










Information Technology Management Occupations

Labor Market Analysis: San Diego County

April 2023

Summary

NEW PROGRAM RECOMMENDATION?	EVIDENCE OF A SUPPLY GAP?	AT OR ABOVE THE LIVING WAGE?	EXPECTED EDUCATION FOR MAJORITY OF OCCUPATIONS ANALYZED
 Proceed with Caution	 	 	<input type="checkbox"/> Doctorate Degree <input type="checkbox"/> Master's Degree <input checked="" type="checkbox"/> Bachelor's Degree <input type="checkbox"/> Associate Degree <input type="checkbox"/> Some College or Certificate <input type="checkbox"/> HS Diploma or Equivalent <input type="checkbox"/> Less than a HS Diploma <input type="checkbox"/> Apprenticeship
SUPPORT FOR PROGRAM MODIFICATION?	NUMBER OF INSTITUTIONS THAT PROVIDE TRAINING	NUMBER OF ANNUAL JOB OPENINGS	
 	HIGH 	HIGH 	

This brief provides labor market information about *Information Technology Management Occupations* to assist the San Diego and Imperial Counties Community Colleges with program development and strategic planning. *Information Technology Management Occupations* include “Computer and Information Systems Managers,” “Computer Network Architects,” “Computer Network Support Specialists,” “Information Security Analysts,” and “Network and Computer Systems Administrators.” According to available labor market information, *Information Technology Management Occupations* in San Diego County have a labor market demand of 1,464 annual job openings (while average demand for a single occupation in San Diego County is 289 annual job openings), and 18 institutions supply 1,318 awards for these occupations, suggesting that there is a supply gap in the labor market. On average, entry-level and median wages are above the living wage. This brief recommends that the colleges proceed with caution when developing a new program and supports a program modification because 1) there is a supply gap in San Diego County; 2) these occupations’ entry-level and median earnings are above the living wage; and 3) there is a high number of annual job openings. Colleges should note that **employers typically require a bachelor’s degree as the minimum educational requirement for these occupations.**

Introduction

This report provides labor market information in San Diego County for the following occupational codes in the Standard Occupational Classification (SOC)¹ system:

- **Computer and Information Systems Managers** (SOC 11-3021): Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming.
- **Computer Network Architects** (SOC 15-1241): Design and implement computer and information networks, such as local area networks (LAN), wide area networks (WAN), intranets, extranets, and other data communications networks. Perform network modeling, analysis, and planning, including analysis of capacity needs for network infrastructures. May also design network and computer security measures. May research and recommend network and data communications hardware and software.
- **Computer Network Support Specialists** (SOC 15-1231): Analyze, test, troubleshoot, and evaluate existing network systems, such as local area networks (LAN), wide area networks (WAN), cloud networks, servers, and other data communications networks. Perform network maintenance to ensure networks operate correctly with minimal interruption.
- **Information Security Analysts** (SOC 15-1212): Plan, implement, upgrade, or monitor security measures for the protection of computer networks and information. Assess system vulnerabilities for security risks and propose and implement risk mitigation strategies. 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.
- **Network and Computer Systems Administrators** (SOC 15-1244): Install, configure, and maintain an organization's local area network (LAN), wide area network (WAN), data communications network, operating systems, and physical and virtual servers. Perform system monitoring and verify the integrity and availability of hardware, network, and server resources and systems. Review system and application logs and verify completion of scheduled jobs, including system backups. Analyze network and server resource consumption and control user access. Install and upgrade software and maintain software licenses. May assist in network modeling, analysis, planning, and coordination between network and data communications hardware and software.

For the purpose of this report, these occupations are referred to as *Information Technology Management Occupations*.

¹ The Standard Occupational Classification (SOC) system is used by federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. [bls.gov/soc](https://www.bls.gov/soc).

Projected Occupational Demand

Between 2022 and 2027, *Information Technology Management Occupations* are projected to increase by 1,515 net jobs or 10 percent (Exhibit 1 a). Employers in San Diego County will need to hire 1,464 workers annually to fill new jobs and backfill jobs due to attrition caused by turnover and retirement, for example.

