# LABOR MARKET ANALYSIS

## FOR PROGRAM RECOMMENDATION

## INFORMATION SECURITY MANAGEMENT
### IN THE GREATER SACRAMENTO REGION

North (Greater Sacramento)

Center of Excellence

**MARCH 2024**

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# SUMMARY

The North (Greater Sacramento) of Excellence for Labor Market Research prepared this report to provide a labor market analysis of educational supply and occupational demand for middle-skilled careers in the North (Greater Sacramento) subregion. This report aims to determine if demand in the local labor market is unmet by the supply from existing community college programs and other postsecondary training providers.

This report primarily focuses on training that leads to jobs in middle-skilled occupations - jobs that typically require education beyond a high school diploma but less than a bachelor's degree - but may include higher-skilled occupations for training pathways that lead to a bachelor's degree. Lowered skilled occupations are rarely considered in this analysis due to the lessened barriers for entry-level work, such as no formal education and fewer on-the-job training requirements.

Key findings include:

- The Greater Sacramento subregion held 4,340 information security jobs in 2022. These jobs are projected to increase by 9% over the next five years, adding 384 new jobs to the subregion by 2027.

- Over the next five years, information security jobs are projected to have 362 annual openings in the Greater Sacramento subregion.

- Analysis of wage data shows that information security occupations earn $27 to $45 above the single adult living wage of $18.72 per hour.

- Between 68% and 79% of incumbent information security workers hold a bachelor's degree or higher.

- Awards data analysis shows that North (Greater Sacramento) training providers conferred an average of 169 awards (certificates and associate degrees) in information security programs over the last three academic years.

Recommendations include:

- The North (Greater Sacramento) Center of Excellence recommends *exercising caution* in developing new information security programs. While there seems to be a need for more information security workers in Greater Sacramento, the typical entry-level education required for employment in the two information security occupations is a bachelor's degree, and less than one-third of workers currently employed in these occupations have an educational background consistent with community college offerings.

- Community colleges offering information security programs should: 1) work closely with local employers to ensure their curriculum aligns with local needs, 2) ensure curriculum aligns to third-party industry certification standards to support students obtaining competitive credentials, and 3) provide a clearly defined and articulated transfer pathway to support students obtaining a four-year degree.

# INTRODUCTION

The North (Greater Sacramento) Center of Excellence (COE) was asked to provide labor market information for a proposed program at a regional community college. This report focuses on the following Standard Occupational Classification (SOC) occupations and codes:

- These middle-skill occupations require more education and training beyond a high school diploma but usually less than a four-year degree:
    - None are included in this report.
- Students who transfer and earn a four-year degree could pursue the following high-skill occupations:
    - Computer and Information Systems Managers (11-3021)
    - Information Security Analysts (15-1212)

A review of related programs revealed the following Taxonomy of Programs (TOP) title(s) and code(s) are appropriate for inclusion in this report:

- Computer Infrastructure and Support (0708.00)

The corresponding Classification of Instructional Program (CIP) title(s) and code(s) are:

- Computer and Information Systems Security/Auditing/Information Assurance (11.1003)

# OCCUPATIONAL DEMAND

Exhibit 1 summarizes the five-year projected job growth for the studied occupations in North (Greater Sacramento)[1], North/Far North, and California.

**Exhibit 1.** Current employment and projected demand, 2022-2027

| Occupation | 2022 Jobs | 2027 Jobs | 2022-2027 Change | 2022-2027 % Change | 2022-2027 Annual Openings |
|---|---|---|---|---|---|
| Computer and Information Systems Managers | 3,775 | 4,066 | 290 | 8% | 307 |
| Information Security Analysts | 565 | 659 | 94 | 17% | 54 |
| **North (Greater Sacramento)** | **4,340** | **4,725** | **384** | **9%** | **362** |
| Computer and Information Systems Managers | 4,178 | 4,512 | 334 | 8% | 343 |
| Information Security Analysts | 648 | 755 | 108 | 17% | 63 |
| **North/Far North** | **4,826** | **5,267** | **441** | **9%** | **406** |
| Computer and Information Systems Managers | 91,085 | 98,275 | 7,190 | 8% | 7,495 |
| Information Security Analysts | 15,432 | 18,103 | 2,671 | 17% | 1,504 |
| **California** | **106,517** | **116,378** | **9,860** | **9%** | **8,999** |

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[1] The North (Greater Sacramento) subregion covers seven counties, including El Dorada, Nevada, Placer, Sacramento, Sutter, Yolo, and Yuba.

