

# **Strong Workforce Program Information & Communication Technologies (ICT) Sector Regional Advisory Meeting Proceedings Artificial Intelligence and Data Analytics**

**November 6, 2020  
Virtual - Zoom**

## **Introduction**

The Los Rios Community College District, in partnership with Valley Vision, and in collaboration with Sierra College and Yuba Community College District, invests Strong Workforce funding to organize and convene Regional Advisories. The objectives of the Regional Advisories are to build strong relationships between employers, educators, and workforce that:

- Provide timely information on skills gaps and workforce needs, informing partners on major industry trend information;
- Improve the efficiency of the advisory process for educators and employers;
- Reflect a regional view of workforce needs and assets
- Provide opportunities for more systemic, ongoing engagement that includes workforce partners in key industry sectors.

Regional Advisory meetings help inform decisions on needed investments and enhancements for Career Education (CE) programs to help fill the growing demand for middle-skill positions. This meeting proceedings report includes key findings, best practices, and minutes from the Fall 2020 Regional Advisory meeting focused specifically on careers in Information & Communication Technologies (ICT) and Artificial Intelligence/Data Analytics.

Valley Vision supports a robust talent pipeline through our multiple 21st Century Workforce initiatives. We prepare our regional workforce for the future by addressing skills gaps, advancing research, aligning efforts and strengthening systems. Valley Vision's workforce efforts are supported by the Sacramento Employment and Training Agency (SETA), Golden Sierra Workforce Development Board (WDB), North Central Counties Consortium, Yolo WDB, City of Sacramento, local community college districts and others.

The Strong Workforce program provides Career Education opportunities to increase social mobility and fuel regional economies with skilled workers.

## Key Findings

Key findings from the discussions that accompanied the data review, industry panel, and breakout sessions include the following:

- The demand for workers with AI skills will increase, as AI becomes more prevalent across all major sectors, such as manufacturing, transportation, agriculture, and healthcare
- There is an increased demand for workers with broader sets of skills, such as being able to switch between technical and business languages and Cloud services
- For start-ups, it is important that workers have the skills to be able to build into a system's architecture and have support, since start-up's new solutions and technologies are often what big companies may want to purchase
- Applications and web services other than Microsoft Office are becoming more in demand, such as Google Suite, Amazon Web Services (AWS) platform, and GitHub
- Increasingly accessible AI tools can help make instruction more accessible in the classroom with faculty and students
- Faculty can work with employers to facilitate internship and mentorship programs for students, while also allowing students to display their skills to employers through opportunities like code-a-thons

## Welcome and Overview

The ICT Advisory Meeting opened up with Valley Vision's Managing Director, Trish Kelly, who explained the meeting's focus on Artificial Intelligence (AI) and Data Analytics. As a Greater Sacramento regional advisory supported by the Los Rios Community College District's Strong Workforce Program, Kelly went on to further describe its objective in having industry partners inform community college faculty, high school instructors, and educational administrators on how to best prepare students for the ICT workforce. Opening remarks were followed by Cornelius Brown, Regional Director of Employer Engagement for ICT/Digital Media at California Community Colleges and Greater Sacramento Region. Brown encouraged K-12 and community college stakeholders to partner with employers and engage in meaningful ways, through which faculty and industry can learn from one another and collaborate on building career pathways for students.

## Labor Market Information Overview

For additional industry context, Ebony J. Benzing, Research Manager at North/Far North Centers of Excellence (COE) at Los Rios, provided information from labor market data and Burning Glass Technologies, such as:

- Industry trends
- Occupational/job data
- Job postings information
- Certificates and degrees conferred from regional community colleges

This information was designed for understanding local labor market conditions, determining skills and credentials needed, examining employment outlook for students, identifying which community college programs were ripe for investment, and better understanding industry needs overall. As Benzing made clear, it is important to note that the following numbers were based on pre-COVID 19 pandemic 2019 census data. Nevertheless, the data displays a prevalent ICT industry in the Sacramento region.

**A. Introduction to Information and Communication Technologies/Digital Media (ICT-DM)**

According to Centers of Excellence, the ICT-DM sector encompasses various sub-sectors (Appendix B), two of which Benzing focused on: Information Technology and Digital Media. An occupational overview revealed there to have been 44,964 ICT-DM jobs across the Greater Sacramento Region in 2019, with a projected 5% job growth by 2024 (Figure 1).

