network Support Specialists” (15-1152).  
    Entry-Level Educational Requirement: Bachelor’s degree  
    Training Requirement: None  
    Percentage of Community College Award Holders or Some Postsecondary Coursework: 40%
* **Computer Occupations, All Other (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: Moderate-term on-the-job training  
    Percentage of Community College Award Holders or Some Postsecondary Coursework: 26%
* **Operations Research Analysts (15-2031):** Formulate and apply mathematical modeling and other optimizing methods to develop and interpret information that assists management with decision making, policy formulation, or other managerial functions. May collect and analyze data and develop decision support software, service, or products. May develop and supply optimal time, cost, or logistics networks for program evaluation, review, or implementation.  
    Entry-Level Educational Requirement: Bachelor’s degree  
    Training Requirement: None  
    Percentage of Community College Award Holders or Some Postsecondary Coursework: 21%

## Occupational Demand

**Table 1. Employment Outlook for Cybersecurity Occupations in Bay Region**

| **Occupation** | **2019 Jobs** | **2024 Jobs** | **5-yr Change** | **5-yr % Change** | **5-yr Total Openings** | **Annual Openings** | **25% Hourly Earning** | **Median Hourly Wage** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Information Security Analysts | 4,024 | 5,808 | 1,783 | 44% | 3,938 | 656 | $ 50 | $ 65 |
| Network and Computer  Systems Administrators | 13,108 | 13,735 | 626 | 5% | 6,091 | 1,015 | $ 40 | $ 53 |
| Computer Occupations, All Other | 41,711 | 42,579 | 868 | 2% | 19,672 | 3,279 | $ 43 | $ 58 |
| Operations Research Analysts | 3,421 | 3,702 | 280 | 8% | 1,847 | 308 | $ 39 | $ 54 |
| **Total** | **62,264** | **65,824** | **3,560** | **6%** | **31,548** | **5,258** | **$42.60** | **$57.18** |
| Source: EMSI 2021.2 | | | | | | | | |

**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 Cybersecurity Occupations in East Bay Sub-region**

| **Occupation** | **2019 Jobs** | **2024 Jobs** | **5-yr Change** | **5-yr % Change** | **5-yr Total Openings** | **Annual Openings** | **25% Hourly Earning** | **Median Hourly Wage** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Information Security Analysts | 771 | 967 | 196 | 26% | 562 | 94 | $ 43 | $ 56 |
| Network and Computer Systems Administrators | 2,597 | 2,461 | -136 | -5% | 946 | 158 | $ 33 | $ 44 |
| Computer Occupations, All Other | 7,799 | 7,273 | -525 | -7% | 2,988 | 498 | $ 36 | $ 48 |
| Operations Research Analysts | 801 | 819 | 17 | 2% | 384 | 64 | $ 36 | $ 49 |
| **Total** | **11,968** | **11,520** | **-448** | **-4%** | **4,880** | **814** | **$35.80** | **$47.71** |
| Source: EMSI 2021.2 | | | | | | | | |

**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 (May 2020 - Apr 2021)**

| **Occupation** | **Bay Region** | **East Bay** |
| --- | --- | --- |
| Operations Research Analysts | 10,290 | 1,929 |
| Information Security Analysts | 7,324 | 1,069 |
| Network and Computer Systems Administrators | 4,564 | 972 |
| Source: Burning Glass | | |

**Table 4a. Top Job Titles for Cybersecurity Occupations for latest 12 months (May 2020 - Apr 2021) Bay Region**

| **Title** | **Bay** | **Title** | **Bay** |
| --- | --- | --- | --- |
| Systems Administrator | 365 | Security Analyst | 93 |
| Security Engineer | 261 | Information Security Analyst | 83 |
| Research Assistant | 174 | Director, Business Development | 83 |
| Research Associate | 159 | Senior Systems Administrator | 78 |
| Senior Security Engineer | 142 | Linux Systems Administrator | 78 |
| Operations Analyst | 129 | Cloud Security Engineer | 75 |
| Business Operations Analyst | 123 | Research Scientist | 73 |
| Business Development Director | 102 | Head Of People | 70 |
| Information Security Engineer | 100 | Research Associate II | 69 |
| Source: Burning Glass | | | |