Exhibit 2 compares the net changes in jobs between 2017 through 2022 and the projected changes through 2027. The rate of change is indexed to the total number of jobs in 2017.

**Exhibit 2. Changes in employment, 2017-2027**
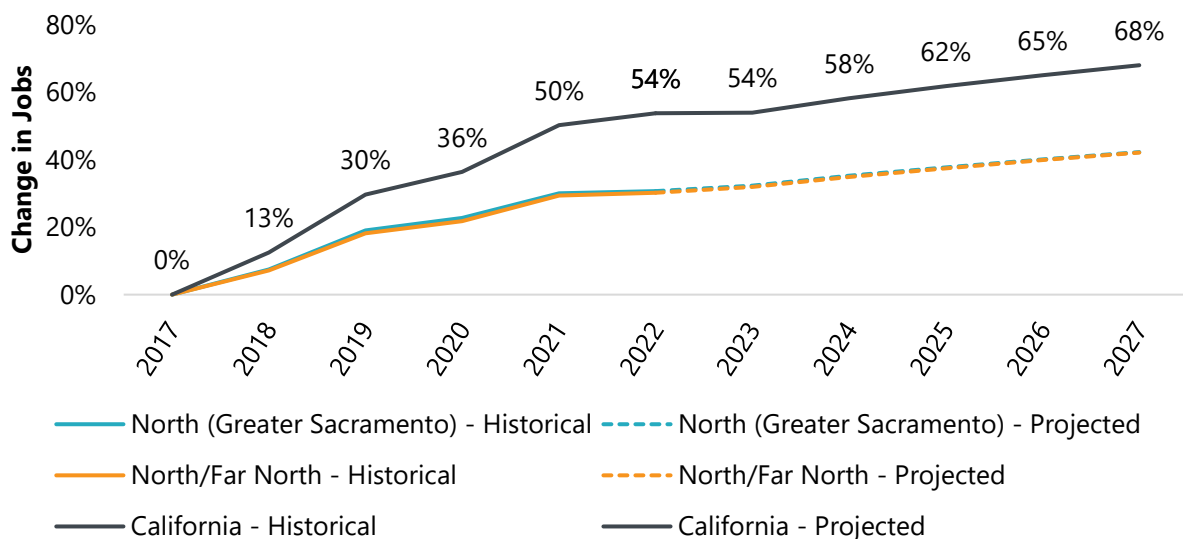


## Wages

Exhibit 3 compares the 25th percentile, median, and 75th percentile hourly wages for the selected occupations to the Greater Sacramento living wage for one working adult ($18.72 per hour) and a small family ($28.91 per hour).[2,3] The 25th and 75th percentile hourly wages are used to estimate entry-level and experienced worker wages.

**Exhibit 3. Hourly wages by occupation, 2022**



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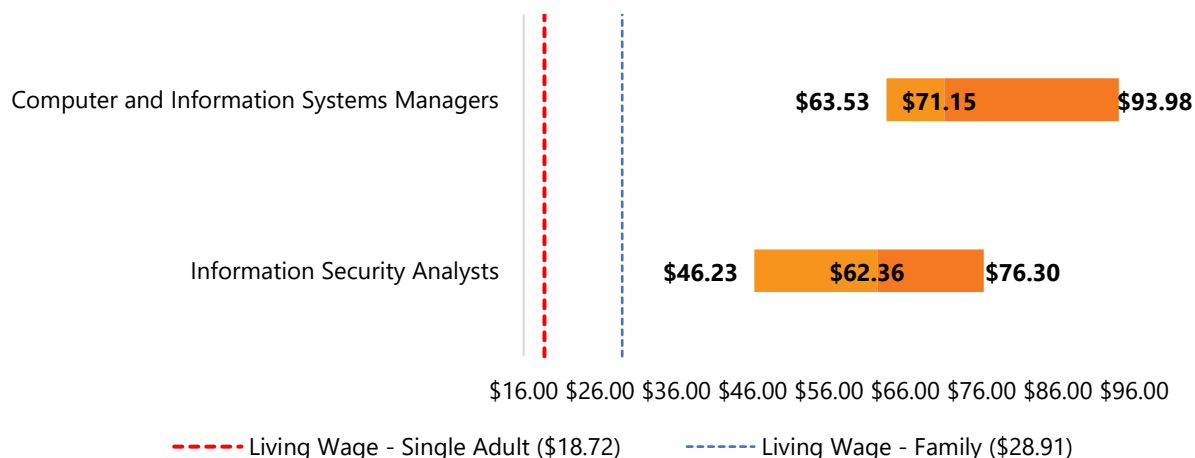
[2] Living wage is defined as the level of income one working adult with no children must earn to meet basic needs, including food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs. Please note that the 25th-percentile and 75th-percentile hourly wages are used as proxy for entry-level and experienced-level wages.

