** Cybersecurity Occupations**

**Labor Market Information Report**

**City College of San Francisco**

Prepared by the San Francisco Bay Center of Excellence

for Labor Market Research

December 2019

# Recommendation

Based on all available data, there appears to be a significant undersupply of Cybersecurity workers compared to the demand for this cluster of occupations in the Bay region and in the Mid-Peninsula sub-region (San Francisco and San Mateo Counties.) There is a projected annual gap of about 9,216 students in the Bay region and 3,251 students in the Mid-Peninsula Sub-Region.

This report also provides student outcomes data on employment and earnings for programs on TOP 0708.10 - Computer Networking 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 City College of San Francisco and in the region.

# Introduction

This report profiles Cybersecurity Occupations in the 12 county Bay region and in the Mid-Peninsula sub-region for a proposed new program at City College of San Francisco.

|  |
| --- |
| * **Information Security Analysts (SOC 15-1122):** 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% |
| * **Business Operations Specialists, All Other (SOC 13-1199):** All business operations specialists not listed separately.
 |
| Entry-Level Educational Requirement: Bachelor's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 23*%* |
| * **Managers, All Other (SOC** **11-9199):** All managers not listed separately.
 |
| Entry-Level Educational Requirement: Bachelor's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 26*%* |

# Occupational Demand

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation  | 2018 Jobs | 2023 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Average Annual Open-ings | 25% Hourly Wage | Median Hourly Wage |
| Information Security Analysts |  3,298  |  4,169  | 871 | 26% |  2,073  |  415  | $41.35 | $55.30 |
| Business Operations Specialists, All Other |  55,253  |  58,494  | 3,240 | 6% |  28,390  |  5,678  | $29.61 | $40.88 |
| Managers, All Other |  39,501  |  42,212  | 2,710 | 7% |  16,745  |  3,349  | $27.48 | $54.83 |
| **Total** |  **98,053**  |  **104,874**  | **6,821** | **7%** |  **47,208**  |  **9,442**  | **$29.15** | **$46.98** |

*Source: EMSI 2019.3*

**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 Cybersecurity Occupations in Mid-Peninsula Sub-Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation  | 2018 Jobs | 2023 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Average Annual Open-ings | 25% Hourly Wage | Median Hourly Wage |
| Information Security Analysts |  1,222  |  1,648  | 426 | 35% |  883  |  177  | $47.55 | $61.05 |
| Business Operations Specialists, All Other |  19,354  |  20,836  | 1,482 | 8% |  10,350  |  2,070  | $33.32 | $44.96 |
| Managers, All Other |  12,119  |  13,132  | 1,013 | 8% |  5,337  |  1,067  | $38.89 | $67.72 |
| **TOTAL** |  **32,695**  |  **35,616**  | **2,921** | **9%** |  **16,570**  |  **3,314**  | **$35.92** | **$54.00** |

*Source: EMSI 2019.3*

**Mid-Peninsula Sub-Region** includes San Francisco and San Mateo Counties

### Job Postings in Bay Region and Mid-Peninsula Sub-Region

**Table 3. Number of Job Postings by Occupation for latest 12 months (December 2018 - November 2019)**

| Occupation | Bay Region | Mid-Peninsula |
| --- | --- | --- |
|  Managers, All Other | 53,099 | 22,053 |
|  Information Security Analysts | 9,459 | 3,888 |
|  Compliance Managers | 1,916 | 953 |
|  Supply Chain Managers | 1,447 | 653 |
|  Security Managers | 1,324 | 523 |
|  Security Management Specialists | 1,167 | 384 |
|  Online Merchants | 1,148 | 556 |
|  Business Continuity Planners | 674 | 292 |
|  Regulatory Affairs Managers | 656 | 368 |
|  Loss Prevention Managers | 368 | 132 |
|  Business Operations Specialists, All Other | 275 | 103 |
|  Energy Auditors | 223 | 69 |
|  Investment Fund Managers | 112 | 51 |
|  Sustainability Specialists | 96 | 44 |
|  Customs Brokers | 66 | 56 |
|  Brownfield Redevelopment Specialists and Site Managers | 5 | 5 |
|  Wind Energy Project Managers | 2 | 1 |
|  **Total** | **72,037** | **30,131** |