**Figure 1: ICT-DM Employment at a Glance**



Source: Emul 2020a; QCEW Employees, Non-QCEW Employees, and Self-Employed in the seven-county North (Greater Sacramento) region, which includes El Dorado, Nevada, Placer, Sacramento, Sutter, Yuba, and Yuba.

Regarding most prevalent ICT positions (Appendix C), Computer User Support Specialists and Project Management Specialists represented more than half of the region’s jobs in this part of the ICT-DM sector. There was an above average growth in Software Developers, Web Developers and Digital Interface Designers, and Information Security Analyst occupations beyond the regional ICT-DM industry’s overall 5% growth. Three occupations that were projected to decline included Computer Programmers, Data Entry Keyers, and Desktop Publishers. This projected decline may have been due to an increase of specialization in skill sets that were incorporated into other occupations. Data Entry Keyers and Desktop Publishers were also occupations that were becoming outdated, which may have contributed to their decline.

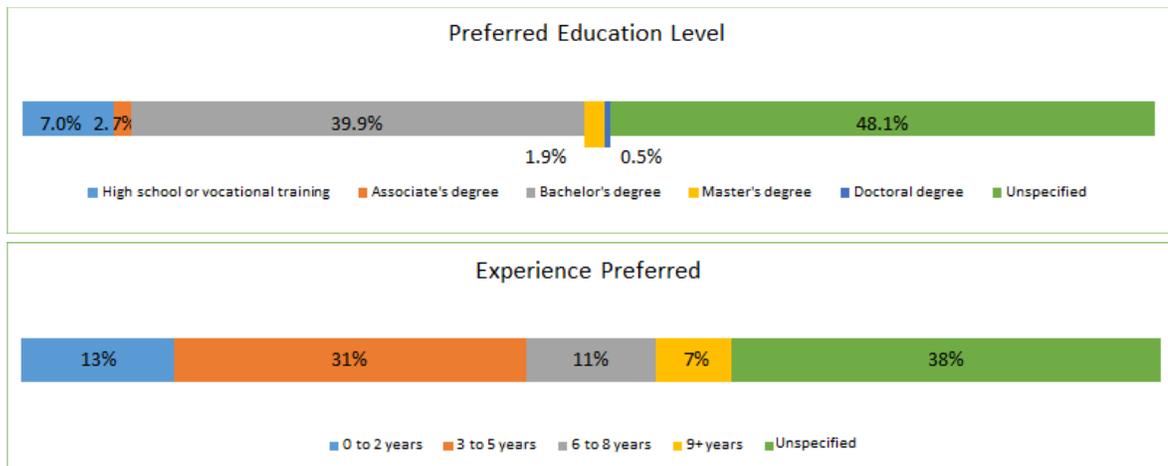
**B. Demographics**

More than half of the Sacramento region’s ICT-DM jobs were primarily staffed by individuals who identify as nonwhite or multiracial. There was a significant disparity in gender, with male workers having made up 60% of the workforce and female workers having made up less than 40%. Meanwhile, 20% of workers were concentrated in the 55+ age group. Within the Greater Sacramento Region, about 25,000 job postings were made over the last 12 months (Nov. 2019 - Oct. 2020), with the greatest amount of postings made in the City of Sacramento, with 13,563 postings.

**C. Job Postings**

Additional job postings data from Burning Glass Technologies further described the available positions within the AI and data analytics fields. For example, by Standard Occupational Classification (SOC) Code, “Software Developers, Applications” and “Computer Occupations, All Other” were shown to be the most in demand AI and data analytics occupations within the Sacramento region. Meanwhile, top employers include Anthem Blue Cross, Centene Corporation, and Deloitte, among many others in the region (Appendix D). And as Figure 2 shows, the education and experience levels that employers demand the most from applicants include Bachelor’s degree and 3 to 5 years of experience in the field.

**Figure 2: Education and Experience in Greatest Demand, seven-county Greater Sacramento**



• Nov 1, 2019 – Oct 30, 2020

**D. Other Considerations**

At the end of her presentation, Benzing noted the economic impacts that AI adoption will have on the existing workforce by referencing particular research reports. In Spring 2020, Valley Vision, in collaboration with COE and four local workforce boards, released *Automation Risk for Jobs in the Capital Region*, a report focused on the impact of AI and automation on jobs in the Capitol Region. According to the report, people who will be most impacted by automation adoption will be workers with lower levels of education and low wage jobs and women. Women were particularly at risk since they were disproportionately employed in occupations with higher levels of automation risk, such as office-related jobs and fast food service. In 2017, Valley Vision identified additional economic disparities with automation adoption, as described in their report, *Charting a Course to the Sacramento Region’s Future Economic Prosperity*. Conducted in partnership with the Brookings Institute and other Sacramento stakeholders, Valley Vision found Black and Latino residents were less likely to have levels of digital/tech skills needed to compete in a fast changing economic environment.

