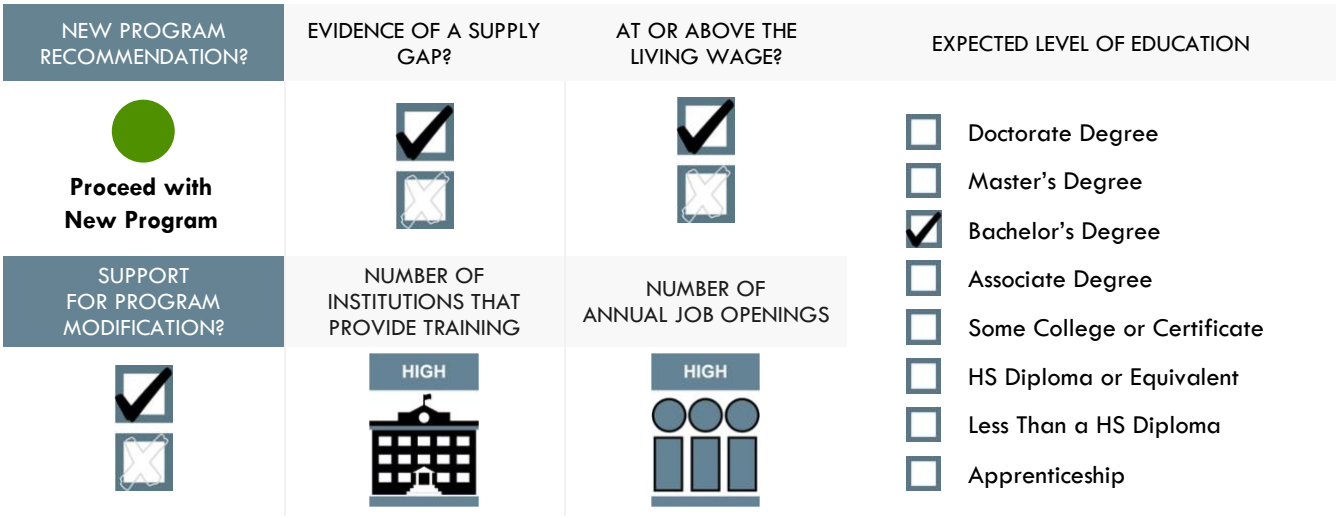
SAN DIEGO & IMPERIAL COUNTIES
COMMUNITY COLLEGES

Computer Information Systems Occupations

Labor Market Analysis: San Diego County **February 2025**

Summary



The San Diego & Imperial Center of Excellence (COE) developed this brief to assist the region's community colleges with strategic planning and program development. *Computer Information Systems Occupations* include "Computer Programmers," "Data Scientists," "Software Developers," and "Software Quality Assurance Analysts and Testers." According to available data, *Computer Information Systems Occupations* in San Diego County have a labor market demand of 2,318 annual job openings (while average demand for a single occupation in San Diego County is 289 annual job openings), and 19 institutions supply 2,026 awards for these occupations, suggesting that there is a supply gap in the labor market. Employers historically reported to the California Employment Development Department (EDD) and U.S. Bureau of Labor Statistics (BLS) that on average *Computer Information Systems Occupations* earned entry-level earnings of $48.57 per hour, which is above the living wage in San Diego County. Additionally, recent online job postings (2022-2024) show median earnings between $59 to $69 per hour. This brief recommends proceeding with developing a new program and supports a program modification because 1) there is a supply gap in the labor market; 2) there is a high number of annual job openings; and 3) entry-level wages are above the living wage. The colleges should note, however, that employers typically require a bachelor's degree as the educational requirement for these occupations.

