Labor Market Analysis for:
0708.00 Computer Infrastructure and Support
Inland Empire/Desert Center of Excellence, March 2024

Prepared by: Shannon Moran, SMoran@iegocollaborative.org

Summary

Program LMI Endorsement	All LMI Criteria Met	**Some LMI Criteria Met** (Proceed with Caution)	LMI Criteria NOT Met
	☐	☒	☐

Program LMI Endorsement Criteria		
Supply Gap	**Yes** ✔	No ☐
	Comments: There is *projected* to be **538 annual job openings** throughout the Inland Empire/Desert region, which is more than the **380 annual average awards conferred by educational institutions over the last 3 years.** Supply data includes both community college awards (180) and non-community college awards (200).	
Living Wage	**Yes** ✔	No ☐
	Comments: **The majority (100%) of annual job openings** for these five occupations **have entry-level hourly wages above the IE/D living wage of 13.74.**[1]	
Education	Yes ☐	**No** ✔
	Comments: **Most job postings for target occupations require a bachelor's degree (61%).** See exhibits 8 and 9 for more details.	

The Inland Empire/ Desert (IE/D) Center of Excellence for Labor Market Research (IE/D COE) reviewed the following occupations to prepare this report:

- Middle-Skill (typically require training/education above a HS diploma but less than a bachelor's degree)
  - Computer Network Support Specialists (15-1231)
- Above Middle-Skill (typically require a bachelor's degree)
  - Information Security Analysts (15-1212)
  - Computer Network Architects (15-1241)
  - Network and Computer Systems Administrators (15-1244)
  - Computer Systems Analysts (15-1211)

Summary of findings

Demand

- The number of jobs related to the middle-skill occupation – computer network support specialists - is projected to increase 11% through 2027, with 95 annual job openings (new and replacement jobs).
- Hourly entry-level wages for all occupations are above living wage at the 25th percentile hourly wage range from $26.36 to $38.80 in IE/D.
- There were 6,188 online job postings from 37 employers over the past 12-months with the highest postings for system administrators and systems analysts.
- Most job postings for target occupations require a bachelor's degree (61%), followed by HS diploma or equivalent (25%), and an AA degree (14%).

Supply

- On average, there were 380 annual awards conferred by educational institutions over the last 3 years in related fields; 180 from community colleges and 200 from other institutions (e.g., 4-year universities, private schools).
- IE/D community college students that exited these programs in the 2020-21 academic year earned a median annual wage of $42,536 ($20.45 per hour).
- 65% of students that exited their program in 2019-20 reported that they are working in a job closely related to their field of study.
- Community college programs play an important role diversifying the talent pipeline in these occupations. Most IE/D professionals in Computer and Support occupations are White or Asian (64%) and over 35 years old (70%). Community college students in related programs are a majority Hispanic or Latino (53%) and under 35 (76%).

[1] *While the UW self-sufficiency standard is currently used by the CO and other COEs, the self-sufficiency standard was last updated by UW in 2021, does not account for significant increases in the cost of living in the Inland Empire the last three years, and is below the State of California minimum wage of $16.00. For these reasons, the COE will provide an alternative living wage calculation from MIT in the analysis below as an additional reference point. MIT estimates, the living wage for an adult with no kids living in 2024 is $26.30 in Riverside County and $25.17 in San Bernadino County.*

Introduction

California Community College computer infrastructure and support (TOP 0708.00) programs prepare students for employment through the instruction of computer infrastructure and supporting, covering network and operation systems design and administration, including preparation for certification exams. Additionally, these programs concentrate on computer networking principles including design, installation, maintenance, and troubleshooting of local, metropolitan, and wide area networks while emphasizes computer support skills, preparing individuals to provide technical assistance to computer users, covering areas such as hardware and software usage, printing, installation, word processing, email, and operating systems (Taxonomy of Programs, 2023). The knowledge, skills, and abilities trained by computer infrastructure and support programs lead to employment in occupations related to IT or cybersecurity.

Job Demand

In 2022, there were 6,503 jobs in occupations related to IT or cybersecurity in the IE/D region. Regional employment for this occupation group is projected to increase by 11% through 2027 with 538 job openings projected annually. Exhibit 1 displays the job count, five-year projected job growth, and job openings in the region.

Exhibit 1. Five-year projections for occupations related to IT or cybersecurity, IE/D Region 2022-2027

Occupation	SOC	2022 Jobs	2027 Jobs	5-year % Change	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)
Computer Systems Analysts	15-1211	2,523	2,805	11%	1,052	210
Network and Computer Systems Administrators	15-1244	1,745	1,908	9%	668	134
Computer Network Support Specialists	15-1231	1,059	1,165	10%	473	95
Computer Network Architects	15-1241	720	777	8%	252	50
Information Security Analysts	15-1212	456	554	21%	246	49
Total		**6,503**	**7,209**	**11%**	**2,691**	**538**

SOURCE: LIGHTCAST 2023.3

Job Postings

The following analysis for occupations related to IT or cybersecurity using online job posting data.