These workforce challenges display the upskilling and reskilling that will be required by the future of work. Benzing defined upskilling as occurring when workers gain new skills to do work required in current jobs. Meanwhile, reskilling occurs when workers need new skills to take on entirely different roles. With these needs in mind, Benzing raised the following questions regarding ICT career pathways and equity gaps:

- Where is there opportunity for cross-disciplinary work?
- Who’s missing from programs?
- Where is there opportunity to bridge the gap?

**Keynote: Re-Imagining the Future with AI**

Following up on the labor market data for the ICT industry, a keynote presentation was offered by Chairman of the Association for Computing Machinery (ACM) Sacramento Chapter and Intel IOT Advisory Board Member, Dr. Harsh Verma. The presentation focused on defining AI and data analytics and their emergence in industry and classroom settings. Dr. Verma explained AI to be defined as any technique that enables computers to mimic human intelligence. Meanwhile, he defined data analytics as the process of analyzing raw data - inspecting, cleansing, transforming and

modeling the data with the goal of discovering useful information and to find trends. With these definitions established, Dr. Verma went on to describe the huge potential for AI with Internet Of Things (IOT) across all major sectors, such as manufacturing, transportation, agriculture, and healthcare. By 2025, economic gain through AI use could be as high as \$11 trillion per year. And many new jobs surrounding AI will be in demand, such as IOT installers, AI model trainers, and remote diagnosticians. Dr. Verma finished off his presentation by displaying increasingly accessible devices that can be used by faculty and students for instruction on AI and data analytics.

## Employer Panel Discussion

The advisory meeting's employer panel was assembled to inform community college curriculum development and faculty engagement with the AI and data analytics industry. The following employer representatives participated in the panel:

- **Américo Carvalho** - Sr. Manager, AIML & Edge, World Wide Public Sector, Amazon Amazon Web Services
- **Suman Sehra** - Global Director, IOT Smart Cities & Intelligent Transportation, Intel
- **Dr. Harsh Verma** - Chairman, ACM Sacramento Chapter, Intel IOT Advisory Board Member
- **Gabriel Youtsey** - Chief Innovation Officer, UC Agriculture and Natural Resources

The various panelists brought forward perspectives from major employers and institutions that offered guidance for faculty forming certificate and degree programs. A series of panel questions helped paint a clearer picture of what available jobs faculty should prepare their students for and what skills to focus on.

### A. In-Demand Jobs and Skills

In response to Benzing's labor market data, the panelists reaffirmed there to be an increasing number of jobs and workplace flexibility in the AI and data analytics fields. As Américo described, these career opportunities include graphical user interface developers, who help compute data to the user for the ability to build and design user-friendly interfaces. Youtsey further explained that the larger demand for software developers demonstrates a rise in technical staff members with broader sets of skills and who know how to interface with business users. Meanwhile, Suman discussed the need for engineers who use tools that would help in the democratization of AI and machine learning. The rise of COVID-induced teleworking has further shown the flexibility of new AI and data analytics jobs. According to Américo, the COVID-19 pandemic has shown that workers can do a decent job with remote and virtual work. Roles have become unconstrained by physical locations, which will likely continue in a post-COVID world and offers flexibility for recruiters as well.

The panelists also described the in-demand skills that employers are looking for in AI and data analytics. For example, Américo explained that workers should be comfortable working with integration across different Cloud services and technologies, and that certain employers search for generalists who can develop skills inside those companies. Youtsey emphasized how software developers are increasingly doing technical integration and stitching together solutions, while translating between business and technical language. For start-ups, Dr. Verma described that an important skill is being able to build into a system's architecture. And Suman explained that when it comes to AI, there is a whole subset of skills, which include annotation of the training datasets for teaching systems.