Exhibit 1a: Number of Jobs for Information Technology Management Occupations (2012-2027)²

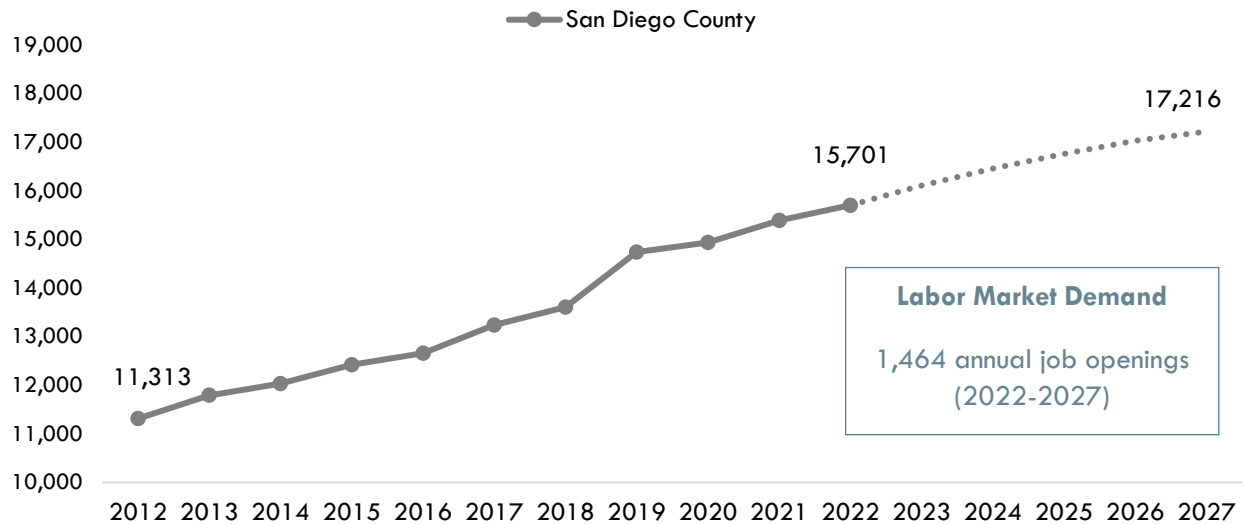


Exhibit 1b disaggregates the projected number of jobs change by occupation. “Computer and Information Systems Managers” are projected to have the most labor market demand between 2022 and 2027, with 751 annual job openings.

Exhibit 1b: Number of Jobs for Information Technology Management Occupations in San Diego County (2022-2027)³

Occupational Title	2022 Jobs	2027 Jobs	2022 - 2027 Net Jobs Change	2022-2027 % Net Jobs Change	Annual Job Openings (Demand)
Computer and Information Systems Managers	7,773	8,554	781	10%	751
Network and Computer Systems Administrators	3,143	3,351	208	7%	259
Information Security Analysts	1,563	1,854	291	19%	180
Computer Network Architects	1,892	2,009	117	6%	144
Computer Network Support Specialists	1,330	1,448	118	9%	130
Total	15,701	17,216	1,515	10%	1,464

² Lightcast 2023.01; QCEW, Non-QCEW, Self-Employed.

³ Lightcast 2023.01; QCEW, Non-QCEW, Self-Employed.

Earnings

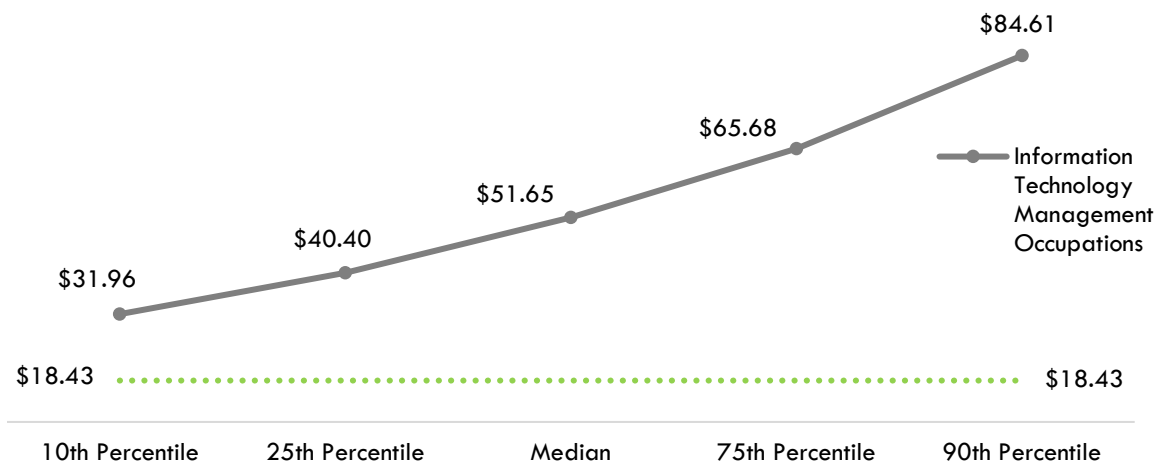
Exhibit 2a disaggregates hourly earnings by occupation. The entry-level hourly earnings for *Information Technology Management Occupations* range from \$24.88 to \$62.93.