[3] A small family is defined as one working adult and one school aged child (between the ages of 5 and 12 years).

# JOB POSTINGS

## About Job Postings Analysis

This section analyzes recent data from online job postings. Online job postings may provide additional insight into recent changes in the labor market that are not captured by historical trends. However, job postings are not the same as labor market demand; demand is based on projected annual openings. Job postings should be used to inform community college curriculum development and identify potential employers for targeted experiential learning opportunities.

Please note several limitations to analyzing and interpreting online job postings. Employers may post a position multiple times to increase the number of job applicants. Job postings may remain online after a business chooses not to fill a position. Employers may advertise one posting to fill multiple vacancies. And not all jobs are posted online.

The North COE identified 595 online job postings for the selected occupations in the seven-county Greater Sacramento subregion. Job posting data comes from Lightcast (formerly Emsi Burning Glass) and represents unique advertisements newly posted online during the last 12 months, from March 2023 through February 2024.

## Top Employers and Job Titles

Exhibit 4 details the number of online job postings for the selected occupations.

**Exhibit 4. Job postings by occupation**

| Occupation | Unique Job Postings | Share of Job Postings |
|---|:---:|:---:|
| Information Security Analysts | 427 | 72% |
| Computer and Information Systems Managers | 168 | 28% |
| **Total Job Postings** | **595** | **100%** |

Exhibit 5 shows the top 10 relevant job titles with the most job postings.

**Exhibit 5. Top jobs titles**

| Job Title | Number of Job Postings |
|---|---|
| IT Supervisors | 32 |
| Information Systems Security Officers | 18 |
| Directors of Information Technology | 17 |
| Information Security Analysts | 17 |
| Cybersecurity Engineers | 12 |
| Specialist Information Security Analysts | 9 |
| Information Security Officers | 9 |
| Security Engineers | 8 |
| Information Security Specialists | 8 |
| Cybersecurity Specialists | 8 |

Exhibit 6 shows the top 10 relevant employers with the most job postings for the selected occupations.

**Exhibit 6. Top Employers**

| Employer | Number of Job Postings |
|---|---|
| University of California | 24 |
| State of California | 21 |
| Deloitte | 15 |
| Sutter Health | 14 |
| California Physicians' Service | 14 |
| Intel | 12 |
| Accenture | 11 |

| Employer | Number of Job Postings |
|---|---|
| PricewaterhouseCoopers | 9 |
| General Dynamics | 9 |
| California State University | 9 |

## Top Skills and Qualifications

Exhibit 7 shows the most relevant certifications requested by employers for the selected occupations.

**Exhibit 7. Most in-demand certifications**

| Certification | Number of Job Postings |
|---|---|
| Certified Information Systems Security Professional | 120 |
| Certified Information Security Manager | 62 |
| Certified Information System Auditor (CISA) | 49 |
| Top Secret-Sensitive Compartmented Information (TS/SCI Clearance) | 44 |
| CompTIA Security+ | 40 |

Exhibit 8 shows the top 10 skills across three categories for the studied occupations: specialized, essential, and software skills.[4]
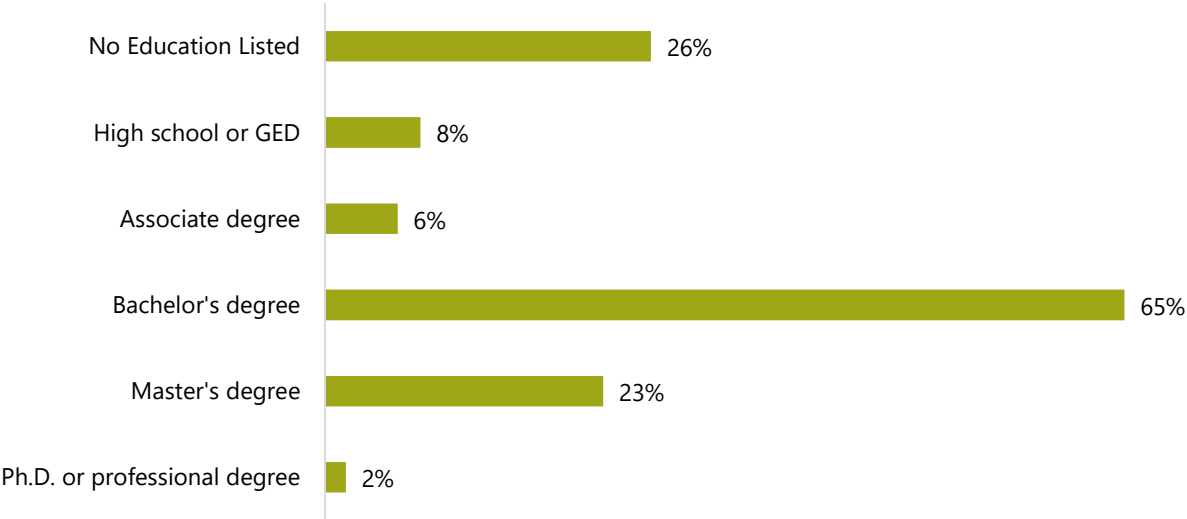
**Exhibit 8. Most in-demand skills**

