Cybersecurity Occupations
Labor Market Information Report
Foothill College

Prepared by the San Francisco Bay Center of Excellence
for Labor Market Research
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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 Silicon Valley Sub-Region (Santa Clara County). There is a projected annual gap of about 11,495 students in the Bay Region and 3,652 students in the Silicon Valley Sub-Region.

Introduction

This report provides student outcomes data on employment and earnings for TOP 0707.00-Computer Software Development 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 Foothill College and in the region.

This report profiles Cybersecurity Occupations in the 12 county Bay Region and in the Silicon Valley Sub-Region for a proposed new program at Foothill College.

- **Business Operations Specialists, All Other / Project Management Specialists and Business Operations Specialists, All Other (13-1199 / 13-1198):** 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%

- **Information Security Analysts (15-1122 / 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%

- **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%

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 Open-ings	Average Annual Open-ings	25% Hourly Wage	Median Hourly Wage
Business Operations Specialists, All Other / Project Management Specialists and Business Operations Specialists, All Other	62,537	66,741	4,204	7%	35,263	7,053	$29.99	$41.45
Information Security Analysts	3,718	4,953	1,234	33%	2,759	552	$44.50	$59.44
Computer and Information Systems Managers	38,017	42,345	4,328	11%	20,011	4,002	$73.84	$91.69
TOTAL	**104,272**	**114,039**	**9,767**	**9%**	**58,032**	**11,607**	**$46.50**	**$60.41**

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 Cybersecurity Occupations in Silicon Valley 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
Business Operations Specialists, All Other/Project Management Specialists and Business Operations Specialists, All Other	16,479	17,688	1,209	7%	9,421	1,884	$30.90	$43.82
Information Security Analysts	1,284	1,738	453	35%	984	197	$46.94	$63.77
Computer and Information Systems Managers	15,012	16,681	1,669	11%	7,855	1,571	$77.52	$95.17
TOTAL	**32,775**	**36,106**	**3,331**	**10%**	**18,260**	**3,652**	**$52.88**	**$68.12**

Source: EMSI 2020.3
Silicon Valley Sub-Region includes Santa Clara County

Job Postings in Bay Region and Silicon Valley Sub-Region
Table 3. Number of Job Postings by Occupation for latest 12 months (November 2019 - October 2020)

Occupation	Bay Region	Silicon Valley Sub-Region
Information Security Analysts	8,351	3,409
Computer and Information Systems Managers	1,984	691
Security Management Specialists	1,332	452
Online Merchants	914	208
Business Continuity Planners	635	206
Business Operations Specialists, All Other	286	57
Energy Auditors	161	18
Sustainability Specialists	60	10
Customs Brokers	38	4
TOTAL	**13,761**	**5,055**

Source: Burning Glass

Table 4a. Top Job Titles for Cybersecurity Occupations for latest 12 months (November 2019 - October 2020) Bay Region

Common Title	Bay	Common Title	Bay
Security Engineer	287	Chief Technology Officer	56
Target Security Specialist	211	It Security Analyst	54
Senior Security Engineer	153	Cybersecurity Engineer	47
Security Analyst	153	Director, Software Engineering	45
Information Security Engineer	143	Senior Cloud Security Engineer	44
Security Specialist	123	E-Commerce Department	44
Information Security Analyst	91	Penetration Tester	42

Network Security Engineer	86	Product Security Engineer	40
Cloud Security Engineer	82	It Security Specialist	39
Cybersecurity Analyst	80	It Auditor	38
Security Architect	74	Senior It Auditor	36
Healthcare - Security Specialist	67	Security Operations Engineer	36
Permit Coordinator	61	Chief Information Officer	35
E-Commerce Manager	59	Technical Director	31

Table 4b. Top Job Titles for Cybersecurity Occupations for latest 12 months (November 2019 - October 2020) Silicon Valley Sub-Region

Common Title	Silicon Valley	Common Title	Silicon Valley
Security Engineer	95	Gcp Security Engineer	22
Information Security Analyst	61	Security Operations Engineer	20
Security Analyst	52	Data Security Engineer	20
Senior Security Engineer	50	Director, Software Engineering	19
Security Specialist	42	Penetration Tester	18
Cloud Security Engineer	41	Senior Security Architect	17
Network Security Engineer	39	It Security Analyst	17
Security Architect	38	Senior Cloud Security Engineer	16
Target Security Specialist	37	Sap Security Consultant	16
It Security Specialist	37	Soc Officer For Technology Site	15
Information Security Engineer	35	Gis Security Engineer	15
Cybersecurity Analyst	33	E-Commerce Program Manager	15
Cybersecurity Engineer	27	Change Management Consultant	15
Product Security Engineer	22	Security Consultant	14