Important note: The data produced in this section were generated by leveraging online job posting data sourced from Lightcast, which is the labor market analytics software tool COEs use to produce these briefs. The job posting data is collected from scraping online job boards such as LinkedIn, Indeed, Glassdoor and many others. The process Lightcast uses to assemble this data does have some limitations due to methods that recruitment professionals sometimes use (e.g., posting one job to fill multiple positions). For example, the number of jobs posted is not necessarily the same as the number of job vacancies. [2] While not perfect, Lightcast leverages machine learning and other AI technologies to enrich, deduplicate and aggregate this information to make it a meaningful dataset.

Exhibit 2 displays the number of job ads posted for occupations related to IT or cybersecurity over the last 12 months and the median posting duration. Over the previous 12 months, there were 1,668 unique job postings for occupations related to IT or cybersecurity the region from 37 employers.

Exhibit 2. Job ads and posting duration, IE/D Region, March 2023 – February 2024

Occupation	Job Ads	Median Posting Duration (days)
Computer Systems Analysts	626	28
Network and Computer Systems Administrators	393	28
Information Security Analysts	366	28
Computer Network Architects	196	30
Computer Network Support Specialists	87	36
Total	**1,668**	

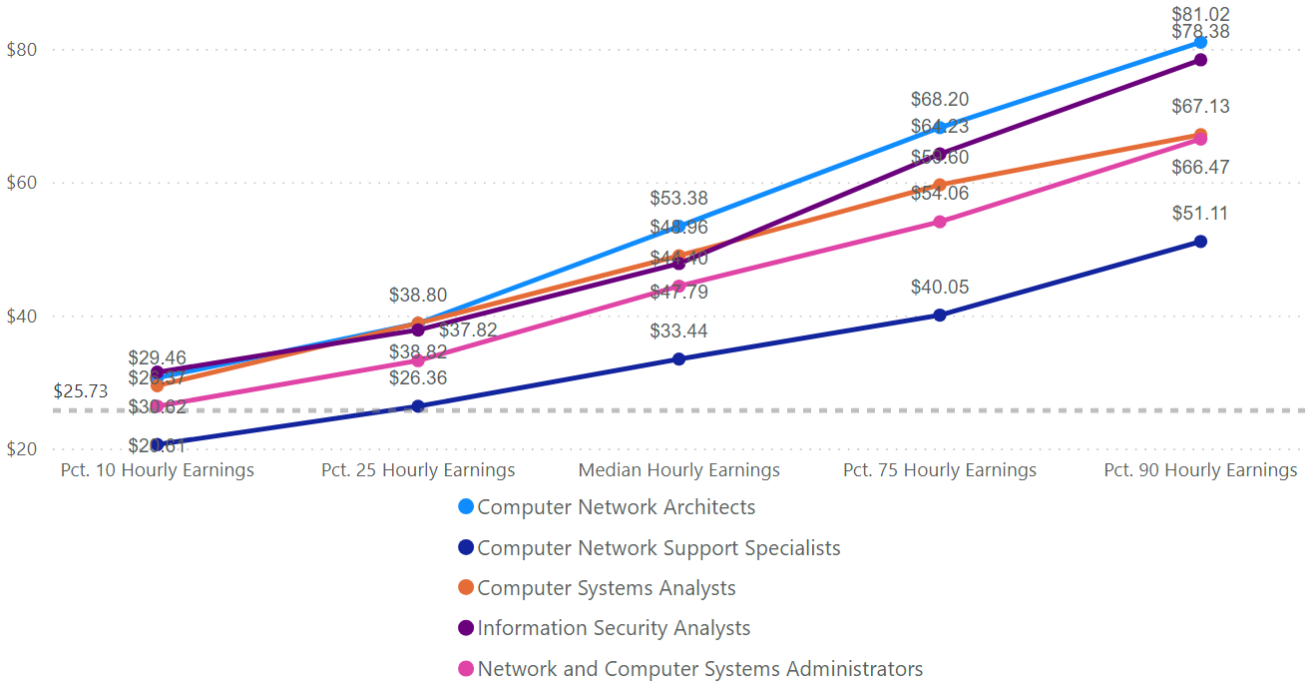
SOURCE: LIGHTCAST 2023.3

[2] *"Job Posting Analytics (JPA) Methodology." Lightcast Knowledge Base, https://kb.lightcast.io/en/articles/6957446-job-posting-analytics-jpa-methodology*

Earnings

Exhibit 3 displays the hourly earnings for occupations related to IT or cybersecurity and includes comparison of hourly earnings as compared to the MIT IE/D living wage of $25.73.[3]

Exhibit 3. Hourly earnings by percentile for occupations related to IT or cybersecurity, IE/D Region, 2022



SOURCE: LIGHTCAST 2023.3

All entry-level earnings (that is, the earnings of the lowest paid 10% of employees in the IE/D) were above the UW Self-Sufficiency Standard for the IE/D[4]. Four of the five occupations we also above the MIT living wage for an adult with no children ($25.73) for four of the five occupations. Only the entry level earnings for Computer Network Support Specialists occupation were below this living wage metric at $20.61/hourly or $42,868.80/annual.