| Specialized Skills | Common Skills | Software Skills |
|---|---|---|
| Computer Science | Management | Firewall |
| Cyber Security | Communication | Microsoft Azure |
| Auditing | Information Technology | Amazon Web Services |
| Information Systems | Leadership | Microsoft Office (Excel, |

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[4] Specialized skills are those primarily required to perform specific tasks in an occupation. Essential skills are typically related to employability. These are skills that are prevalent across many occupations, and include both interpersonal attributes and learned skills (aka "soft skills"). Software skills are specific to any software tool or programming component used to support a job.

| Specialized Skills | Common Skills | Software Skills |
|---|---|---|
| | | PowerPoint) |
| Project Management | Operations | Operating Systems |
| Risk Analysis | Planning | Active Directory |
| Vulnerability | Writing | Linux |
| Incident Response | Problem-Solving | Python (Programming Language) |
| Risk Management | Research | SAP Applications |
| Security Controls | Presentations | Java (Programming Language) |

Exhibit 9 shows the minimum education level preferred by employers for related job postings in the Greater Sacramento subregion.[5]
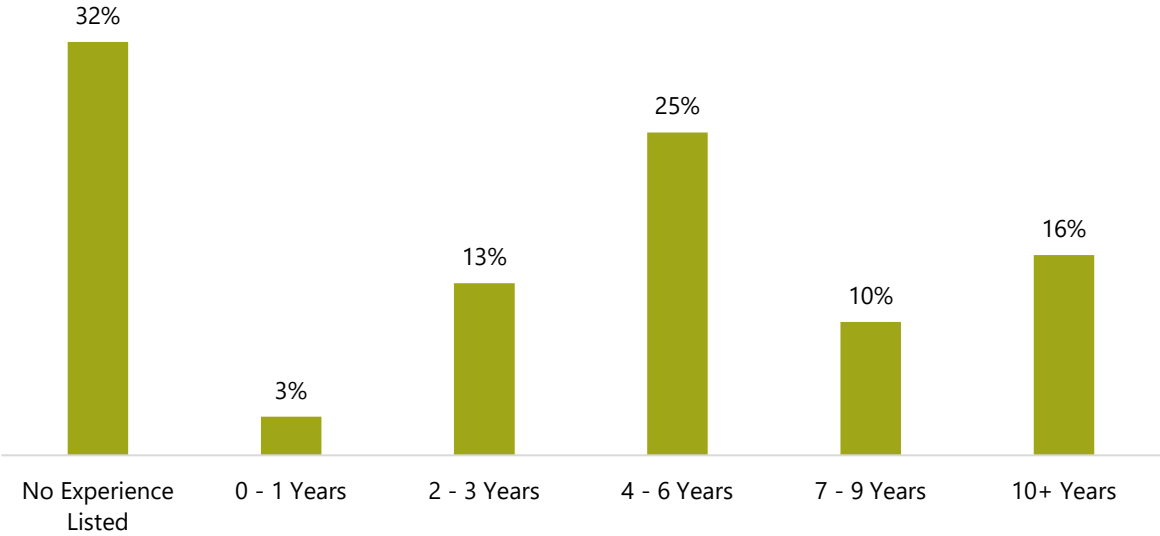
**Exhibit 9. Employer-preferred education**



- No Education Listed — 26%
- High school or GED — 8%
- Associate degree — 6%
- Bachelor's degree — 65%
- Master's degree — 23%
- Ph.D. or professional degree — 2%

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[5] Employers may include more than one level of education as a hiring requirement in a job posting. As a result, the values in exhibit 9 may sum to greater than 100%.