Introduction

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

- **Computer Programmers** (SOC 15-1251): Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.
- **Data Scientists** (SOC 15-2051): Develop and implement a set of techniques or analytics applications to transform raw data into meaningful information using data-oriented programming languages and visualization software. Apply data mining, data modeling, natural language processing, and machine learning to extract and analyze information from large structured and unstructured datasets. Visualize, interpret, and report data findings. May create dynamic data reports.
- **Software Developers** (SOC 15-1252): Research, design, and develop computer and network software or specialized utility programs. Analyze user needs and develop software solutions, applying principles and techniques of computer science, engineering, and mathematical analysis. Update software or enhance existing software capabilities. May work with computer hardware engineers to integrate hardware and software systems, and develop specifications and performance requirements. May maintain databases within an application area, working individually or coordinating database development as part of a team.
- **Software Quality Assurance Analysts and Testers** (SOC 15-1253): Develop and execute software tests to identify software problems and their causes. Test system modifications to prepare for implementation. Document software and application defects using a bug tracking system and report defects to software or web developers. Create and maintain databases of known defects. May participate in software design reviews to provide input on functional requirements, operational characteristics, product designs, and schedules.

For the purpose of this report, these occupations are referred to as *Computer Information Systems 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. https://www.bls.gov/soc/.

Projected Occupational Demand

Between 2023 and 2028, employers in San Diego County will need to hire 2,318 workers annually to fill new jobs and backfill jobs in *Computer Information Systems Occupations* due to attrition caused by turnover and retirement, for example (Exhibit 1). "Software Developers" are projected to have the most labor market demand between 2023 and 2028, with 1,673 annual job openings.

Exhibit 1: Number of Jobs for *Computer Information Systems Occupations* (2023-2028)[2]

Occupational Title	2023 Jobs	2028 Jobs	2023 – 2028 Net Jobs Change	2023 - 2028 % Net Jobs Change	Annual Job Openings (Demand)
Software Developers	20,473	23,101	2,628	13%	1,673
Computer Programmers	3,906	3,693	-213	-5%	229
Data Scientists	2,367	2,762	395	17%	229
Software Quality Assurance Analysts and Testers	2,226	2,450	224	10%	187
Total	**28,972**	**32,006**	**3,034**	**10%**	**2,318**

Earnings

According to traditional[3] labor market information (LMI), entry-level hourly earnings for *Computer Information Systems Occupations* range from $40.77 to $58.06 (Exhibit 2).

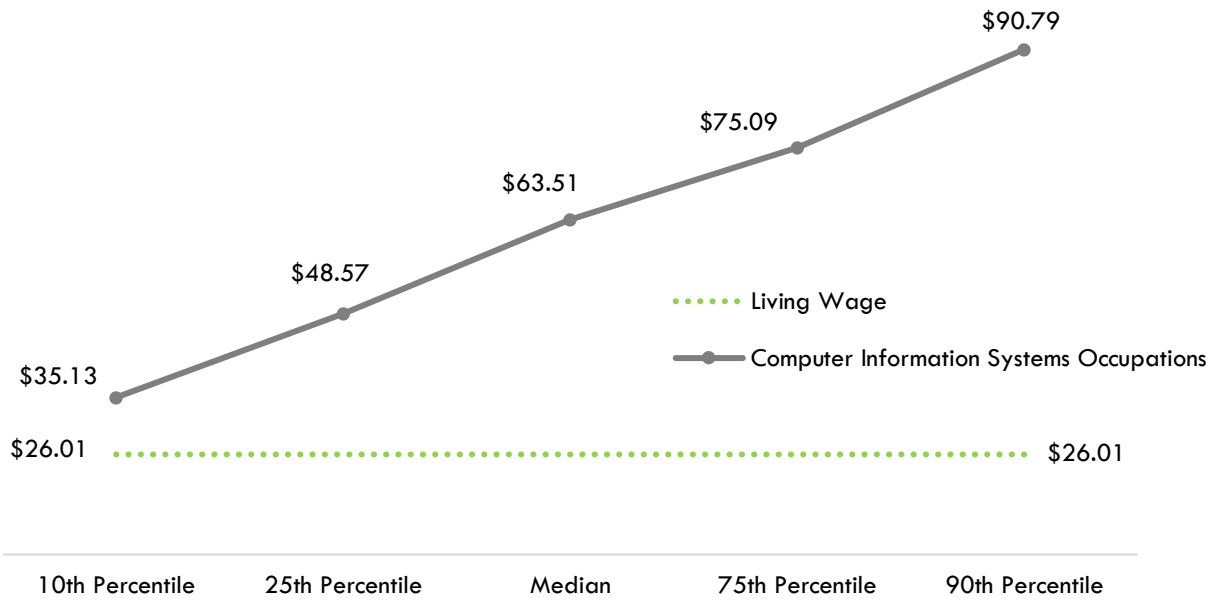
Exhibit 2: Hourly Earnings for *Computer Information Systems Occupations* in San Diego County[4]