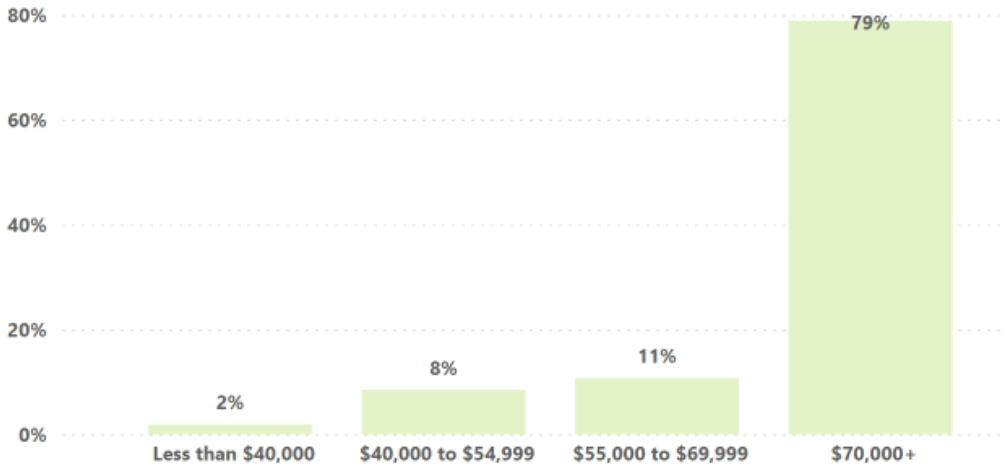
[3] *While the UW self-sufficiency standard is currently used by the CO and other COEs, the self-sufficiency standard was last updated by UW in 2021, does not account for significant increases in the cost of living in the Inland Empire the last three years, and is below the State of California minimum wage of $16.00. While the COE uses this standard for the LMI Wage criteria, For these reasons, the provides an alternative living wage calculation from MIT in the analysis as an additional reference point. MIT estimates, the living wage for an adult with no kids living in 2024 is $26.30 in Riverside County and $25.17 in San Bernadino County.*

[4] *ibid*

Advertised Salary from Online Job Ads

Exhibit 4 displays the regional online advertised salaries for the occupations related to IT or cybersecurity over the last 12 months. Online job ad salary information data suggests most employers (79%) advertise an annual salary greater than $70,000.

Exhibit 4. Online advertised salaries for occupations related to IT or cybersecurity***, IE/D Region, March '23 to February '24***



SOURCE: LIGHTCAST 2023.3

Online Job Advertisements: top job titles, skills, education & work experience.

Exhibit 5 displays the job titles most frequently used in job postings for the occupations related to IT or cybersecurity over the last 12 months. Assessing the top advertised job titles may provide insight into the types of positions sought by employers.

Exhibit 5. Job titles most frequently used in job ads, IE/D March '23 to February '24

Job Title	Unique Postings
Systems Administrators	82
Business Systems Analysts	71
Network Engineers	46
Quality Control Leads	33
IT Business Systems Analysts	31
Network Administrators	28
Network Managers	23
Security Analysts	23
Team Leads	23
Systems Analysts	22

SOURCE: LIGHTCAST 2023.3

Exhibit 6 displays the employers posting the most job ads for this occupational group during the last 12 months. Showing employer names can provide insight into where students may find employment after completing a program and may inform job development and other employer engagement targets for faculty and staff involved in related programs. Inland Empire Health Plan and Leidos had the highest unique job posts for this occupational group in the last 12 months. Posting intensity is the ratio of total job posts to unique job posts which are deduplicated. A higher posting intensity can represent the level of effort and activity the organization is putting into hiring for that position. The following report comes directly from Lightcast's Job Posting Analytics dashboard.

Exhibit 6. Employers posting the most job ads, IE/D March '23 to February '24

Company	Total/Unique (Mar 2023 - Feb 2024)	Posting Intensity	Median Posting Duration
Inland Empire Health Plan	125 / 41	3 : 1	44 days
Leidos	75 / 40	2 : 1	16 days
County Of Riverside	217 / 39	6 : 1	29 days
California State University	141 / 33	4 : 1	22 days
Burlington	172 / 33	5 : 1	26 days
County of San Bernardino	45 / 30	2 : 1	33 days
Esri	99 / 27	4 : 1	30 days
CTG	27 / 24	1 : 1	34 days
San Manuel Band Of Mission Indians	60 / 21	3 : 1	20 days
San Bernardino County	90 / 19	5 : 1	21 days