Exhibit 2a: Hourly Earnings for Information Technology Management Occupations in San Diego County⁴

Occupational Title	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 th Percentile)
Computer and Information Systems Managers	\$62.93	\$79.40	\$99.71
Information Security Analysts	\$38.57	\$49.32	\$62.83
Computer Network Architects	\$38.21	\$49.79	\$65.89
Network and Computer Systems Administrators	\$37.39	\$47.40	\$59.15
Computer Network Support Specialists	\$24.88	\$32.33	\$40.85

On average, the entry-level hourly earnings for *Information Technology Management Occupations* are \$40.40; this is more than the living wage for a single adult in San Diego County, which is \$18.43 per hour (Exhibit 2b).⁵

Exhibit 2b: Average Hourly Earnings⁶ for Information Technology Management Occupations in San Diego County⁷



⁴ Lightcast 2023.01; QCEW, Non-QCEW, Self-Employed.

⁵ "Family Needs Calculator (formerly the California Family Needs Calculator)," Insight: Center for Community Economic Development, last updated 2021. insightccd.org/family-needs-calculator/.

⁶ 10th and 25th percentiles could be considered entry-level wages, and 75th and 90th percentiles could be considered experienced wages for individuals who may have been in the occupation longer, received more training than others, etc.

⁷ Lightcast 2023.01; QCEW, Non-QCEW, Self-Employed.

Educational Supply

Educational supply for an occupation can be estimated by analyzing the number of awards in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes.⁸ There are **eight** TOP codes and **17** CIP codes related to *Information Technology Management Occupations* (Exhibit 3).

Exhibit 3: Related TOP and CIP Codes for Information Technology Management Occupations⁹

TOP or CIP Code	TOP or CIP Program Title
TOP 0702.00	Computer Information Systems
TOP 0707.10	Computer Programming
TOP 0707.30	Computer Systems Analysis
TOP 0708.00	Computer Infrastructure and Support
TOP 0708.10	Computer Networking
TOP 0708.20	Computer Support
TOP 0709.00	World Wide Web Administration
TOP 0934.30	Telecommunications Technology
CIP 11.0201	Computer Programming/Programmer, General
CIP 11.0202	Computer Programming, Specific Applications
CIP 11.0203	Computer Programming, Vendor/Product Certification
CIP 11.0299	Computer Programming, Other
CIP 11.0301	Data Processing and Data Processing Technology/Technician
CIP 11.0501	Computer Systems Analysis/Analyst
CIP 11.0802	Data Modeling/Warehousing and Database Administration
CIP 11.0901	Computer Systems Networking and Telecommunications
CIP 11.1001	Network and System Administration/Administrator
CIP 11.1002	System, Networking, and LAN/WAN Management/Manager
CIP 11.1003	Computer and Information Systems Security/Information Assurance
CIP 11.1004	Web/Multimedia Management and Webmaster
CIP 11.1005	Information Technology Project Management
CIP 11.1006	Computer Support Specialist
CIP 15.0305	Telecommunications Technology/Technician
CIP 15.1202	Computer Technology/Computer Systems Technology
CIP 47.0103	Communications Systems Installation and Repair Technology

⁸ TOP data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP data comes from the Integrated Postsecondary Education Data System (nces.ed.gov/ipeds/use-the-data).

⁹ This brief uses a conservative estimate of program supply and only calculates awards from the TOP codes in Exhibit 3.

According to TOP data, nine community colleges supply the region with awards for these occupations: Cuyamaca College, Grossmont College, MiraCosta College, Palomar College, San Diego City College, San Diego College of Continuing Education, San Diego Mesa College, San Diego Miramar College, and Southwestern College. According to CIP data, nine non-community-college institutions supply the region with awards: ATA College, California College San Diego, California Institute of Arts & Technology, California Institute of Arts & Technology-National City, ICOHS College, National University, Point Loma Nazarene University, Poway Adult School, and Vista Adult School (Exhibit 4).