Occupational Title	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)
Software Developers	$58.06	$73.06	$84.94
Computer Programmers	$51.91	$66.92	$71.64
Data Scientists	$43.54	$60.81	$78.03
Software Quality Assurance Analysts and Testers	$40.77	$53.25	$65.73

[2] Lightcast 2024.03; QCEW, Non-QCEW, Self-Employed.
[3] Traditional LMI is generally historical data captured by the U.S. Bureau of Labor Statistics (BLS) or the California Employment Development Department (EDD). It does not account for recent technological, economic, or legislative changes that may affect labor market demand and wages.
[4] Lightcast 2024.03; QCEW, Non-QCEW, Self-Employed.

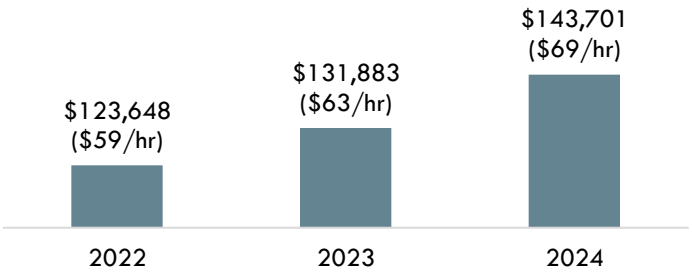
On average, the entry-level hourly earnings are $48.57—or $101,026 annual salary[5]; this is more than the living wage for a single adult in San Diego County, which is $26.01 per hour (Exhibit 3).[6]

Exhibit 3: Hourly Earnings[7] for *Computer Information Systems Occupations* in San Diego County[8]



Between January 1, 2022 and December 30, 2024, employers advertised between $59 to $69 per hour in online job postings for *Computer Information Systems Occupations* in San Diego County (Exhibit 4).[9] This suggests that employers in recent years are increasing wages due to labor market forces that may not be captured by traditional LMI.

Exhibit 4: Median Advertised Salaries in Online Job Postings for *Computer Information Systems Occupations* in San Diego County (2022-2024)*



[5] Annualized salaries assume a full-time position with 2,080 hours. Multiplying the hourly wage with 2,080 yields the annual salary.
[6] Center for Women's Welfare, University of Washington. (2024). The self-sufficiency standard for California 2024. selfsufficiencystandard.org/California.
[7] 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.
[8] Lightcast 2024.03; QCEW, Non-QCEW, Self-Employed.
[9] Lightcast 2024.03; "Job Posting Analytics." 2022-2024.

Expected Level of Education

According to traditional LMI, *Computer Information Systems Occupations* have a national educational attainment of a bachelor's degree.[10] (Exhibit 5).

Exhibit 5: National Educational Attainment for *Computer Information Systems Occupations*[11]

Occupational Title	Typical Entry-Level Education
Computer Programmers	Bachelor's degree
Data Scientists	Bachelor's degree
Software Developers	Bachelor's degree
Software Quality Assurance Analysts and Testers	Bachelor's degree

Similarly, online job postings between January 1, 2022 and December 31, 2024 in San Diego County had a bachelor's degree as the most requested educational requirement for *Computer Information Systems Occupations;* however, employers also expected the following certifications (Exhibit 6).[12]

Exhibit 6: Top Certifications for *Computer Information Systems Occupations* in San Diego County in Online Job Postings (2022-2024)[13]