Exhibit 10 shows the minimum level of experience employers prefer for related job postings in the Greater Sacramento subregion.[6]

**Exhibit 10. Employer-preferred job experience**



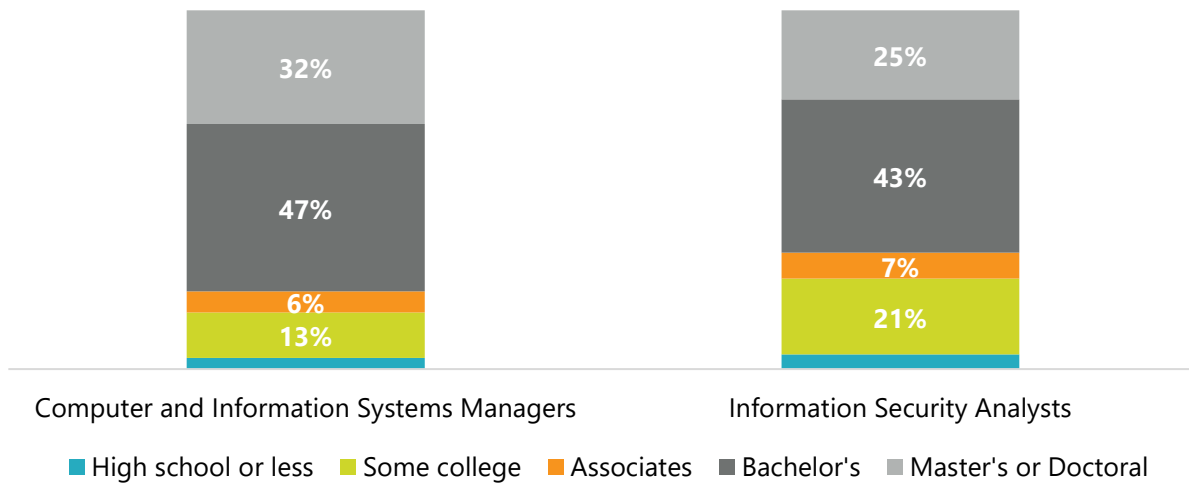| | | | | | |
|---|---|---|---|---|---|
| 32% | 3% | 13% | 25% | 10% | 16% |
| No Experience Listed | 0 - 1 Years | 2 - 3 Years | 4 - 6 Years | 7 - 9 Years | 10+ Years |

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[6] Employers may include more than one level of experience as a hiring requirement in a job posting. As a result, the values in exhibit 10 may sum to greater than 100%.

# EDUCATION AND TRAINING REQUIREMENTS

The U.S. Census Bureau collects data on the highest education level achieved by workers across all occupations. Exhibit 11 shows California's educational attainment of the current workforce in the selected occupations.

**Exhibit 11. California educational attainment for selected occupations, 2019**



Computer and Information Systems Managers — 32%, 47%, 6%, 13%

Information Security Analysts — 25%, 43%, 7%, 21%

Legend: High school or less | Some college | Associates | Bachelor's | Master's or Doctoral

The U.S. Bureau of Labor Statistics (BLS) uses a categorical system to assign typical entry-level education and job requirements to each occupation for which the BLS publishes projection data. These categories include entry-level education, work experience in a related occupation, and on-the-job training. Exhibit 12 shows the selected occupations' typical entry-level job requirements.

**Exhibit 12. Typical entry-level job requirements**

| Occupation | Entry-level Education Requirements | Work Experience Requirements | On-The-Job Training Requirements |
|---|---|---|---|
| Computer and Information Systems Managers | Bachelor's degree | Five years or more | None |
| Information Security Analysts | Bachelor's degree | Less than five years | None |

# EDUCATIONAL SUPPLY

Educational supply for an occupation can be estimated by analyzing the number of awards issued in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes. Exhibit 13 shows the TOP and CIP codes for educational programs related to the selected occupations.

**Exhibit 13. TOP and CIP codes for training programs related to the selected occupations**

| TOP Programs and Codes | Aligned CIP Programs and Codes |
|---|---|
| Computer Infrastructure and Support (0708.00) | Computer and Information Systems Security/Auditing/Information Assurance (11.1003) |

## Community College Supply

Exhibits 14 and 15 compare the average number of certificates and degrees from selected Greater Sacramento community college programs over the last three academic years.