**Exhibit 4: Number of Awards (Certificates and Degrees) Conferred by Postsecondary Institutions
(Program Year 2017-18 through Program Year 2020-21 Average)**

TOP6 or CIP Code	TOP or CIP Program Title	3-Yr Annual Average CC Awards (PY18-19 to PY20-21)	Other Educational Institutions 3-Yr Annual Average Awards (PY17-18 to PY19-20)	3-Yr Total Average Supply (PY17-18 to PY20-21)
0702.00	Computer Information Systems	97	0	97
	• MiraCosta	4	0	
	• Palomar	20	0	
	• San Diego City	1	0	
	• San Diego Cont. Ed.	47	0	
	• San Diego Mesa	14	0	
	• San Diego Miramar	7	0	
	• Southwestern	4	0	
0707.10	Computer Programming	51	0	51
	• Grossmont	21	0	
	• MiraCosta	17	0	
	• Palomar	5	0	
	• San Diego City	6	0	
	• Southwestern	2	0	
0707.30	Computer Systems Analysis	90	0	90
	• San Diego Cont. Ed.	90	0	
0708.00	Computer Infrastructure and Support	407	0	407
	• Grossmont	11	0	
	• MiraCosta	23	0	

TOP6 or CIP Code	TOP or CIP Program Title	3-Yr Annual Average CC Awards (PY18-19 to PY20-21)	Other Educational Institutions 3-Yr Annual Average Awards (PY17-18 to PY19-20)	3-Yr Total Average Supply (PY17-18 to PY20-21)
	<ul style="list-style-type: none"> San Diego City 	31	0	
	<ul style="list-style-type: none"> San Diego Cont. Ed. 	342	0	
0708.10	Computer Networking	60	0	60
	<ul style="list-style-type: none"> Cuyamaca 	8	0	
	<ul style="list-style-type: none"> Grossmont 	4	0	
	<ul style="list-style-type: none"> MiraCosta 	9	0	
	<ul style="list-style-type: none"> Palomar 	19	0	
	<ul style="list-style-type: none"> San Diego Cont. Ed. 	18	0	
	<ul style="list-style-type: none"> Southwestern 	2	0	
0708.20	Computer Support	339	0	339
	<ul style="list-style-type: none"> MiraCosta 	2	0	
	<ul style="list-style-type: none"> San Diego Cont. Ed. 	336	0	
	<ul style="list-style-type: none"> Southwestern 	1	0	
0709.00	World Wide Web Administration	15	0	15
	<ul style="list-style-type: none"> Grossmont 	14	0	
	<ul style="list-style-type: none"> Palomar 	1	0	
0934.30	Telecommunications Technology	3	0	3
	<ul style="list-style-type: none"> San Diego City 	3	0	
11.0201	Computer Programming/Programmer, General	0	14	14
	<ul style="list-style-type: none"> California College San Diego 	0	14	
11.0202	Computer Programming, Specific Applications	0	0	0
	<ul style="list-style-type: none"> California Institute of Arts & Technology 	0	0	
	<ul style="list-style-type: none"> California Institute of Arts & Technology-National City 	0	0	
11.0203	Computer Programming, Vendor/Product Certification	0	4	4
	<ul style="list-style-type: none"> Vista Adult School 	0	4	

TOP6 or CIP Code	TOP or CIP Program Title	3-Yr Annual Average CC Awards (PY18-19 to PY20-21)	Other Educational Institutions 3-Yr Annual Average Awards (PY17-18 to PY19-20)	3-Yr Total Average Supply (PY17-18 to PY20-21)
11.0299	Computer Programming, Other	0	1	1
	• Poway Adult School	0	1	
11.0802	Data Modeling/Warehousing and Database Administration	0	0	0
	• National University	0	0	
11.0901	Computer Systems Networking and Telecommunications	0	1	1
	• Poway Adult School	0	1	
11.1001	Network and System Administration/Administrator	0	17	17
	• California Institute of Arts & Technology	0	13	
	• California Institute of Arts & Technology-National City	0	2	
	• ICOHS College	0	2	
11.1002	System, Networking, and LAN/WAN Management/Manager	0	7	7
	• California Institute of Arts & Technology	0	6	
	• California Institute of Arts & Technology-National City	0	1	
11.1003	Computer and Information Systems Security/Information Assurance	0	2	2
	• Vista Adult School	0	2	
11.1005	Information Technology Project Management	0	65	65
	• National University	0	65	
11.1006	Computer Support Specialist	0	7	7
	• ICOHS College	0	0	
	• Poway Adult School	0	7	
15.1202	Computer/Computer Systems Technology/Technician	0	138	138
	• ATA College	0	2	

TOP6 or CIP Code	TOP or CIP Program Title	3-Yr Annual Average CC Awards (PY18-19 to PY20-21)	Other Educational Institutions 3-Yr Annual Average Awards (PY17-18 to PY19-20)	3-Yr Total Average Supply (PY17-18 to PY20-21)
	<ul style="list-style-type: none"> California Institute of Arts & Technology 	0	125	
	<ul style="list-style-type: none"> California Institute of Arts & Technology-National City 	0	10	
	<ul style="list-style-type: none"> Point Loma Nazarene University 	0	1	
			Total	1,318

Demand vs. Supply

Comparing labor demand (annual openings) with labor supply¹⁰ suggests that there is a supply gap for these occupations in San Diego County, with 1,464 annual openings and 1,318 awards. Comparatively, there are 18,623 annual openings in California and 6,373 awards, suggesting that there is also a supply gap across the state¹¹ (Exhibit 5).