1. Secret Clearance / Security Clearance
2. Top Secret-Sensitive Compartmented Information (TS/SCI Clearance)
3. Software Development Engineer in Test
4. Certified Information Systems Security Professional
5. IAT Level II Certification
6. CompTIA Security+
7. Basic Life Support (BLS) Certification
8. Advanced Cardiovascular Life Support (ACLS) Certification
9. Neonatal Resuscitation Program Certification (NRP)
10. Epic EMR Certification
11. Enterprise Desktop Administrator (Microsoft Certified IT Professional)
12. Salesforce Certification
13. Microsoft Certified Systems Engineer
14. Project Management Professional Certification
15. Microsoft Certified Professional

[10] Lightcast 2024.03; QCEW, Non-QCEW, Self-Employed.
[11] Lightcast 2024.03; QCEW, Non-QCEW, Self-Employed.
[12] Lightcast 2024.03; "Job Posting Analytics." 2022-2024.
[13] Lightcast 2024.03; "Job Posting Analytics." 2022-2024.

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. There are eight TOP codes and 11 CIP codes related to *Computer Information Systems Occupations* (Exhibit 7).

Exhibit 7: Related TOP and CIP Codes for *Computer Information Systems Occupations*[14]

TOP or CIP Code	TOP or CIP Program Title
TOP 0614.20	Electronic Game Design
TOP 0701.00	Information Technology, General
TOP 0702.00	Computer Information Systems
TOP 0707.00	Computer Software Development
TOP 0707.10	Computer Programming
TOP 0707.20	Database Design and Administration
TOP 0708.00	Computer Infrastructure and Support
TOP 0708.10	Computer Networking
CIP 11.0101	Computer and Information Sciences, General
CIP 11.0201	Computer Programming/Programmer, General
CIP 11.0204	Computer Game Programming
CIP 11.0501	Computer Systems Analysis/Analyst
CIP 11.0701	Computer Science
CIP 11.0802	Data Modeling/Warehousing and Database Administration
CIP 11.0902	Cloud Computing
CIP 15.1202	Computer/Computer Systems Technology/Technician
CIP 30.7001	Data Science, General
CIP 30.7101	Data Analytics, General
CIP 30.7103	Data Visualization

[14] This brief uses a conservative estimate of program supply and only calculates awards from the TOP code listed in Exhibit 7.

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, 10 non-community-college institutions supply the region with awards: Associated Technical College-San Diego, ATA College, California Institute of Arts & Technology, California Institute of Arts & Technology-National City, California State University-San Marcos, National University, Point Loma Nazarene University, San Diego State University, University of California-San Diego, and University of San Diego (Exhibit 8).

Exhibit 8: Number of Awards (Certificates and Degrees) Conferred by Postsecondary Institutions (Program Year 2019-20 Through Program Year 2022-23 Average)

TOP6 or CIP Code	TOP6 or CIP Program Title	3-Yr Annual Average CC Awards (PY20-21 to PY22-23)	Other Educational Institutions 3-Yr Annual Average Awards (PY19-20 to PY21-22)	Total Average Supply (PY19-20 to PY22-23)
0614.20	Electronic Game Design	**6**	**0**	**6**
	Palomar	**1**	**0**	
	• Certificate 6 < 18 units	1	0	
	San Diego Mesa	**2**	**0**	
	• Associate Degree	1	0	
	• Certificate 30 < 60 units	1	0	
	Southwestern	**3**	**0**	
	• Associate Degree	2	0	
	• Certificate 16 < 30 units	1	0	
0701.00	Information Technology, General	**57**	0	**57**
	Grossmont	**24**	**0**	
	• Associate Degree	11	0	
	• Certificate 16 < 30 units	13	0	
	MiraCosta	**13**	**0**	
	• Associate Degree	6	0	
	• Certificate 16 < 30 units	7	0	