**Exhibit 14. Annual average community college awards by program**

| Program - TOP Code | College | Annual Awards 2020-21 | Annual Awards 2021-22 | Annual Awards 2022-23 | 3-Yr Annual Awards Average |
|---|---|---|---|---|---|
| Computer Infrastructure and Support (0708.00) | American River | 18 | 21 | 19 | 19 |
| | Cosumnes River | 17 | 13 | 22 | 17 |
| | Sacramento City | 16 | 24 | 35 | 25 |
| | Sierra | 21 | 0 | 4 | 8 |
| | **Grand Total** | **72** | **58** | **80** | **70** |

**Exhibit 15. Annual average community college awards by type, 2019-20 through 2021-22**

| Award Type | Average Number of Awards Issued Per Year |
|---|---|
| Associate Degree | 34 |
| Certificate 16 < 30 semester units | 16 |
| Certificate 30 < 60 semester units | 9 |
| Certificate 6 < 18 semester units | 8 |
| Certificate 8 < 16 semester units | 3 |

Average Number of Awards Issued Per Year
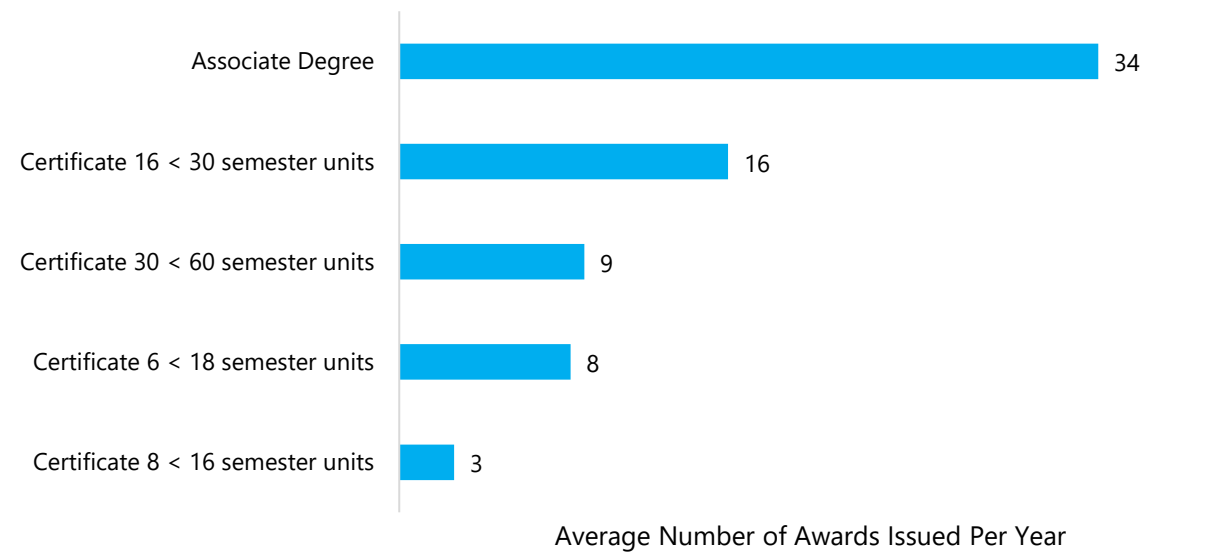
Exhibit 16 lists the program titles by college found within the selected TOP codes (Computer Infrastructure and Support – 0708.00). Programs are active as of March 25, 2024.

| College | Program Title | Award Offered |
|---|---|---|
| American River | Cybersecurity and Information Assurance | • Associate degree<br>• Certificate 30<60 units |
| | Cybersecurity and Information Security Administration | • Certificate 30<60 units |
| | Enterprise Mainframe System Administration | • Certificate 30<60 units |
| | Network Administration Essentials: Windows | • Certificate 18+ units |
| Cosumnes River | CIS: Information Systems Security | • Associate degree<br>• Certificate 16<30 units |
| | Cybersecurity and Information Assurance | • Associate degree |
| | Cybersecurity | • Certificate 16<30 units |
| Sacramento City | Cybersecurity and Information | • Associate degree |

| | | | |
|---|---|---|---|
| Assurance | | • Certificate 30<60 units | |
| Cloud Computing | | • Certificate 16<30 units | |

| Sierra | Cloud Computing | • Associate degree |
|---|---|---|
| | | • Certificate 16<30 units |

## Other Postsecondary Supply

Exhibit 17 compares the average number of degrees that non-community college training providers conferred in the Greater Sacramento subregion over the last two academic years.

Please note that non-community college data often lags by one year, and other postsecondary awards data may only cover a two-year average due to a taxonomy update from the 2010 to 2020 CIP codes.

**Exhibit 17. Other postsecondary awards by program**

| Program - CIP Code | Provider | Annual Awards 2019-20 | Annual Awards 2020-21 | Annual Awards 2021-22 | 3-Yr Annual Awards Average |
|---|---|---|---|---|---|
| Computer and Information Systems Security/Auditing/Information Assurance (11.1003) | Asher College (Award 1<2 Yrs.) | 33 | 39 | 26 | 33 |
| | Asher College (Associate) | 62 | 62 | 76 | 67 |
| | **Grand Total** | **95** | **101** | **102** | **99** |

# FINDINGS

This report focuses on two occupations in the information security career pathway: computer and information systems managers and information security analysts.