SOURCE: LIGHTCAST 2023.3

Exhibit 7 displays the top common, specialized and computer skills that were included in the job postings over the last 12 months. Today's demand is an important indicator of which skills employers are looking for in the current market. Analyzing skills from a historical perspective as well as projecting the future needs of employers may provide insight into how the job posting skills demand compares to the market as a whole. Rapidly growing skills are those that are increasing in demand at a faster rate than the market as a whole. [5]

Exhibit 7. Top 10 in-demand skills from employer job ads, IE/D March '23 to February '24

Common skills	Total Postings	Skill Growth Relative to Market
Communication	621	Lagging
Management	532	Stable
Troubleshooting (Problem Solving)	475	Growing
Operations	448	Stable
Customer Service	369	Stable
Information Technology	328	Rapidly Growing
Problem Solving	295	Growing
Leadership	288	Stable
Planning	267	Growing
Detail Oriented	221	Stable

Specialized skills	Total Postings	Skill Growth Relative to Market
Computer Science	327	Rapidly Growing
Firewall	209	Rapidly Growing
Operating Systems	208	Rapidly Growing
Auditing	198	Rapidly Growing
Information Systems	198	Rapidly Growing
Cyber Security	178	Growing
Project Management	175	Growing
Workflow Management	158	Growing
Automation	152	Rapidly Growing
Business Requirements	141	Rapidly Growing

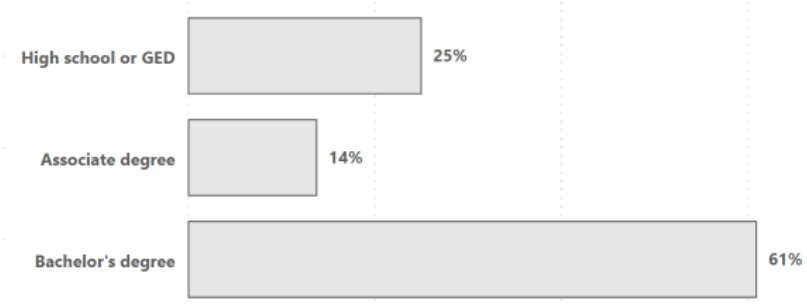
[5] *"What are Lightcast Skill Projects", Lightcast Knowledge base, https://kb.lightcast.io/en/articles/8496296-what-are-lightcast-skill-projections*

Computer Skills	Total Postings	Skill Growth Relative to Market
Firewall	221	Rapidly Growing
Operating Systems	212	Rapidly Growing
Microsoft Excel	136	Growing
Microsoft Office	130	Growing
Linux	105	Stable
SQL (Programming Language)	92	Stable
Windows Servers	84	Lagging
Microsoft Outlook	78	Rapidly Growing
Active Directory	75	Lagging
Microsoft Azure	69	Rapidly Growing

SOURCE: LIGHTCAST 2023.3

Exhibit 8 includes the minimum educational requirements from job postings for this occupational group with bachelor's degree (61%) significantly greater than associate degree (14%) or High school diploma or equivalent (25%)

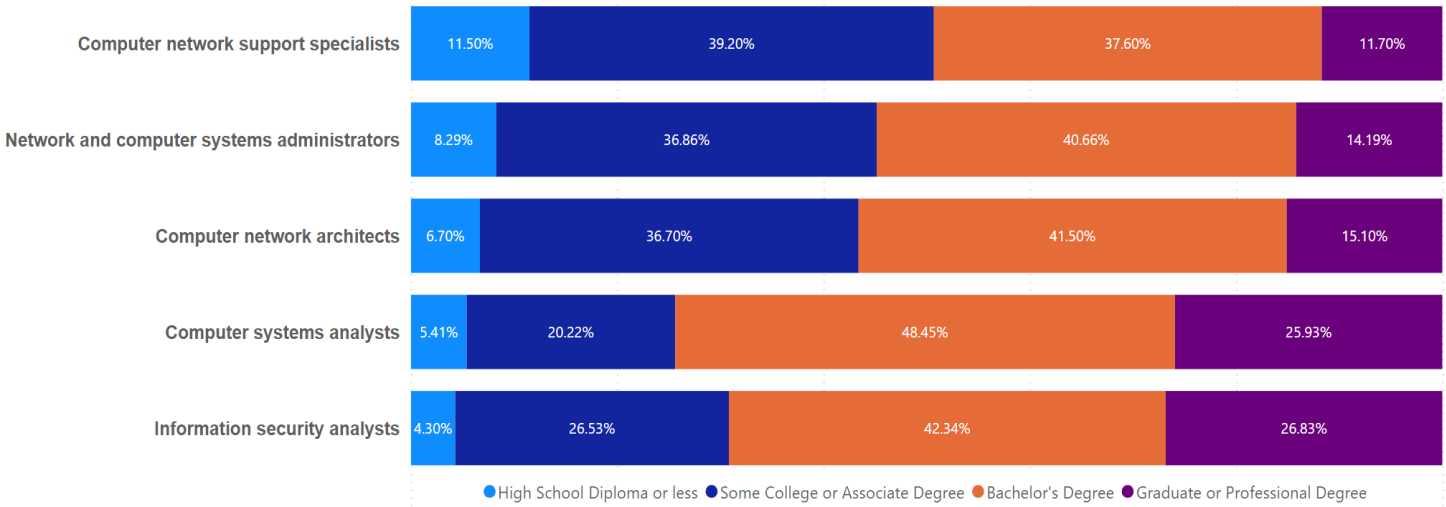
Exhibit 8 Minimum educational requirements in job postings for this occupational group, 2022