TOP6 or CIP Code	TOP6 or CIP Program Title	3-Yr Annual Average CC Awards (PY20-21 to PY22-23)	Other Educational Institutions 3-Yr Annual Average Awards (PY19-20 to PY21-22)	Total Average Supply (PY19-20 to PY22-23)
	Palomar	**17**	**0**	
	• Associate Degree	9	0	
	• Noncredit 288 < 480 hrs	8	0	
	Southwestern	**3**	**0**	
	• Associate Degree	1	0	
	• Certificate 6 < 18 units	2	0	
0702.00	Computer Information Systems	**113**	**0**	**113**
	MiraCosta	**10**	**0**	
	• Associate Degree	3	0	
	• Certificate 30 < 60 units	3	0	
	• Certificate 6 < 18 units	4	0	
	Palomar	**15**	**0**	
	• Associate Degree	6	0	
	• Certificate 30 < 60 units	5	0	
	• Certificate 16 < 30 units	4	0	
	San Diego Cont. Ed.	**53**	**0**	
	• Noncredit 48 < 96 hrs	53	0	
	San Diego Mesa	**14**	**0**	
	• Associate Degree	13	0	
	• Certificate 30 < 60 units	1	0	
	San Diego Miramar	**15**	**0**	
	• Associate Degree	14	0	
	• Certificate 30 < 60 units	1	0	
	Southwestern	**6**	**0**	
	• Associate Degree	6	0	

TOP6 or CIP Code	TOP6 or CIP Program Title	3-Yr Annual Average CC Awards (PY20-21 to PY22-23)	Other Educational Institutions 3-Yr Annual Average Awards (PY19-20 to PY21-22)	Total Average Supply (PY19-20 to PY22-23)
0707.10	Computer Programming	**81**	**0**	**81**
	Grossmont	**28**	**0**	
	• Associate Degree	13	0	
	• Certificate 30 < 60 units	10	0	
	• Certificate 16 < 30 units	5	0	
	Palomar	**5**	**0**	
	• Certificate 30 < 60 units	2	0	
	• Certificate 8 < 16 units	3	0	
	San Diego Cont. Ed.	**44**	**0**	
	• Noncredit 144 < 192 hrs	11	0	
	• Noncredit 48 < 96 hrs	33	0	
	Southwestern	**4**	**0**	
	• Associate Degree	3	0	
	• Certificate 6 < 18 units	1	0	
0708.00	Computer Infrastructure and Support	**599**	**0**	**599**
	Grossmont	**51**	**0**	
	• Associate Degree	23	0	
	• Certificate 16 < 30 units	28	0	
	MiraCosta	**39**	**0**	
	• Associate Degree	13	0	
	• Certificate 30 < 60 units	8	0	
	• Certificate 16 < 30 units	13	0	
	• Certificate 6 < 18 units	5	0	
	Palomar	**3**	**0**	
	• Certificate 8 < 16 units	3	0	

TOP6 or CIP Code	TOP6 or CIP Program Title	3-Yr Annual Average CC Awards (PY20-21 to PY22-23)	Other Educational Institutions 3-Yr Annual Average Awards (PY19-20 to PY21-22)	Total Average Supply (PY19-20 to PY22-23)
	San Diego Cont. Ed.	**469**	**0**	
	• Noncredit < 48 hrs	202	0	
	• Noncredit 192 < 288 hrs	18	0	
	• Noncredit 96 < 144 hrs	181	0	
	• Noncredit 48 < 96 hrs	68	0	
	San Diego City	**37**	**0**	
	• Associate Degree	24	0	
	• Certificate 30 < 60 units	5	0	
	• Certificate 16 < 30 units	8	0	
0708.10	Computer Networking	**31**	**0**	**31**
	Cuyamaca	**5**	**0**	
	• Associate Degree	5	0	
	MiraCosta	**2**	**0**	
	• Associate Degree	1	0	
	• Certificate 16 < 30 units	1	0	
	Palomar	**10**	**0**	
	• Associate Degree	5	0	
	• Certificate 16 < 30 units	5	0	
	San Diego Cont. Ed.	**13**	**0**	
	• Noncredit 96 < 144 hrs	13	0	
	Southwestern	**1**	**0**	
	• Associate Degree	1	0	
11.0101	Computer and Information Sciences, General	**0**	**18**	**18**
	Associated Technical College-San Diego	**0**	**18**	
	• Certificates of less than 1 year	0	18	