### B. Role of Community Colleges

According to the industry panel, the Sacramento region's community colleges can leverage many existing resources to prepare students for jobs in AI and data analytics. Suman encouraged professors to look at tools that make it easier for different levels of community (i.e, teachers, developers) to engage, so that AI use is not limited to a few. And instead of starting from scratch, faculty can use pre-trained models and other tools for different industries that Intel and other companies offer. Ultimately, as

Youtsey explained, faculty should be able to talk to industries about their talent and research needs. Where faculty support can especially be helpful is the startup sector, since it is in this sector where new solutions and technologies are created that big companies may want to purchase. No matter what methods faculty use to educate students on AI and data analytics, the panelists emphasized the importance of centering their work on students' needs and assets. Dr. Verma emphasized that faculty ought to work with employers to offer opportunities for students to work in internship environments so they can work with industry members and gain experience. Opportunities for mentoring between students and professionals can also be a benefit of these programs. Students can bring forward their skills to the industry as well through student groups, such as the Association for Computing Machinery (ACM) chapters, and code-a-thons that they can put on.

## Previous Curriculum Actions and K-12 AI Initiatives

Towards the advisory's end, previous curriculum actions and K-12 AI initiatives were presented by Markus Geissler, Professor of Computer Information Science at Cosumnes River College, and Jared Amalong, Director of Computer Science and Distance Learning at Sacramento County Office of Education. After providing an opportunity to remember the late Dr. Anne-Louise Radimsky, Geissler explained the previous curriculum review process and outcomes in the form of A.S. degrees and certificates offered by different community colleges in the region (Appendix E). Next, Amalong offered insight into the Artificial Intelligence (AI) for K-12 initiative (AI4K12) to provide updates on how educators might bridge the gap from K-12 to community college to emerging job opportunities in AI. Included in AI4K12's efforts towards national guidelines for teaching AI, the initiative has categorized three tiers of AI learning in high schools: AI User, AI Manager, and AI Developer. For additional information on how to get involved in AI4K12, attendees could visit: <http://bit.ly/scoe-ai4k12>.

## Breakout Sessions and Curriculum Review

In order to thoroughly discuss and review curriculum that has been proposed by faculty, advisory attendees were split into three breakout sessions:

- Networking and Cybersecurity
- Office Applications and Web
- Programming and Database/Data Analytics

Before the event, curriculum submitters were asked to categorize their A.S. degree, course, or certificate under one of the three topics above. Where curriculum was not submitted, the breakout session discussion focused on the interests and questions of attendees at the moment.

### A. Networking and Cybersecurity

Led by Markus Geissler, the Networking and Cybersecurity breakout session received a total of seven curriculum submissions by Sacramento City College faculty. Submissions were reviewed, discussed, and all approved by breakout attendees. Details and comments can be found in Appendix A.

### B. Office Applications and Web

Led by Cornelius Brown, the Office Applications and Web breakout session received no curriculum submissions and, instead, discussed emerging trends on apps and web services. Regarding apps, it was recommended that cloud, shared drive, and outlook be incorporated into classrooms and that faculty use Microsoft certification testing for their students. Another useful app is Microsoft Teams with its powerful tools and widespread use. Meanwhile, for web services, it was recommended that faculty and students be exposed to the Amazon Web Services (AWS) platform and GitHub since they are platforms

the industry is using. It was also noted that junior high and high school students are often just getting their first-hand experience with coding, and so any tools should keep students' varying levels of experience in mind. An introduction for students to open source resources were also mentioned by faculty.

As voiced by industry representatives in the breakout session, employer needs are boutique, with certain software being used within particular positions. Technology impact on the workforce is also described to not be even, with a need for standards to display digital literacy and capabilities for individuals by using a wide variety of applications. In addition, it was described that recent Burning Glass Technologies data has demonstrated trends towards shared platforms other than Microsoft Office, such as Google Suite.

### **C. Programming and Database/Data Analytics**

Led by Jared Amalong, the Programming and Database/Data Analytics breakout session also received no curriculum submissions and, instead, discussed how industry and faculty could continue engaging for curriculum development.

## **Conclusion**

At the end of the advisory, faculty and employers were encouraged to continue to engage with one another for a stronger pipeline into the AI and data analytics fields. For any follow up information and connections, attendees are encouraged to contact Cornelius Brown at [BrownC@crc.losrios.edu](mailto:BrownC@crc.losrios.edu).