SOURCE: LIGHTCAST 2023.3

The Bureau of Labor Statistics (BLS) education attainment data in Exhibit 9 for current professionals in the occupations of interest indicates that between 20% and 39% of workers have completed some college or an associate degree as their highest level of education. Of the middle-skill occupations, between 40% and 48.5% have completed a bachelor's degree.

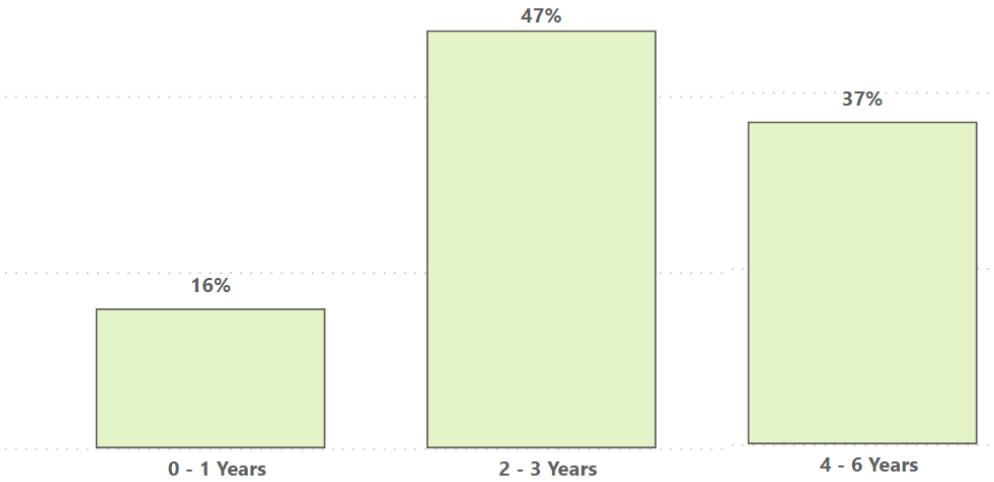
Exhibit 9 National-level Education Attainment for Occupations



SOURCE: BLS 2021

Exhibit 10 displays the work experience typically required from employer job ads for this occupational group. The majority (47%) of employer listing minimum experience requirements sought candidates with 2 – 3 years of previous work experience.

Exhibit 10 Work experience requirements, IE/D March '23 to February '24



SOURCE: LIGHTCAST 2023.3

Student Completions and Program Outcomes

Exhibit 11 displays student completions for the Computer Infrastructure and Support (TOP 0708.00) programs over the last three academic years (2019-2022). In the previous three academic years, seven regional community colleges issued an average of 180 awards in relevant programs.

Exhibit 11 Annual average community college awards for Computer Infrastructure and Support (TOP 0708.00)

TOP Code	Program	College	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Award Average
0708.00	Computer Infrastructure and Support	Chaffey	22	61	45	43
		Moreno Value	0	0	2	1
		Mt. San Jacinto	1	0	0	0
		Riverside		21	26	16
Supply Subtotal/Average			**23**	**82**	**73**	**60**
0708.10	Computer Networking	Chaffey	76	2	1	26
		Copper Mountain	2	1	1	1
		Desert	1	7	11	6
		Moreno Valley	0	3	1	1
		Mt. San Jacinto	0	0	3	1
		Riverside	38	108	57	68
Supply Subtotal/Average			**117**	**121**	**73**	**103**
0708.20	Computer Support	Chaffey	8	16	11	12
		Moreno Valley	0	11	1	4
		San Bernardino	1	2	1	1
Supply Subtotal/Average			**9**	**29**	**14**	**17**
Supply Total/Average			**149**	**232**	**159**	**180**

SOURCE: MIS DATA MART

Non-Community College Supply

Award completion data is available Computer Systems Networking and Telecommunications (CIP 11.0901), Cloud Computing (CIP 11.0902), Network and System Administration/Administrator (CIP 11.1001), Computer and Information Systems Security/Auditing/Information Assurance (CIP 11.1003), or Computer Support Specialist (CIP 11.1006) in the IE/D for non-community college programs.

In the previous two academic years, four regional non-community colleges institutions issued an average of 200 awards in relevant programs.