TOP6 or CIP Code	TOP6 or CIP Program Title	3-Yr Annual Average CC Awards (PY20-21 to PY22-23)	Other Educational Institutions 3-Yr Annual Average Awards (PY19-20 to PY21-22)	Total Average Supply (PY19-20 to PY22-23)
11.0701	Computer Science	**0**	**1,002**	**1,002**
	California State University-San Marcos	**0**	**152**	
	• Bachelor's degree	0	152	
	National University	**0**	**33**	
	• Bachelor's degree	0	33	
	Point Loma Nazarene University	**0**	**12**	
	• Bachelor's degree	0	12	
	San Diego State University	**0**	**252**	
	• Bachelor's degree	0	252	
	University of California-San Diego	**0**	**519**	
	• Bachelor's degree	0	519	
	University of San Diego	**0**	**34**	
	• Bachelor's degree	0	34	
15.1202	Computer/Computer Systems Technology/Technician	**0**	**118**	**118**
	ATA College	**0**	**6**	
	• Certificates of less than 1 year	0	6	
	California Institute of Arts & Technology	**0**	**79**	
	• Certificates of less than 1 year	0	37	
	• Associate degree	0	42	
	California Institute of Arts & Technology-National City	**0**	**33**	
	• Certificates of less than 1 year	0	8	
	• Associate degree	0	25	
30.7001	Data Science, General	**0**	**1**	**1**
	Point Loma Nazarene University	**0**	**1**	

TOP6 or CIP Code	TOP6 or CIP Program Title	3-Yr Annual Average CC Awards (PY20-21 to PY22-23)	Other Educational Institutions 3-Yr Annual Average Awards (PY19-20 to PY21-22)	Total Average Supply (PY19-20 to PY22-23)
	• Bachelor's degree	0	1	
			Total	**2,026**

Comparing labor demand (annual openings) with labor supply[15] suggests that there is a supply gap for these occupations in San Diego County, with 2,318 annual openings and 2,026 awards. Comparatively, there are 34,676 annual openings in California and 14,505 awards, suggesting that there is also a supply gap across the state[16] (Exhibit 9).

Exhibit 9: Labor Demand (Annual Openings) Compared with Labor Supply (Average Annual Awards)

	Demand (Annual Openings)	**Supply** (Annual Awards)	**Supply Gap or Oversupply**
San Diego	2,318	2,026	**292**
California	34,676	14,505	**20,171**