**Table 4b. Top Job Titles for Cybersecurity Occupations for latest 12 months (May 2020 - Apr 2021) East Bay Sub-Region**

| **Title** | **East Bay** | **Title** | **East Bay** |
| --- | --- | --- | --- |
| Systems Administrator | 63 | Windows Systems Administrator | 19 |
| Research Associate | 41 | Information Security Engineer | 19 |
| Research Assistant | 41 | Senior Security Engineer | 18 |
| Process Scientist III | 35 | Security Analyst | 18 |
| Operations Analyst | 33 | Informatica Administrator | 17 |
| Security Engineer | 29 | Disclosure Specialist | 17 |
| Scientist II | 25 | Installation Coordinator | 16 |
| Senior Systems Administrator | 23 | Senior It Auditor | 15 |
| Scientist I | 20 | Research Associate II | 15 |
| Source: Burning Glass | | | |

## Industry Concentration

**Table 5. Industries hiring Cybersecurity 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 | 12,209 | 13,831 | 13% | 20% |
| Computer Systems Design Services | 7,065 | 7,452 | 5% | 11% |
| Software Publishers | 3,700 | 3,950 | 7% | 5% |
| Data Processing, Hosting, and Related Services | 2,902 | 3,867 | 33% | 5% |
| Federal Government, Civilian, Excluding Postal Service | 2,630 | 2,971 | 13% | 5% |
| Internet Publishing and Broadcasting and Web Search Portals | 3,577 | 3,268 | -9% | 5% |
| Corporate, Subsidiary, and Regional Managing Offices | 2,642 | 2,242 | -15% | 4% |
| Electronic Computer Manufacturing | 1,193 | 2,242 | 88% | 3% |
| Other Computer Related Services | 1,706 | 1,985 | 16% | 3% |
| Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) | 1,171 | 1,321 | 13% | 2% |
| Source: EMSI 2021.2 | | | | |

**Table 6. Top Employers Posting Cybersecurity Occupations in Bay Region and East Bay Sub-Region (May 2020 - Apr 2021)**

| **Employer** | **Bay** | **Employer** | **East Bay** |
| --- | --- | --- | --- |
| Facebook | 448 | University Of California | 100 |
| University Of California | 365 | Thermo Fisher Scientific Inc | 77 |
| Genentech | 275 | Lawrence Berkeley National Laboratory | 56 |
| Vmware Incorporated | 243 | Lawrence Livermore National Laboratory | 53 |
| Palo Alto Networks | 215 | Day & Zimmermann Incorporated | 47 |
| Amazon | 210 | Wells Fargo | 43 |
| Cisco Systems Incorporated | 209 | Tesla | 42 |
| Wells Fargo | 205 | Pacific Gas and Electric Company | 42 |
| Splunk | 195 | Lawrence Berkeley National Lab | 36 |
| Stanford University | 181 | Anthem Blue Cross | 33 |
| Source: Burning Glass | | | |

## Educational Supply

There are 15 community colleges in the Bay Region issuing 246 awards on average annually (last 3 years ending 2018-19) on TOP 0708.10 - Computer Networking. In the East Bay Sub-Region, there are five (5) community colleges that issued 61 awards on average annually (last 3 years) on this TOP code.

**Table 7. Community College Awards on TOP 0708.10 - Computer Networking in Bay Region**

| **College** | **Subregion** | **Associate** | **Certificate Low** | **Noncredit** | **Total** |
| --- | --- | --- | --- | --- | --- |
| Cabrillo | SC-Monterey | 6 | 1 | 0 | 7 |
| Contra Costa | East Bay | 2 | 13 | 0 | 15 |
| De Anza | Silicon Valley | 17 | 14 | 0 | 31 |
| Diablo Valley | East Bay | 7 | 2 | 0 | 9 |
| Foothill | Silicon Valley | 1 | 0 | 0 | 1 |
| Gavilan | Silicon Valley | 3 | 2 | 0 | 5 |
| Las Positas | East Bay | 3 | 1 | 1 | 5 |
| Los Medanos | East Bay | 8 | 6 | 0 | 14 |
| Mission | Silicon Valley | 10 | 15 | 0 | 25 |
| Monterey | SC-Monterey | 0 | 2 | 1 | 3 |
| Ohlone | East Bay | 4 | 14 | 0 | 18 |
| San Francisco | Mid-Peninsula | 0 | 66 | 0 | 66 |
| San Jose City | Silicon Valley | 8 | 10 | 0 | 18 |
| Santa Rosa | North Bay | 0 | 19 | 0 | 19 |
| Skyline | Mid-Peninsula | 8 | 2 | 0 | 10 |
| **Total** |  | **77** | **167** | **2** | **246** |
| 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 5,258 annual openings for the Cybersecurity occupational cluster and 246 annual (3-year average) awards for an annual undersupply of 5,012 students. In the East Bay Sub-Region, there is also a gap with 814 annual openings and 61 annual (3-year average) awards for an annual undersupply of 753 students.