Exhibit 5: Labor Demand (Annual Openings) Compared with Labor Supply (Average Annual Awards)

	Demand (Annual Openings)	Supply ¹² (Total Annual Average Supply)	Supply Gap or Oversupply
San Diego	1,464	1,318	146
California	18,623	6,373	12,250

Please note: This is a basic analysis of supply and demand of labor. The data does not include workers currently in the labor force who could fill these positions or workers who are not captured by publicly available data. This data should be used to discuss the potential gaps or oversupply of workers; however, it should not be the only basis for determining whether or not a program should be developed.

¹⁰ Labor supply can be found from two different sources: Lightcast or the California Community Colleges Chancellor's Office MIS Data Mart. Lightcast uses CIP codes while MIS uses TOP codes. Different coding systems result in differences in the supply numbers.

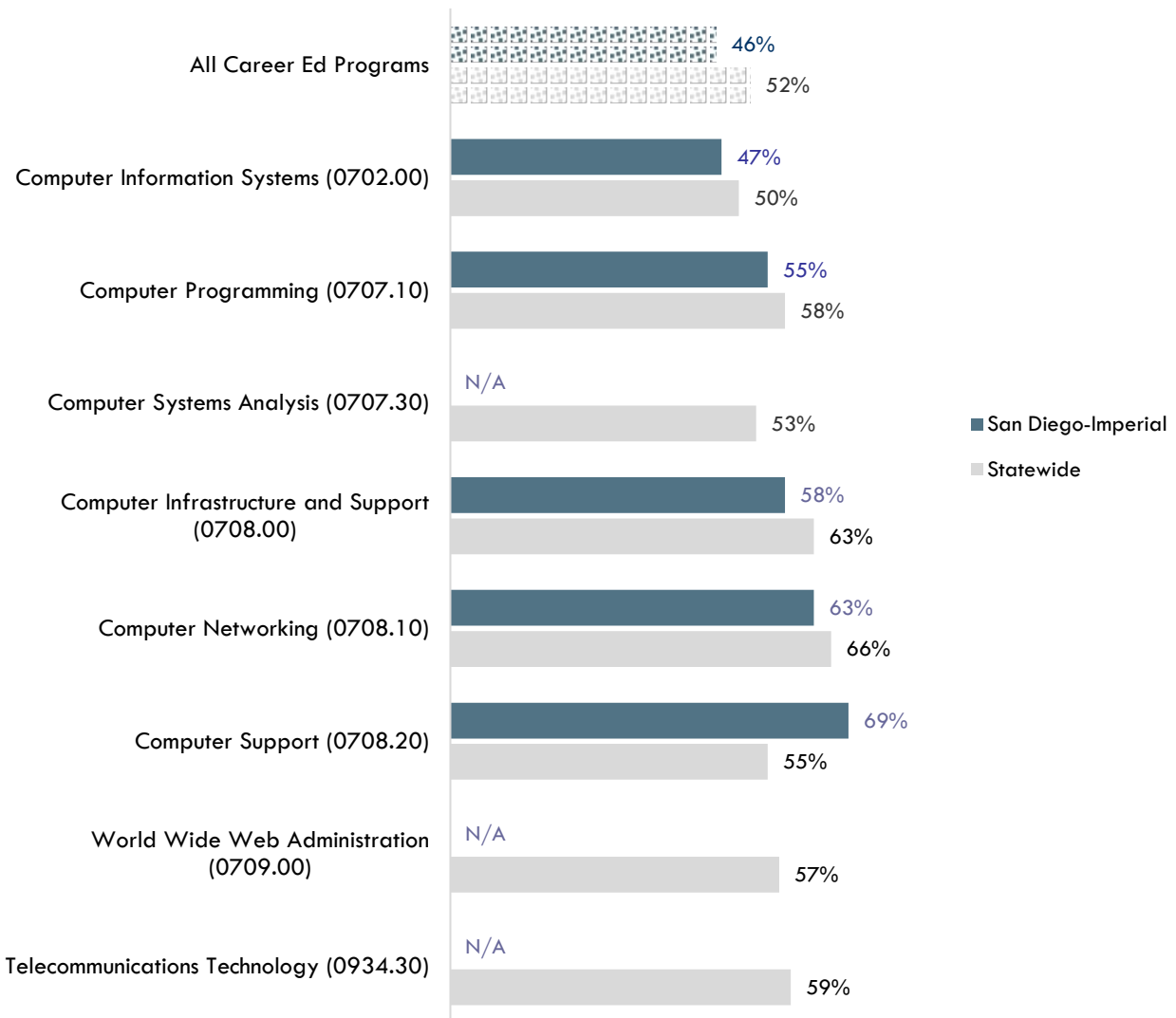
¹¹ "Supply and Demand," Centers of Excellence Student Outcomes, <https://coecc.net/our-resources/>.