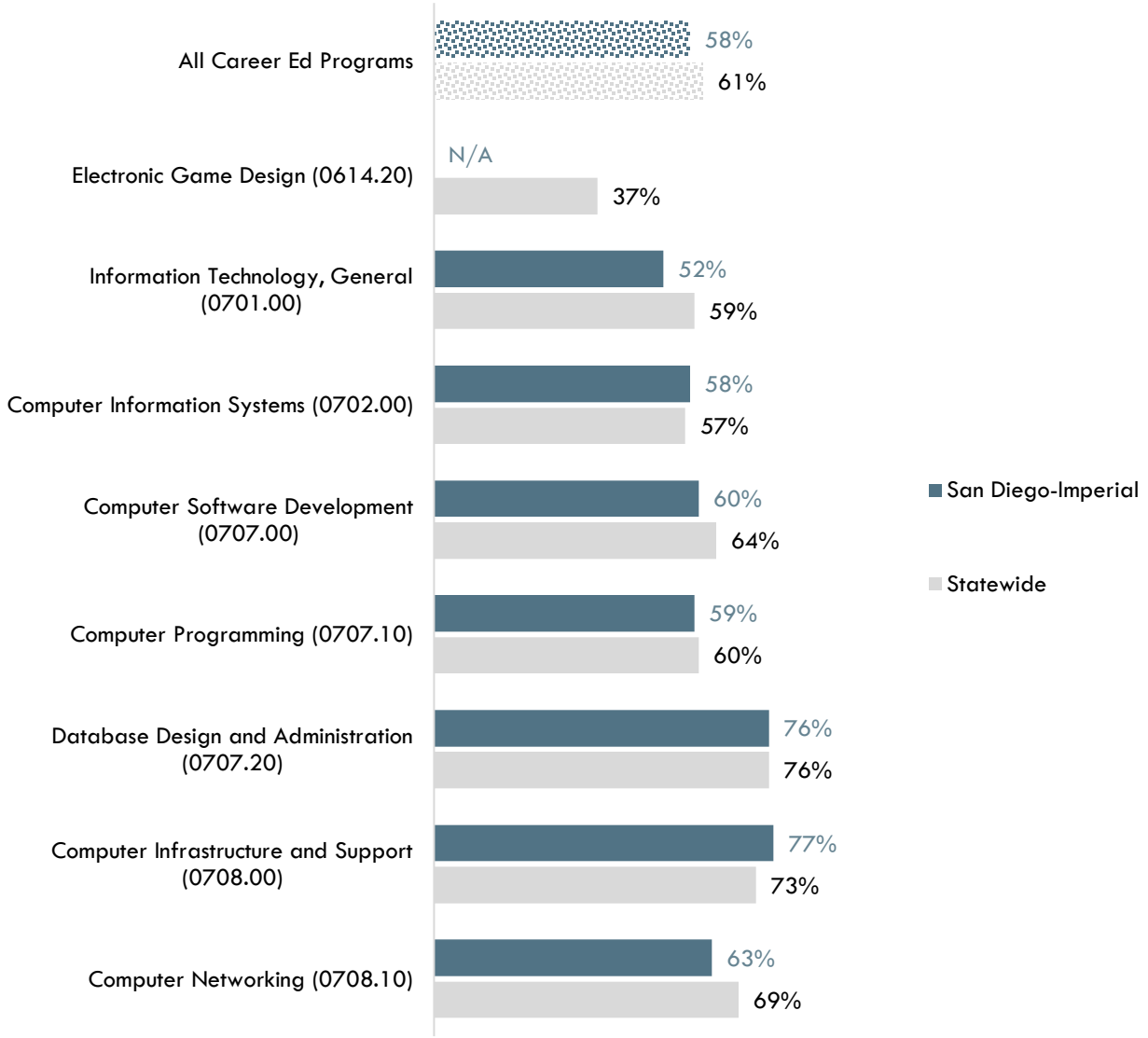
Please note: This is a basic analysis of supply and demand of labor. The data does not include workers currently in the labor force who could fill these positions or workers who are not captured by publicly available data. This data should be used to discuss the potential gaps or oversupply of workers;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

[15] 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.
[16] "Supply and Demand," Centers of Excellence Student Outcomes, coeccc.net/our-resources.

Student Outcomes and Regional Comparisons

According to the California Community Colleges DataVista, 52 to 77 percent of students in the San Diego-Imperial region earned a living wage after completing a program related to *Computer Information Systems Occupations*, compared to 37 to 76 percent statewide and 61 percent of students in Career Education programs in general across the state (Exhibit 10).[17]

Exhibit 10: Percentage of Students Who Earned a Living Wage by Program, PY2021-22[18]