## Student Outcomes

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0708.10 - Computer Networking**

| **Metric Outcomes** | **Bay**  **All CTE Programs** | **Ohlone**  **All CTE Programs** | **State 0708.10** | **Bay 0708.10** | **East Bay 0708.10** | **Ohlone 0708.10** |
| --- | --- | --- | --- | --- | --- | --- |
| Students with a Job Closely Related to Their Field of Study | 75% | 72% | 71% | 76% | 79% | 75% |
| Median Annual Earnings for SWP Exiting Students | $44,575 | $88,529 | $47,183 | $52,196 | $61,228 | $64,792 |
| Median Change in Earnings for SWP Exiting Students | 31% | 18% | 23% | 23% | 22% | 27% |
| Exiting Students Who Attained the Living Wage | 52% | 73% | 65% | 54% | 65% | 70% |
| Source: Launchboard Strong Workforce Program from version 2017-18. | | | | | | |

## Skills, Certifications and Education

**Table 9. Top Skills for Cybersecurity Occupations in Bay Region (May 2020 - Apr 2021)**

| **Skill** | **Posting** | **Skill** | **Posting** |
| --- | --- | --- | --- |
| Python | 4,187 | Product Development | 1,354 |
| Information Security | 3,626 | Cryptography | 1,329 |
| Linux | 3,002 | C++ | 1,328 |
| Project Management | 2,603 | Business Development | 1,311 |
| Experiments | 2,189 | VMware | 1,262 |
| System Administration | 2,122 | Budgeting | 1,246 |
| Data Analysis | 1,950 | Biology | 1,243 |
| SQL | 1,857 | Molecular Biology | 1,223 |
| Customer Service | 1,803 | Scheduling | 1,208 |
| Java | 1,716 | Machine Learning | 1,198 |
| Software Development | 1,611 | Biochemistry | 1,160 |
| Information Systems | 1,532 | UNIX | 1,140 |
| Network Security | 1,507 | Domain Name System (DNS) | 1,097 |
| Software Engineering | 1,441 | Technical Support | 1,095 |
| Source: Burning Glass | | | |

**Table 10. Certifications for Cybersecurity Occupations in Bay Region (May 2020 - Apr 2021)**

| **Certification** | **Posting** | **Certification** | **Posting** |
| --- | --- | --- | --- |
| Certified Information Systems Security  Professional (CISSP) | 1,823 | Certified in Risk and Information Systems Control | 313 |
| Certified Information Systems Auditor (CISA) | 810 | Project Management Certification | 244 |
| Certified Information Security Manager (CISM) | 761 | Cisco Certified Security Professional | 223 |
| SANS/GIAC Certification | 707 | Cisco Certified Network Professional (CCNP) | 196 |
| Information Systems Certification | 485 | Microsoft Certified Solutions Expert (MCSE) | 166 |
| Security Clearance | 471 | GIAC Certified Incident Handler (GCIH) | 163 |
| Driver's License | 432 | GIAC Security Essentials Certification | 155 |
| CompTIA Security+ | 401 | Microsoft Certified Solutions Associate (MCSA) | 148 |
| Cisco Certified Network Associate (CCNA) | 352 | Project Management Professional (PMP) | 111 |
| IT Infrastructure Library (ITIL) Certification | 329 | Certified Ethical Hacker (CEH) | 98 |
| Source: Burning Glass | | | |

*Note: 81% 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.*

**Table 11. Education Requirements for Cybersecurity Occupations in Bay Region**

| **Education (minimum advertised)** | **Latest 12 Mos. Postings** | **Percent 12 Mos. Postings** |
| --- | --- | --- |
| High school or vocational training | 509 | 3% |
| Associate's degree | 426 | 3% |
| Bachelor's degree | 11,191 | 75% |
| Master's degree | 1,213 | 8% |
| Doctoral degree | 1,620 | 11% |
| 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/  
Statewide CTE Outcomes Survey  
Employment Development Department Unemployment Insurance Dataset  
Living Insight Center for Community Economic Development  
Chancellor’s Office MIS system

## Contacts

For more information, please contact:

• Leila Jamoosian, Research Analyst, for Bay Area Community College Consortium (BACCC) and Centers of Excellence (CoE), [leila@baccc.net](mailto:leila@baccc.net)

• John Carrese, Director, San Francisco Bay Center of Excellence for Labor Market Research, [jcarrese@ccsf.edu](mailto:jcarrese@ccsf.edu) or (415) 267-6544