¹² Awards included: associate degree; award <1 year; award 1<2 years; and postsecondary awards.

Student Outcomes and Regional Comparisons

According to the California Community Colleges LaunchBoard, 47 to 69 percent of students in the San Diego-Imperial region earned a living wage after completing a program related to *Information Technology Management Occupations*, compared 50 to 66 percent statewide and 52 percent of students in Career Education programs in general across the state (Exhibit 6a).¹³

Exhibit 6a: Percentage of Students Who Earned a Living Wage by Program, PY2019-20¹⁴



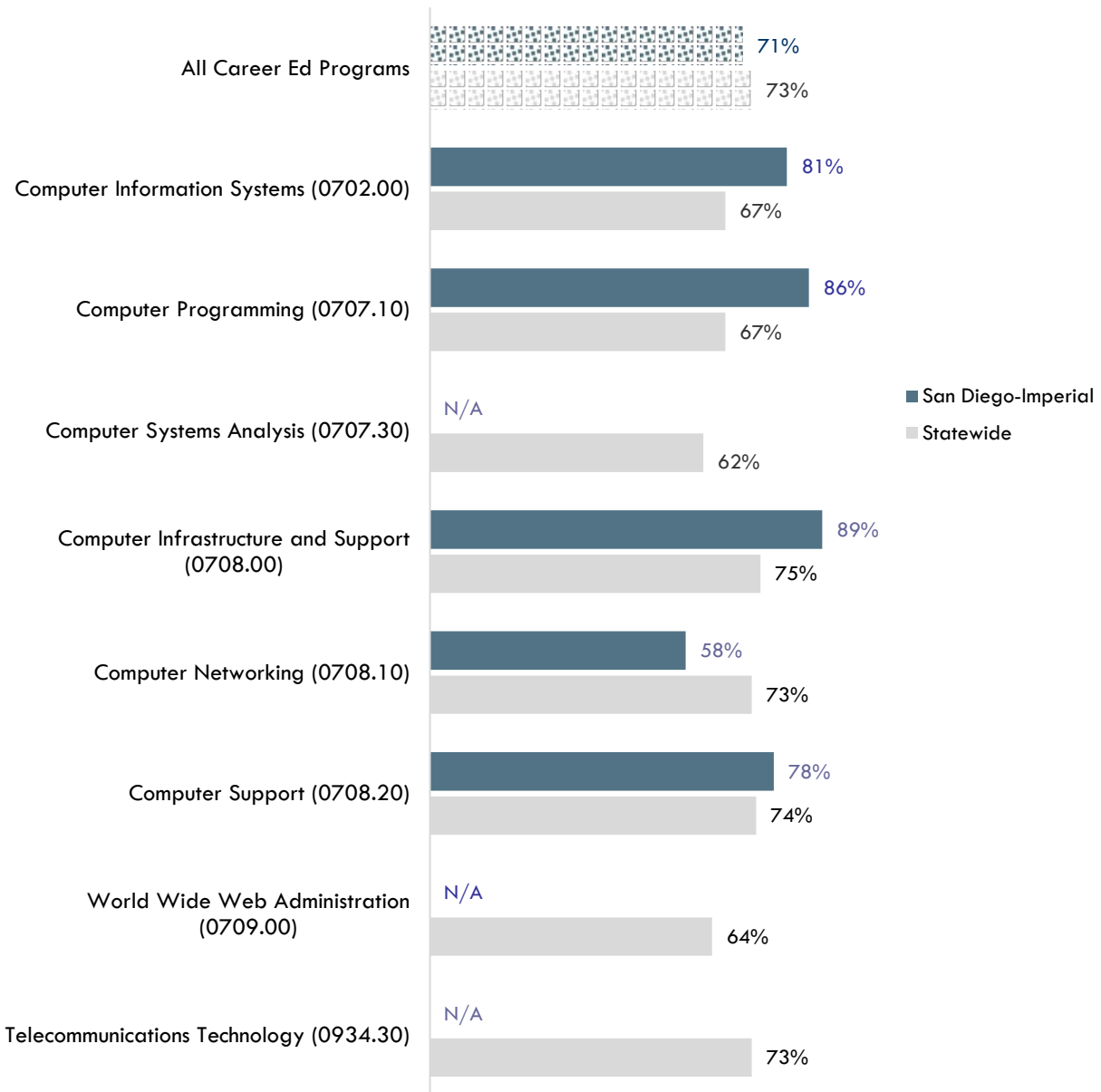
"N/A" indicates insufficient data

¹³ "California Community Colleges Strong Workforce Program," California Community Colleges, calpassplus.org/LaunchBoard/SWP.aspx.

¹⁴ Most recent year with available data is Program Year 2019-20. Among completers and skills builders who exited, the percentage of students who attained a living wage.

According to the California Community Colleges LaunchBoard, 58 to 89 percent of students in the San Diego-Imperial region obtained a job closely related to their field of study after completing a program related to *Information Technology Management Occupations*, compared to 62 to 75 percent statewide and 73 percent of students in Career Education programs in general across the state (Exhibit 6b).¹⁵

Exhibit 6b: Percentage of Students in a Job Closely Related to Field of Study by Program, PY2018-19¹⁶



"N/A" indicates insufficient data

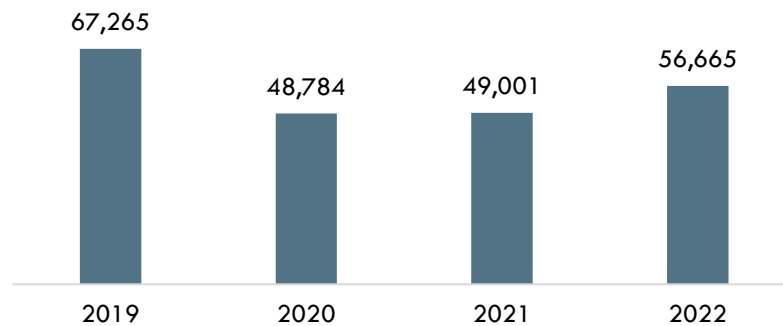
¹⁵ "California Community Colleges Strong Workforce Program," California Community Colleges, calpassplus.org/LaunchBoard/SWP.aspx.

¹⁶ Most recent year with available data is Program Year 2018-19. Percentage of Students in a Job Closely Related to Field of Study: Among students who responded to the CTEOS, the percentage reporting employment in the same or similar field as their program of study.

Online Job Postings