CIP Code	Program	2019-20 Awards	2020-21 Awards	2-Year Award Average
11.0901	Computer Systems Networking and Telecommunications	64	39	52
11.1001	Network and System Administration/Administrator	12	14	13
11.1003	Computer and Information Systems Security/Auditing/Information Assurance	18	14	16
11.1006	Computer Support Specialist	102	137	120
Supply Total/Average		**196**	**204**	**200**

SOURCE: IPEDS

California program outcome data may provide useful insight into the likelihood of success for the proposed program. Community college student outcome information based on the selected TOP code and region is provided in Exhibit 12.

Exhibit 12 Computer Infrastructure and Support strong workforce program outcomes, IE/D, most recent academic year

Program metric title	Inland Empire	Statewide
Attained a living wage (completers and skills-builders)	69%	68%
Completed 9+ career education units in one year	41%	36%
Job closely related to the field of study	65%	67%
Median annual earnings (all exiters)	$42,536	$54,572
Median change in earnings (all exiters)	22%	19%
Students who attained a noncredit workforce milestone in a year	42%	84%
Students who earned a degree, certificate, or attained apprenticeship	115	1,285
Unduplicated count of enrolled students	1,095	14,089

SOURCE: LAUNCHBOARD

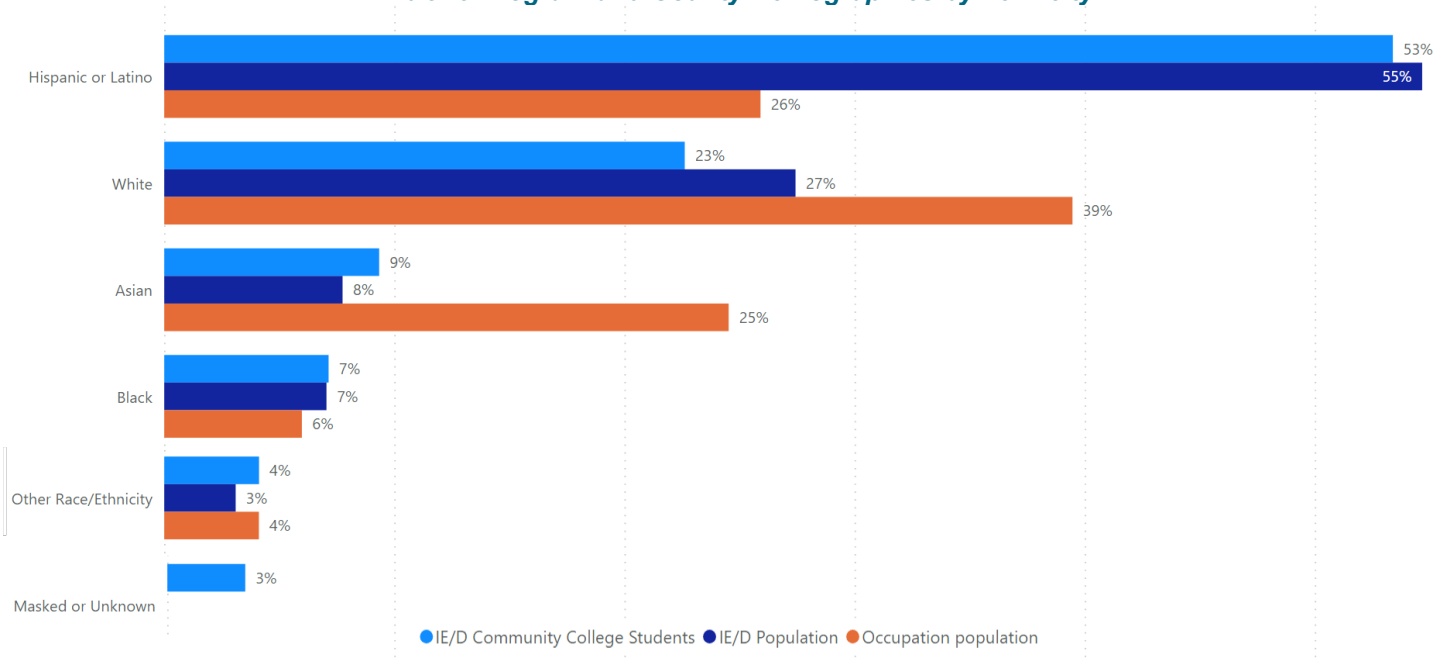
Building an Inclusive Economy

This section examines demographic data for IE/D community college students in Computer Infrastructure and Support programs compared to the IE/D population. We also include demographics for related occupation data for the five occupations related to IT or cybersecurity. This analysis can be used to:

- Understand the community college system's current or potential role supporting a diverse talent pipeline into the occupations of interest.
- Inform students (and the faculty and staff working with them) the extent to which individuals from similar demographic groups are over or underrepresented in the professions related to their field of study.
- Inform employers of the diverse talent pipeline coming from the community college system for the occupations analyzed.