*Occupational Demand*

- The Greater Sacramento subregion held 4,340 information security jobs in 2022. These jobs are projected to increase by 9% over the next five years, adding 384 new jobs to the subregion by 2027.

- Greater Sacramento information security jobs are projected to grow at a rate similar to that of the state (both at 9%).

- Over the next five years, information security jobs are projected to have 362 annual openings in the Greater Sacramento subregion.

*Wages*

- Analysis of wage data shows that information security occupations earn $27 to $45 above the single adult living wage of $18.72 per hour.

*Job Postings*

- In the last 12 months, there were 595 online job postings for information security jobs across the Greater Sacramento subregion. Most of these job postings – 72%– were for information security analysts (n = 427 of 595).

- Employers with the most job postings included the University of California, the State of California, Deloitte, Accenture, and several health organizations.

- Sixty-five percent of job postings required a bachelor's degree as the preferred minimum level of education for information security jobs in the Greater Sacramento subregion.

*Education and Training Requirements*

- Between 19% and 28% of incumbent information security workers have educational attainment levels consistent with community college offerings (some college or associate degrees).

- Another 68% to 79% of workers in these occupations hold a bachelor's degree or higher.

*Postsecondary Supply*

- Four Greater Sacramento community colleges offer degrees and certificates in information security and data management programs. These programs conferred an average of 70 awards (certificates and associate degrees) in these programs over the last three academic years (2020-21 through 2022-23).

- Local non-community college postsecondary training providers also offer training related to the studied occupations. Between 2019-20 and 2021-22, non-community college training providers conferred an average of 99 awards in information assurance programs over the last three years. Please note that non-community college awards data often lags by one year.

- Information security job postings suggest a local employer preference for individuals with bachelor's degrees. Given this regional preference, it should be known that local four-year institutions, including CSU Sacramento, UC Davis, and William Jessup, offer bachelor's degrees in information security-related fields, such as Computer Science. However, the educational supply from these programs is not included in this report's supply-demand gap analysis.

# RECOMMENDATIONS

- Based on a comparison of annual openings to average annual awards in the Greater Sacramento subregion, there seems to be an undersupply of skilled information security workers.

  - Community colleges and other postsecondary training providers issued an average of 169 awards over the last three years.

  - There are 362 projected annual openings for information security jobs.

- The North (Greater Sacramento) Center of Excellence recommends exercising caution in developing new information security programs.

  - While there seems to be a need for more information security workers in Greater Sacramento, a bachelor's degree is a typical entry-level education required for employment in the two information security occupations.

  - Furthermore, less than one-third of workers currently employed in these occupations have an educational background consistent with community college offerings. This suggests that a bachelor's degree may be necessary to be a competitive job candidate for these roles. However, alternative routes that do not require a four-year degree may exist for these occupations.

- Community colleges offering information security programs should: 1) work closely with local employers to ensure their curriculum aligns with local needs, 2) ensure curriculum aligns to third-party industry certification standards to support students obtaining competitive credentials, and 3) provide a clearly defined and articulated transfer pathway to support students obtaining a four-year degree.

| New Program Recommendation | | |
|:---:|:---:|:---:|
| **Move forward with the new program** | **Exercise caution** | **A new program is not recommended** |
| ☐ | ☒ | ☐ |

# APPENDIX A. METHODOLOGY AND SOURCES

This report identified Occupations using the Center of Excellence TOP-to-CIP-to-SOC crosswalk and O*Net OnLine. This report's findings were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi, and jobs posting data from Burning Glass.

"The Chancellor's Office Curriculum Inventory System (COCI)." California Community Colleges Curriculum Inventory (COCI), 2023. https://coci2.ccctechcenter.org/.

Glasmeier, Amy K. "Living Wage Calculator." Living Wage Calculator, 2023. https://livingwage.mit.edu/.

Integrated Postsecondary Education Data System (IPEDS). National Center for Education Statistics. U.S. Department of Education. https://nces.ed.gov/ipeds/.

Labor Market Information Division. California Employment Development Department. https://labormarketinfo.edd.ca.gov/.

Lightcast (Formerly EMSI/Burning Glass) 2024.1; QCEW Employees, Non-QCEW Employees, and Self-Employed. https://www.economicmodeling.com/. (*Note: EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors)).*

Management Information Systems (MIS) Data Mart. California Community Colleges Chancellor's Office. https://datamart.cccco.edu/.