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)
Corporate, Subsidiary, and Regional Managing Offices	1,925	1,907	-1%	8%
Custom Computer Programming Services	1,217	1,262	4%	5%
Computer Systems Design Services	1,134	1,096	-3%	5%
Federal Government, Civilian, Excluding Postal Service	968	964	0%	4%
Local Government, Excluding Education and Hospitals	947	970	2%	4%
Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)	842	930	10%	4%
Colleges, Universities, and Professional Schools (State Government)	671	626	-7%	3%
Data Processing, Hosting, and Related Services	598	809	35%	3%
Software Publishers	616	689	12%	2%
State Government, Excluding Education and Hospitals	560	602	8%	2%
Direct Health and Medical Insurance Carriers	486	597	23%	2%
Engineering Services	457	480	5%	2%
Natural Gas Distribution	383	386	1%	2%
Research and Development in Biotechnology (except Nanobiotechnology)	375	447	19%	2%
Administrative Management and General Management Consulting Services	324	384	19%	1%
Temporary Help Services	322	345	7%	1%
HMO Medical Centers	315	370	17%	1%

Services for the Elderly and Persons with Disabilities	311	368	18%	1%
Other Scientific and Technical Consulting Services	305	288	-6%	1%
Commercial Banking	296	314	6%	1%
General Medical and Surgical Hospitals	288	258	-11%	1%

Source: EMSI 2020.3

Table 6. Top Employers Posting Cybersecurity Occupations in Bay Region and Silicon Valley Sub-Region (November 2019 - October 2020)

Employer	Bay	Employer	Bay	Employer	Silicon Valley
Wells Fargo	273	Amazon	85	Palo Alto Networks	124
Target	218	IBM	84	Apple Inc.	101
Deloitte	154	Pacific Gas and Electric Company	80	Vmware Inc	99
Cisco Systems Inc	152	Accenture	79	Cisco Systems Inc	93
Security Industry Specialists, Inc	146	Lockheed Martin Corporation	67	Allied Universal	84
Splunk	143	Capital One	62	IBM	82
Facebook	131	Nvidia Corporation	54	Google Inc.	76
Palo Alto Networks	125	Tesla	53	Splunk	71
Anthem Blue Cross	120	Lawrence Livermore National Laboratory	49	Security Industry Specialists, Inc	62
Apple Inc.	119	Splunk, Inc	48	Deloitte	62
Securitas	117	SAP	48	Microsoft Corporation	57
Vmware Inc	111	Dell	43	Anthem Blue Cross	56
Allied Universal	111	Security Industry Specialists	41	Nvidia Corporation	53
Salesforce	107	Safeway Inc	40	KPMG	39
KPMG	96	Blue Cross Blue Shield of CA	39	Nsys Design Systems	37
Microsoft Corporation	89	Nsys Design Systems	37	Target	36
Google Inc.	85	Infobahn Softworld Inc	36	Lockheed Martin Corporation	36

Source: Burning Glass

Educational Supply

There are four (4) community colleges in the Bay Region issuing 112 awards on average annually (last 3 years ending 2018-19) on TOP 0707.00-Computer Software Development. In the Silicon Valley Sub-Region here are no community colleges issuing awards on average annually (last 3 years) on this TOP code.

There is one (1) other CTE Educational Institution in the Bay Region issuing one (1) award on average annually (last 3 years ending 2016-17) on TOP 0707.00-Computer Software Development. There are no colleges in the Silicon Valley Sub-Region issuing awards on average annually (last 3 years) on this TOP code.