Notably, 53% of students enrolled in Computer Infrastructure and Support programs are Hispanic or Latino, which is significantly higher than Hispanic or Latino workers in occupations related to IT or cybersecurity in the IE/D region (26%). Additionally, 39% of the IE/D population that are employed in occupations related to IT or cybersecurity are White, which is significantly higher than both IE/D community college students (23%) and IE/D population (27%). Though 25% of the workers employed in occupations related to IT or cybersecurity are Asian, only 6% students in Computer Infrastructure and Support programs and 8% of the IE/D population are Asian.

Exhibit 13 Program and County Demographics by Ethnicity



SOURCE: LIGHTCAST 2023.3 AND LAUNCHBOARD

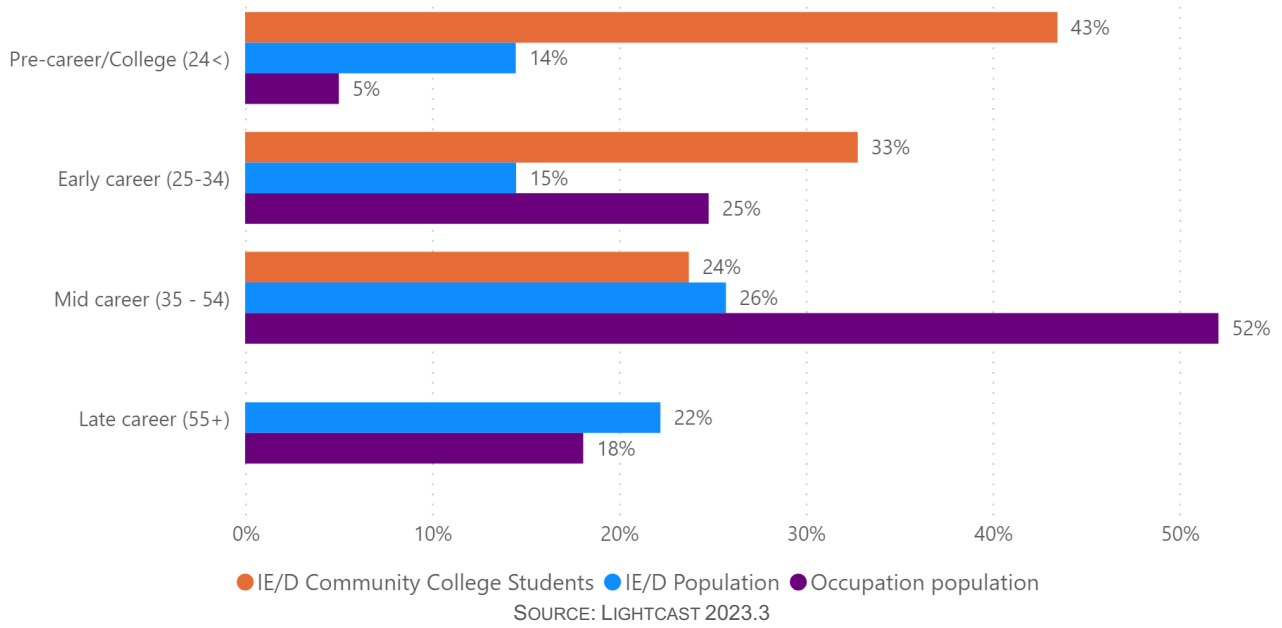
Most IE/D professionals in IT or cybersecurity occupations are White or Asian (64%), over 35 years old (70%), and male (71%). Community college students in related programs are a majority Hispanic or Latino (53%), under 35 (76%), and male (80%). Major takeaways:

- Community colleges are an important talent source for employers committed to greater racial/ethnic diversity, especially Hispanic/Latino professionals.
- College programs may want to consider strategies to engage more women into these programs.

Exhibit 14 compares the age of IE/D community college students enrolled in Computer Infrastructure and Support programs compared to the IE/D population.

The majority of students enrolled in Computer Infrastructure and Support programs are either in the "Pre-career/College (<24 years old)" category (43%) or "Early career (25-34)" category (33%) as compared to IE/D population and workforce in these five occupations related to IT or cybersecurity. These programs are an important entry point for young IT professionals.