O*NET OnLine. U.S. Department of Labor/Employment and Training Administration (DOL ETA). https://www.onetonline.org/.

Self-Sufficiency Standard Tool for California. The University of Washington. http://www.selfsufficiencystandard.org/

"Taxonomy of Programs." California Community Colleges Chancellor's Office. June 2012, 6th Edition. https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Educational-Services-and-Support/Academic-Affairs/What-we-do/Curriculum-and-Instruction-Unit/Files/TOPmanual6200909corrected12513pdf.ashx

"TOP-CIP-SOC Crosswalk." Centers of Excellence for Labor Market Research. June 2021 Edition. http://coeccc.net/

# APPENDIX B. GLOSSARY

| Key Terms | Definition |
|---|---|
| **Occupation** | Occupation refers to a category of jobs, careers, or professions that are similar regarding the work performed and the skills the workers possess. Workers who perform essentially the same tasks are in the same occupation, whether in the same industry. Some occupations are concentrated in a few industries, while others are found in many industries.<br><br>Occupations differ from jobs in that jobs show the number of positions held in each occupation. |
| **Jobs** | A job is a specific instance of employment and includes any position where a worker provides labor for monetary compensation.<br><br>Job numbers include employees (those who work for businesses) and proprietors (those who work for themselves). Full- and part-time jobs are included and counted equally (i.e., not adjusted to full-time equivalents). Data for jobs, or employment, are annual averages. |
| **Employment** | Employment refers to filled jobs, whether full- or part-time, temporary or permanent. The scope of "who" is counted as employed is noted in Appendix A. Methodology and Sources. |
| **Job Change** | Job change is the net increase or decrease of jobs over a given timeframe. |
| **Job Opening** | Job openings are the projected number of positions available for workers entering an occupation.<br><br>Openings include growth and replacement job counts. Growth job counts are the positive change in the total number of workers employed. Replacement job counts are the estimates of new workers needed to replace workers permanently leaving the occupation. |
| **Percentile Wage (or wages)** | A percentile wage is the value of a wage at which a certain percentage of workers falls below. For example, a 25th percentile hourly wage of $15.00 indicates that 25% of workers earn less than $15.00, while 75% earn more. Percentile wages are specific to the geography shown in the report.<br><br>The 25th-percentile and 75th-percentile hourly wages are used as a proxy for entry-level and experienced-level wages. |
| **Living Wage** | The living wage is the level of income a single, working adult with no children must earn to meet basic needs. The living wage is calculated using basic allowances for food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs, and assumes full-time employment (40 hours per week, 52 weeks a year). |

| Key Terms | Definition |
|---|---|
|  | Beginning in 2023-24, NFN COE adopted the MIT calculations for a living wage better aligned to the economic conditions following the pandemic. For additional information, please visit https://livingwage.mit.edu/. |
| **Educational Attainment** | Educational attainment is the highest level of education achieved by workers in an occupation. The data include workers aged 25 years and older. |
| **Typical Entry-level Education** | The education level most workers need to gain employment in an occupation. Categories range from "no formal educational credential" and "high school diploma or equivalent" to "doctoral or professional degree." The types most relevant to community training are "some college, no degree," "postsecondary nondegree award," and "associate degree." <br><br> The typical entry-level education may differ from the actual educational levels attained by workers employed in an occupation. |
| **Typical Work Experience** | The relevant prior experience a worker needs to gain employment in an occupation. Categories include "5 years or more", "less than five years," and "none." |
| **Typical On-The-Job (OTJ) Training** | The level of on-the-job training a worker needs to obtain for competency in the skills required for an occupation. Categories include "none," "short-term (1 month or less)," "moderate-term (more than one month but less than 12 months)," "long-term (more than 12 months)," "apprenticeship," and "internship/residency." |
| **Awards** | Awards are the number of certificates and degrees conferred for a specific course of study each year. Awards count "papers" and, as a result, may be greater than the number of students who complete a program. |

**COVID-19 Statement:** This report includes employment projection data produced by Lightcast (formerly EMSI). Employment projections are developed using models based on historical data, which in this set of projections covers the period through 2021. Most input data, therefore, precedes the pandemic. Employment projections are long-term projections intended to capture structural changes in the economy, not cyclical fluctuations. As such, projections data are not intended to capture the impacts of the recession that began in February 2020. Cyclical fluctuations, like recessions, impact projections when they become part of the historical data set.

**Important Disclaimer:** All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges, or their representatives based upon components or recommendations contained in this study.

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