*Source: Burning Glass*

**Table 4a. Top Job Titles for Cybersecurity Occupations for latest 12 months (December 2018 - November 2019) Bay Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | Bay | Common Title | Bay |
| Project Manager | 5,685 | Security Supervisor | 496 |
| Manager | 4,647 | Program Coordinator | 444 |
| Program Manager | 3,738 | Security Architect | 440 |
| Security Engineer | 2,130 | Software Development Engineer | 363 |
| Project Coordinator | 1,816 | Assistant Manager | 362 |
| Technical Program Manager | 1,025 | Information Security Analyst | 358 |
| Security Manager | 988 | Security Consultant | 357 |
| Senior Project Manager | 947 | Regulatory Affairs Manager | 308 |
| Security Analyst | 867 | Information Security Engineer | 296 |
| Supply Chain Manager | 827 | Director of Regulatory Affairs | 295 |
| Supervisor | 825 | Information Technology Project Manager | 286 |
| Security Specialist | 736 | Network Security Engineer | 272 |
| Senior Program Manager | 718 | Compliance Manager | 223 |
| Senior Manager | 562 | Contract Manager | 213 |

**Table 4b. Top Job Titles for Cybersecurity Occupations for latest 12 months (December 2018 - November 2019) Mid-Peninsula Sub-Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | Mid-Peninsula | Common Title | Mid-Peninsula |
| Manager | 2,196 | Director of Regulatory Affairs | 182 |
| Project Manager | 2,145 | Program Coordinator | 163 |
| Program Manager | 1,284 | Security Architect | 162 |
| Security Engineer | 969 | Security Supervisor | 154 |
| Project Coordinator | 730 | Assistant Manager | 152 |
| Security Manager | 447 | Regulatory Affairs Manager | 146 |
| Technical Program Manager | 393 | Information Security Analyst | 129 |
| Senior Project Manager | 390 | Software Development Engineer | 125 |
| Supply Chain Manager | 359 | Security Consultant | 123 |
| Security Analyst | 335 | Information Security Engineer | 123 |
| Senior Manager | 332 | Strategic Manager | 121 |
| Supervisor | 286 | Compliance Manager | 120 |
| Senior Program Manager | 258 | Information Technology Project Manager | 117 |
| Security Specialist | 215 | Contract Manager | 116 |

*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 (2018) | Jobs in Industry (2022) | % Change (2018-22) | % in Industry (2018) |
| Corporate, Subsidiary, and Regional Managing Offices (551114) | 5,794 | 6,125 | 6% | 6% |
| Federal Government, Civilian, Excluding Postal Service (901199) | 5,597 | 5,436 | -3% | 6% |
| Local Government, Excluding Education and Hospitals (903999) | 4,345 | 4,513 | 4% | 4% |
| Custom Computer Programming Services (541511) | 4,206 | 4,963 | 18% | 4% |
| Internet Publishing and Broadcasting and Web Search Portals (519130) | 3,417 | 4,346 | 27% | 4% |
| Computer Systems Design Services (541512) | 2,374 | 2,667 | 12% | 2% |
| Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715) | 2,177 | 2,315 | 6% | 2% |
| Colleges, Universities, and Professional Schools (State Government) (902612) | 2,173 | 2,092 | -4% | 2% |
| State Government, Excluding Education and Hospitals (902999) | 2,078 | 2,166 | 4% | 2% |
| Administrative Management and General Management Consulting Services (541611) | 2,017 | 2,410 | 19% | 2% |
| Software Publishers (511210) | 1,948 | 2,376 | 22% | 2% |
| Research and Development in Biotechnology (except Nanobiotechnology) (541714) | 1,371 | 1,792 | 31% | 1% |
| Colleges, Universities, and Professional Schools (611310) | 1,401 | 1,501 | 7% | 1% |
| Other Scientific and Technical Consulting Services (541690) | 1,342 | 1,237 | -8% | 1% |
| Engineering Services (541330) | 1,278 | 1,367 | 7% | 1% |
| Data Processing, Hosting, and Related Services (518210) | 1,209 | 1,600 | 32% | 1% |
| Residential Remodelers (236118) | 1,151 | 1,367 | 19% | 1% |
| Marketing Consulting Services (541613) | 1,033 | 1,229 | 19% | 1% |
| General Medical and Surgical Hospitals (622110) | 1,066 | 1,019 | -4% | 1% |
| Office Administrative Services (561110) | 1,012 | 1,003 | -1% | 1% |
| Corporate, Subsidiary, and Regional Managing Offices (551114) | 5,794 | 6,125 | 6% | 6% |
| Federal Government, Civilian, Excluding Postal Service (901199) | 5,597 | 5,436 | -3% | 6% |