This report analyzes not only historical and projected (traditional LMI) data, but also recent data from online job postings (real-time LMI). Online job postings may provide additional insight about recent changes in the labor market that are not captured by historical data. Between 2019 and 2022, there was an average of 55,429 online job postings per year for *Information Technology Management Occupations* in San Diego County (Exhibit 7). Please note that online job postings do **not** equal labor market demand; demand is represented by annual job openings (see Exhibit 1 b). While this brief includes online jobs postings data to help with curriculum development, the community colleges should note that this type of data is impacted by several variables: employers may post a position multiple times to increase the pool of applicants; a job posting can remain posted after a business decides not to fill a position; or an employer may use one posting to fill multiple positions, for example.

Exhibit 7: Number of Online Job Postings for *Information Technology Management Occupations* in San Diego County (2018-2022)¹⁷



¹⁷ Lightcast; "Job Posting Analytics." 2018-2022.

Top Employers

Between January 1, 2020 and December 31, 2022, the top five employers in San Diego County for *Information Technology Management Occupations* were Robert Half, Elevance Health, Northrop Grumman, KPMG, and Randstad based on online job postings (Exhibit 8).

Exhibit 8: Top Employers for *Information Technology Management Occupations* in San Diego County¹⁸

Top Employers	
<ul style="list-style-type: none">• Robert Half• Elevance Health• Northrop Grumman• KPMG• Randstad	<ul style="list-style-type: none">• CyberCoders• University of California San Diego• Deloitte• Raytheon Technologies• Motion Recruitment

Education, Skills, and Certifications

Information Technology Management Occupations have a national educational attainment ranging from an associate degree to a bachelor's degree (Exhibit 9a).