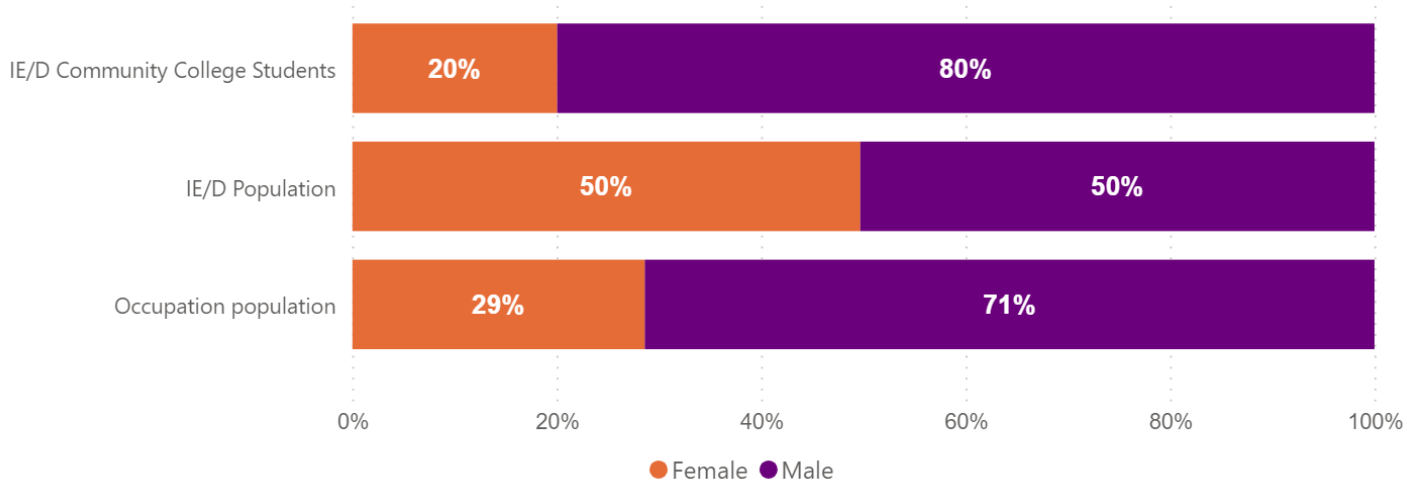
Exhibit 14 Program and County Demographics by Age



SOURCE: LIGHTCAST 2023.3

Exhibit 15 compares the gender of IE/D County community college students enrolled in Computer Infrastructure and Support programs compared to the IE/D population. We also include demographics for related occupation data for the five occupations related to IT or cybersecurity to identify potential diversity and equity issues addressable by community college programs.

Exhibit 15 Program and County Demographics by Gender



SOURCE: LIGHTCAST 2023.3

Appendix: Methodology

Exhibit 11 displays the average annual California Community College (CCC) awards conferred during the three academic years between 2019 and 2022 from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. Awards are the combined total during the timeframe, divided by three in this case to calculate an annual average. This is done to minimize the effect of atypical variations that might be present in a single year.

Community college student outcome information is from LaunchBoard and based on the selected TOP code and region. These metrics are based on records submitted to the California Community Colleges Chancellor's Office Management Information Systems (MIS) by community colleges, which come from self-reported student information from CCC Apply and the National Student Clearinghouse. Employment and earnings metrics are sourced from California's Employment Development Department's Unemployment Insurance database. When available, outcomes for completers are reported to demonstrate the impact that earning a degree or certificate can have on employment and earnings. For more information on the types of students included for each metric, please see the web link for LaunchBoard's Strong Workforce Program Metrics Data Element Dictionary in the References section (LaunchBoard, 2023a). Finally, employment in a job closely related to the field of study comes from self-reported student responses on the CTE Employment Outcomes Survey (CTEOS) administered by Santa Rosa Junior College (LaunchBoard, 2023a).

Appendix: References

Type of Data	Source
Occupational Projections, Wages, and Job Postings	Traditional labor market information data is sourced from Lightcast, a labor market analytics firm. Lightcast occupational employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Wage estimates are based on Occupational Employment. https://lightcast.io/
Living Wage	The living wage is derived from MITs Living Wage Calculator, which measures the income necessary for an individual of family to afford basic expenses. The data assesses the cost of housing, food, childcare, health care, transportation, and taxes. For more information, see: https://livingwage.mit.edu/pages/methodology The living wage for one adult in San Bernardino County is $25.17 per hour ($52,353.60 annually). The living wage for one adult in Riverside County is $26.30 per hour ($54,704 annually). The average living wage to represent Inland Empire/Desert is $25.74 per hour (53,539.20 annually)
Typical Education and Training Requirements, and Educational Attainment	The Bureau of Labor Statistics (BLS) provides information about education and training requirements for hundreds of occupations. BLS uses a system to assign categories for entry-level education, work experience in a related occupation, and typical on-the-job training to each occupation for which BLS publishes projections data. For more information, see https://www.bls.gov/emp/documentation/education/tech.htm
Educational Supply	The CCCCO Data Mart provides information about students, courses, student services, outcomes and faculty and staff. For more information, see: https://datamart.cccco.edu The National Center for Education Statistics (NCES) Integrated Postsecondary Integrated Data System (IPEDS) collects data on the number of postsecondary awards earned (completions). For more information, see https://nces.ed.gov/ipeds/use-the-data/survey-components/7/completions
Student Metrics and Demographics	LaunchBoard, a statewide data system supported by the California Community Colleges Chancellor's Office and hosted by Cal-PASS Plus, provides data on progress, success, employment, and earnings outcomes for California community college students. For more information, see: https://www.calpassplus.org/LaunchBoard/Home.aspx