*Source: EMSI 2019.3*

**Table 6. Top Employers Posting Cybersecurity Occupations in Bay Region and Mid-Peninsula Sub-Region (December 2018 - November 2019)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Employer | Bay | Employer | Bay | Employer | Mid-Peninsula |
| Google Inc. | 1,269 | Microsoft Corporation | 233 | Facebook | 806 |
| Facebook | 907 | KPMG | 226 | Uber | 333 |
| Apple Inc. | 739 | Vmware Incorporated | 215 | Deloitte | 302 |
| Anthem Blue Cross | 572 | Visa | 211 | Salesforce | 298 |
| Cisco Systems Inc | 503 | IBM | 209 | Wells Fargo | 267 |
| Deloitte | 455 | Target | 195 | Accenture | 190 |
| Uber | 372 | University Of California Berkeley | 192 | Visa | 188 |
| Securitas | 313 | Linkedin Limited | 180 | Gilead Sciences | 170 |
| Salesforce | 309 | Workday, Inc | 174 | Google Inc. | 163 |
| Amazon | 308 | Milestone Technologies Incorporated | 173 | Genentech | 162 |
| Wells Fargo | 305 | Adobe Systems | 171 | University Of California San Francisco | 160 |
| Allied Universal Corp | 276 | Gilead Sciences | 170 | KPMG | 155 |
| Accenture | 276 | Genentech | 167 | Juul Labs | 148 |
| University California | 268 | Bank of America | 167 | University California | 140 |
| CBRE | 262 | University Of California San Francisco | 162 | Milestone Technologies Incorporated | 135 |
| Stanford University | 258 | Pacific Gas and Electric Company | 158 | Anthem Blue Cross | 126 |
| Kaiser Permanente | 250 | Walmart / Sam's | 157 | Amazon | 126 |

*Source: Burning Glass*

# Educational Supply

There are 15 community colleges in the Bay Region issuing 226 awards on average annually (last 3 years) on TOP 0708.10 - Computer Networking. There are two colleges in the Mid-Peninsula Sub-Region issuing 63 awards on average annually (last 3 years) on this TOP code.

**Table 7. Awards on TOP 07081.0 - Computer Networking in Bay Region**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| College | Sub-Region | Associates | Certificate 18+ units | Certificate Low unit | Total |
| Cabrillo College  | Santa Cruz-Monterey |  3  |  |  |  3  |
| City College of San Francisco  | Mid-Peninsula |  |  1  |  48  |  49  |
| Contra Costa College  | East Bay |  3  |  |  13  |  16  |
| De Anza College  | Silicon Valley |  13  |  3  |  8  |  24  |
| Diablo Valley College  | East Bay |  7  |  2  |  0  |  9  |
| Foothill College  | Silicon Valley |  1  |  |  |  1  |
| Gavilan College  | Santa Cruz-Monterey |  4  |  2  |  |  6  |
| Las Positas College  | East Bay |  4  |  1  |  |  5  |
| Los Medanos College  | East Bay |  8  |  5  |  3  |  16  |
| Mission College  | Silicon Valley |  14  |  6  |  9  |  29  |
| Monterey Peninsula College  | Santa Cruz-Monterey |  |  1  |  1  |  2  |
| Ohlone College  | East Bay |  3  |  4  |  12  |  19  |
| San Jose City College  | Silicon Valley |  8  |  6  |  2  |  16  |
| Santa Rosa Junior College  | North Bay |  |  |  23  |  23  |
| Skyline College  | Mid-Peninsula |  7  |  1  |  |  8  |
| **Total Bay Region** |  **75**  |  **31**  |  **120**  |  **226**  |
| **Total Mid-Peninsula Sub-Region** |  **24**  |  **11**  |  **28**  |  **63**  |

# *Source: Data Mart*

Note: The annual average for awards is 2015-16 to 2017-18.

# Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 9,442 annual openings for the Cybersecurity occupational cluster and 226 annual (3-year average) awards for an annual undersupply of 9,216 students. In the Mid-Peninsula Sub-Region, there is also a gap with 3,314 annual openings and 63 annual (3-year average) awards for an annual undersupply of 3,251 students.

# Student Outcomes

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2015-16 | Bay (All CTE Programs) | City College of San Francisco (All CTE Programs) | State (0708.10) | Bay (0708.10) | Mid-Peninsula (0708.10) | City College of San Francisco (0708.10) |
| % Employed Four Quarters After Exit | 74% | 72% | 72% | 74% | 73% | 74% |
| Median Quarterly Earnings Two Quarters After Exit | $10,550 | $10,170 | $26,672 | $28,862 | $12,411 | $12,482 |
| Median % Change in Earnings | 46% | 31% | 40% | 45% | 38% | 38% |
| % of Students Earning a Living Wage | 63% | 65% | 70% | 74% | 70% | 70% |

*Source: Launchboard Pipeline (version available on 12/2/19)*

# Skills, Certifications and Education

**Table 9. Top Skills for Cybersecurity Occupations in Bay Region (December 2018 - November 2019)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Skill | Postings | Skill | Postings | Skill | Postings |
| Project Management | 29,201 | Business Development | 3,854 | Onboarding | 2,445 |
| Budgeting | 16,718 | Product Management | 3,773 | Software Engineering | 2,438 |
| Scheduling | 14,382 | Process Improvement | 3,667 | E-Commerce | 2,337 |
| Program Management | 12,625 | Python | 3,597 | Linux | 2,333 |
| Project Planning and Development Skills | 7,562 | Software Development | 3,415 | Supervisory Skills | 2,333 |
| Customer Service | 7,509 | Quality Management | 3,336 | Strategic Planning | 2,310 |
| Staff Management | 6,490 | Sales | 3,307 | Atlassian JIRA | 2,299 |
| Information Security | 5,011 | Key Performance Indicators (KPIs) | 3,195 | Data Analysis | 2,234 |
| Stakeholder Management | 4,933 | Procurement | 3,002 | Supply Chain Management | 2,233 |
| Quality Assurance and Control | 4,389 | Salesforce | 2,939 | Scrum | 2,183 |
| Microsoft Project | 4,200 | SQL | 2,886 | Business Administration | 2,119 |
| Change Management | 4,122 | Information Systems | 2,700 | Supply Chain Knowledge | 2,106 |
| Customer Contact | 4,038 | Accounting | 2,699 | Java | 2,081 |
| Product Development | 3,890 | Conflict Management | 2,571 | Cost Control | 2,030 |
| Business Process | 3,878 | Software as a Service (SaaS) | 2,558 | Lifecycle Management | 2,028 |

*Source: Burning Glass*

**Table 10. Certifications for Cybersecurity Occupations in Bay Region (December 2018 - November 2019)**

Note: 76% 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 | 5,881 | Registered Nurse | 417 |
| Project Management Professional (PMP) | 3,810 | Six Sigma Certification | 353 |
| Driver's License | 3,274 | GIAC Certified Incident Handler (GCIH) | 339 |
| Certified Information Systems Security Professional (CISSP) | 2,770 | CompTIA Security+ | 326 |
| Certified Information Systems Auditor (CISA) | 1,582 | Cisco Certified Network Associate (CCNA) | 323 |
| Certified Information Security Manager (CISM) | 1,172 | Certified Public Accountant (CPA) | 303 |
| SANS/GIAC Certification | 1,146 | LEED AP | 260 |
| Security Clearance | 746 | Cisco Certified Security Professional | 244 |
| IT Infrastructure Library (ITIL) Certification | 676 | Leadership In Energy And Environmental Design (LEED) Certified | 241 |
| Information Systems Certification | 534 | ITIL Certification | 234 |
| Certified in Risk and Information Systems Control | 472 | GIAC Security Essentials (GSEC) | 223 |
| First Aid CPR AED | 444 | Cisco Certified Network Professional (CCNP) | 220 |
| Certified ScrumMaster (CSM) | 424 | Registered Nurse | 417 |

*Source: Burning Glass*

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

Note: 43% 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 | 4,150 | 9% |
| Associate Degree | 1,117 | 2% |
| Bachelor’s Degree or Higher | 38,414 | 89% |

*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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