Exhibit 9a: National Educational Attainment for *Information Technology Management Occupations*¹⁹

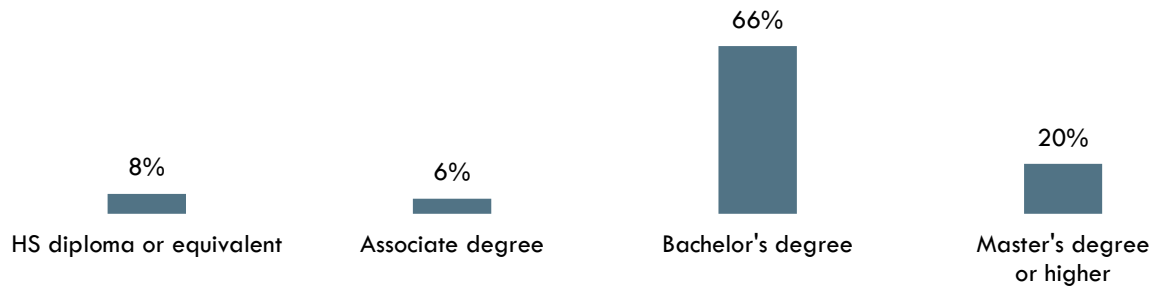
Occupational Title	Typical Entry-Level Education
Computer and Information Systems Managers	Bachelor's degree
Information Security Analysts	Bachelor's degree
Computer Network Architects	Bachelor's degree
Network and Computer Systems Administrators	Bachelor's degree
Computer Network Support Specialists	Associate degree

¹⁸ Lightcast; "Job Posting Analytics." 2020-2022.

¹⁹ Lightcast 2023.01; QCEW, Non-QCEW, Self-Employed.

Based on online job postings between January 1, 2020 and December 31, 2022 in San Diego County, employers posted a **bachelor's degree** as the most requested educational requirement for *Information Technology Management Occupations* (Exhibit 9b).²⁰

Exhibit 9b: Educational Requirements for Information Technology Management Occupations in San Diego County²¹



*May not total 100 percent due to rounding

Exhibit 10 lists the top specialized, soft, and software skills that appeared in online job postings between January 1, 2020 and December 31, 2022.

Exhibit 10: Top Skills for Information Technology Management Occupations in San Diego County²²

Specialized Skills	Soft Skills	Software Skills
<ul style="list-style-type: none"> • Computer Science • Operating Systems • Automation • Cyber Security • Auditing • Scripting • Vulnerability • Information Systems • System Administration • Network Security • Innovation • Coordinating • Self-Motivation • Sales • Prioritization 	<ul style="list-style-type: none"> • Communications • Management • Troubleshooting • Operations • Leadership • Problem Solving • Planning • Information Technology • Customer Service • Writing • Research • Detail Oriented • Verbal Communication Skills • Presentations • Interpersonal Communications 	<ul style="list-style-type: none"> • Firewall • Operating Systems • Linux • Python • Amazon Web Services • Microsoft Azure • Active Directory • Windows Servers • Microsoft Excel • SQL • Java • Unix • Windows PowerShell • Dynamic Host Configuration Protocol • Application Programming Interface

²⁰ Lightcast; "Job Posting Analytics." 2020-2022.

²¹ "Educational Attainment for Workers 25 Years and Older by Detailed Occupation," Bureau of Labor Statistics, last modified April 9, 2021. bls.gov/emp/tables/educational-attainment.htm.

²² Lightcast; "Job Posting Analytics." 2020-2022.

Exhibit 11 lists the top certification that appeared in online job postings between January 1, 2020 and December 31, 2022.

Exhibit 11: Top Certification for Information Technology Management Occupations in San Diego County²³

Top Certification in Online Job Postings

1. Certified Information Systems Security Professional
 2. Cisco Certified Network Associate
 3. Security Clearance
 4. CompTIA Security+
 5. Certified Information System Auditor (CISA)
 6. Certified Information Security Manager
 7. GIAC Certifications
 8. Secret Clearance
 9. Cisco Certified Network Professional
 10. Valid Driver's License
 11. Top Secret-Sensitive Compartmented Information (TS/SCI Clearance)
 12. Microsoft Certified Systems Engineer
 13. Certified Ethical Hacker
 14. IAT Level II Certification
 15. Cisco Certified Internetwork Expert
-

²³ Lightcast; "Job Posting Analytics." 2020-2022.

Prepared by:

Tina Ngo Bartel, Director (tnkobartel@miracosta.edu)

John Edwards, Research Analyst (jedwards@miracosta.edu)

Center of Excellence for the San Diego & Imperial Counties Community Colleges



Important Disclaimers

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. This study examines the most recent data available at the time of the analysis; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and the report findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.