## Appendices

### Appendix A: Curriculum Review

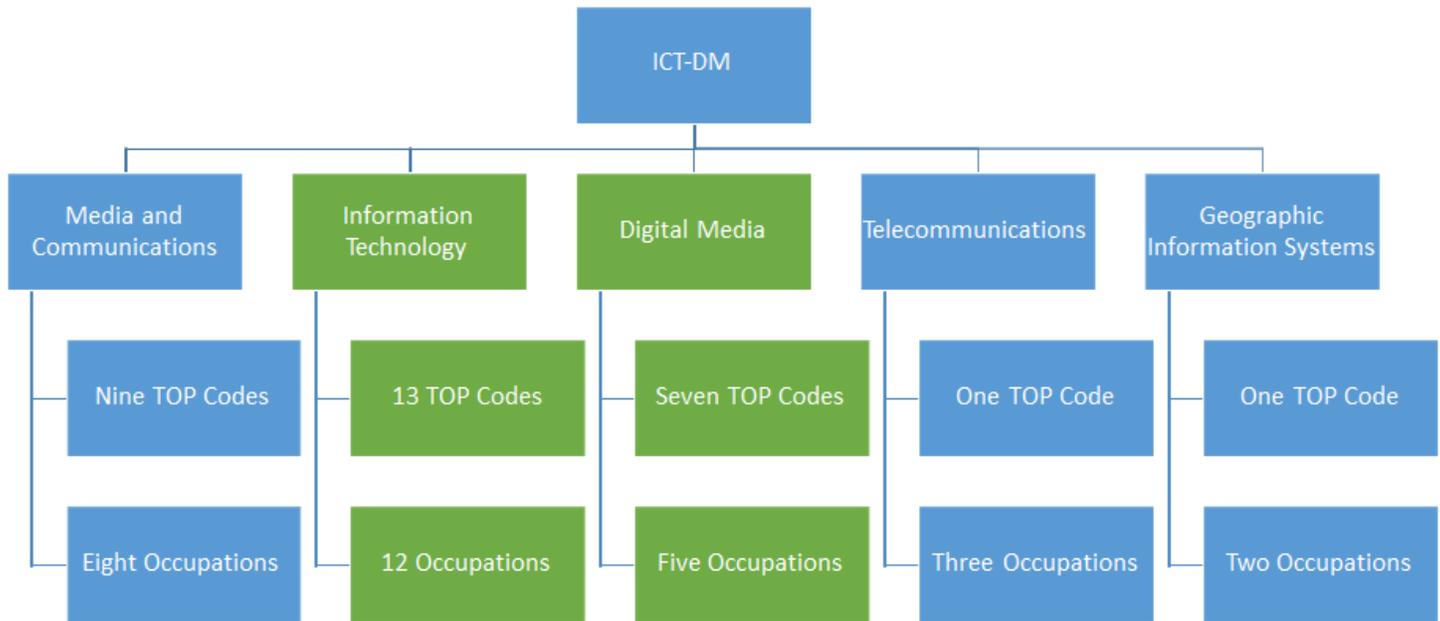
#### Networking and Cybersecurity

Breakout attendance: Markus Geissler, Jesse Flores, Abdelaziz Kaina, Daniel Gilbert-Valencia, Joy Baldwin, Lance Parks, Wendy Porter

<b>Sacramento City College</b>			
<b>Title</b>	<b>Curriculum</b>	<b>Comments and Suggestions</b>	<b>Status</b>
Cloud Computing	Certificate	19.5 is a good size for a certificate; Looks reasonable approach; is it vendor dependent? AWS will make it easy; Daniel and Lance gave a thumbs up; we want to see how it goes for Cosumnes River College; Encourage cloud	Approved
Cloud Solution Architect	Course	None	Approved
39 Course, Cloud SysOps and Operations Admin	Course	None	Approved
CISN 342: CISCO Networking Academy (CCNA)tm – Advanced Routing	Certificate	Update name for new term used by CISCO; Routing shall be changed from 4 to 3	Approved
Cybersecurity and Information Assurance	A.S. Degree	44.5 units are a lot; comprehensive	Approved
Cybersecurity	Certificate	None	Approved
CSS 321 Scripting for Cyber Security	Course	Cybersecurity context	Approved