Table 7a. Awards on TOP 0707.00-Computer Software Development in Bay Region

College	Sub-Region	Associates	Certificate Low Unit	Total
Las Positas	East Bay		1	1
San Francisco	Mid-Peninsula		2	2
San Mateo	Mid-Peninsula	7	83	90
Solano	North Bay		19	19
Total Bay Region		**7**	**105**	**112**
Total Silicon Valley Sub-Region		**0**	**0**	**0**

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

Table 7b. Other CTE Institution Awards on 0707.00-Computer Software Development in Bay Region

College	Sub-Region	Associates

Pacific Union College	North Bay	1
Total Bay Region		**1**
Total Silicon Valley Sub-Region		**0**

Source: Data Mart

Note: The annual average for awards is 2014-15 to 2016-17.

Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay Region with 11,607 annual openings for the Cybersecurity occupational cluster and 112 annual (3-year average) awards from community colleges and other CTE Institutions for an annual undersupply of 11,495 students. In the Silicon Valley Sub-Region, there is also a gap with 3,652 annual openings and no annual (3-year average) awards for an annual undersupply of 3,652 students.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0707.00-Computer Software Development

2017-18	Bay All CTE Programs	Foothill College All CTE Programs	State 0707.00	Bay 0707.00	Silicon Valley 0707.00	Foothill College 0707.00
% Employed Four Quarters After Exit	67%	71%	59%	59%	58%	58%
Median Quarterly Earnings Two Quarters After Exit	$11,466	$16,942	$11,006	$13,085	$18,986	$19.292
Median % Change in Earnings	31%	46%	26%	27%	28%	28%
% of Students Earning a Living Wage	53%	72%	59%	65%	69%	69%

Source: Launchboard Pipeline (version available on August 2020)

Skills, Certifications and Education

Table 9. Top Skills for Cybersecurity Occupations in Bay Region (November 2019 - October 2020)

Skill	Postings	Skill	Postings	Skill	Postings
Information Security	4,135	Business Process	1,041	Transmission Control Protocol / Internet Protocol (TCP / IP)	682
Python	2,352	Software as a Service (SaaS)	976	UNIX	678
Project Management	2,041	Authentication	896	Kubernetes	673
Linux	1,727	SQL	880	NIST Cybersecurity Framework	662
Information Systems	1,663	Product Management	855	Vulnerability assessment	662
Software Development	1,647	DevOps	835	Good Clinical Practices (GCP)	623
Customer Service	1,552	Scheduling	810	Risk Management	621
Network Security	1,446	C++	809	Risk Assessment	606
Java	1,421	Threat Modeling	773	Staff Management	596
Cryptography	1,397	Threat Analysis	766	Cisco	584
Budgeting	1,286	Splunk	757	Open Web Application Security Project (OWASP)	582
Software Engineering	1,252	ISO 27001	734	Product Development	579
E-Commerce	1,123	JavaScript	728	Oracle	575
Security Operations	1,115	Health Insurance Portability and Accountability Act (HIPAA)	706	Intrusion detection	565
Penetration Testing	1,070	Change Management	694	Data Security	548

Source: Burning Glass

Table 10. Certifications for Cybersecurity Occupations in Bay Region (November 2019 - October 2020)

Note: 70% 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
Certified Information Systems Security Professional (CISSP)	2,310	Cisco Certified Security Professional	243
Certified Information Systems Auditor (CISA)	1,130	GIAC Certified Incident Handler (GCIH)	216
Certified Information Security Manager (CISM)	946	GIAC Security Essentials Certification	206
SANS/GIAC Certification	891	Cisco Certified Network Professional (CCNP)	176
Information Systems Certification	638	Project Management Professional (PMP)	169
Certified in Risk and Information Systems Control	448	GIAC Certified Intrusion Analyst	153
Driver's License	364	Cisco Certified Internetwork Expert (CCIE)	111
Security Clearance	357	Certified Ethical Hacker (CEH)	109
CompTIA Security+	332	Systems Security Certified Practitioner (SSCP)	96
Cisco Certified Network Associate (CCNA)	305	First Aid CPR AED	89
Project Management Certification	299	Certified Internal Auditor (CIA)	86
IT Infrastructure Library (ITIL) Certification	257	Certified Public Accountant (CPA)	81

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	495	6%
Associate Degree	192	2%
Bachelor's Degree or Higher	7,188	92%

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:

- Doreen O'Donovan, Research Analyst, for Bay Area Community College Consortium (BACCC) and Centers of Excellence (CoE), doreen@baccc.net or (831) 479-6481
- John Carrese, Director, San Francisco Bay Center of Excellence for Labor Market Research, jcarrese@ccsf.edu or (415) 267-6544