Overall: All breakout attendees approved curriculum

## Appendix B: AI / Data Analytics Occupations Overview



Source: COE DWM Sectors to TOP codes and TOP-to-CIP-to-SOC crosswalks

## Appendix C: AI / Data Analytics Occupations Overview

Occupation	2019 Jobs	2024 Jobs	2019 - 2024 Projected % Change	Annual Openings	Annual Replacement Rate	Median Hourly Earnings
Computer User Support Specialists	12,216	12,629	3%	1,100	8.2%	\$33.83
Project Management Specialists and Business Operations Specialists, All Other	11,388	12,015	6%	1,245	9.6%	\$34.83
Software Developers and Software Quality Assurance Analysts and Testers	7,983	8,690	9%	785	7.8%	\$54.19
Computer Systems Analysts	3,253	3,386	4%	266	7.2%	\$46.72
Network and Computer Systems Administrators	1,762	1,841	4%	142	7.0%	\$44.44
Graphic Designers	1,720	1,782	4%	188	10.0%	\$26.01
Computer Programmers	1,215	1,182	(3%)	85	7.0%	\$38.56
Data Entry Keyers	1,191	1,099	(8%)	134	11.5%	\$17.36
Computer Network Support Specialists	1,086	1,150	6%	104	8.2%	\$33.32
Web Developers and Digital Interface Designers	1,005	1,104	10%	100	7.6%	\$31.84
Computer Network Architects	656	684	4%	53	7.0%	\$56.03
Database Administrators and Architects	635	678	7%	55	7.1%	\$53.85
Information Security Analysts	454	530	17%	50	7.1%	\$55.93
Special Effects Artists and Animators	341	356	4%	41	10.9%	\$21.53
Desktop Publishers	59	52	(12%)	7	11.6%	\$29.96
<b>North (Greater Sacramento) Totals</b>	<b>44,964</b>	<b>47,179</b>	<b>5%</b>	<b>4,354</b>	<b>—</b>	<b>\$38.56</b>

Source: Emsi 2020.4; QCEW Employees, Non-QCEW Employees, and Self-Employed in the seven-county North (Greater Sacramento) region, which includes El Dorado, Nevada, Placer, Sacramento, Sutter, Yolo, and Yuba.

**Appendix D: Top Employers for Sacramento Region ICTDM Occupations**

Employer	Job Postings
Anthem Blue Cross	416
Centene Corporation	389
Deloitte	315
Blue Cross Blue Shield of California	279
University California	225
Accenture	203
University California Davis	129
Zeektek	127
Amazon	125
Northrop Grumman	116
PricewaterhouseCoopers	113
Travelers	105
Intel Corporation	97
UC Davis Health	87
Key Business Solutions Incorporated	82

Burning Glass Labor Insights

- Locations and employers with the most job postings, seven-county North (Greater Sacramento) subregion Nov 1, 2019 – Oct 31, 2020
- 16 ICTDM Occupations (2010 SOCs), n=24,969 postings; 7,468 unspecified postings for employers, zero for location

**Appendix E: Feedback on Previous Curriculum Actions**

**ICT Programs Available in Greater Sacramento**

- Computer Science (applied and transfer)
  - Management Information Systems (transfer)
- Information & Communication Technologies Advisory Meeting 11-6-20

- Cybersecurity (applied and transfer)
- Information Technology (applied)
  - Cisco Networking Academy
  - Microsoft Imagine Academy
- Database Admin (applied)
  - Oracle Academy
- Web Development (applied)
- Office Applications (applied)
- (New) Data Analytics (CSUS College of Business)

#### American River College

- CIS: Computer Networking Management - AS degree and certificate (2019)
- CIS: Microcomputer Applications - AS degree and certificate (2019)
- CIS: Database Management - AS degree and certificate (2019)
- Cybersecurity and Information Assurance - AS degree and certificate (2020)
- Computer Information Security Essentials - Certificate (2020)

#### Cosumnes River College

- CIS: Information Technology - AS degree and certificate (2018)
- CIS: Web Publishing - certificate (2018)
- Cybersecurity - certificate (2019)
  - Online Collaborative with Fresno CC and LA Pierce/Mt. San Jacinto College
- Cybersecurity and Information Assurance - AS degree and certificate (2020); (formerly CIS: Information Systems Security)
- Management Information Systems - AS degree (2020)

#### Folsom Lake College

- Information Technology - AS degree (2019) and certificate (2020)

#### Lake Tahoe Community College

- IT Technician - Cybersecurity - AS degree and certificate (2019)

#### Sacramento City College

- Information Processing - AS degree (2021)
- Information Processing Technician - certificate (2019)
- Data Science - certificate (2020)
- Cybersecurity and Information Assurance - AS degree and certificate (2020)
- PC Support - certificate (2019)
- Web Developer - AS degree and certificate (2020)
- Front-end Web Developer - certificate (2019)

#### Sierra College

- IT: Cybersecurity - AS degree (2020)
- IT: Network Technician - AS degree (2020)
- IT: Data Analytics - AS degree (2020)
- IT: Information Assurance and Cyber Defense - certificate (2020)
- IT: Data Specialist - certificate (2019)