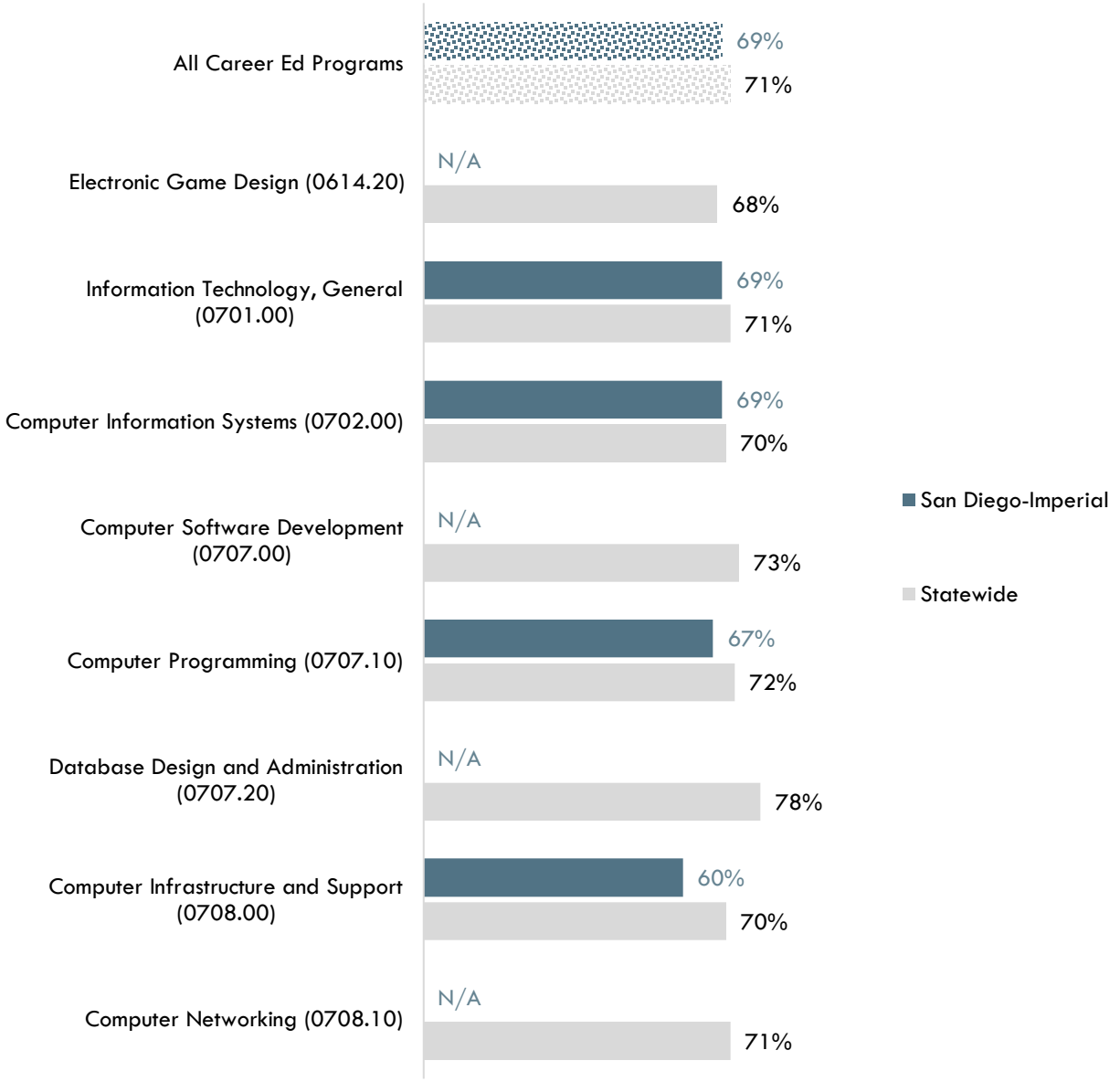


"N/A" indicates insufficient data

[17] DataVista, California Community Colleges, datavista.cccco.edu/.
[18] Most recent year with available data is Program Year 2021-22. Among completers and skills builders who exited, the percentage of students who attained a living wage.

According to the California Community Colleges DataVista, 60 to 69 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 *Computer Information Systems Occupations*, compared 68 to 78 percent statewide and 71 percent of students in Career Education programs in general across the state (Exhibit 11).[19]

Exhibit 11: Percentage of Students in a Job Closely Related to Field of Study by Program, PY2020-21[20]



"N/A" indicates insufficient data

[19] DataVista, California Community Colleges, datavista.cccco.edu/.
[20] Most recent year with available data is Program Year 2020-21. 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.

Employers

Between January 1, 2022 and December 31, 2024, the top five employers in San Diego County for *Computer Information Systems Occupations* were Apple, Qualcomm, CyberCoders, Leidos, and Randstad based on online job postings (Exhibit 12).

Exhibit 12: Top Employers for *Computer Information Systems Occupations* in San Diego County[21]

Top Employers	
• Apple • Qualcomm • CyberCoders • Leidos • Randstad	• Deloitte • Jobot • General Atomics • Northrop Grumman • UnitedHealth Group

Skills

Exhibit 13 lists the top specialized, soft, and software skills that appeared in online job postings between January 1, 2022 and December 31, 2024.

Exhibit 13: Top Skills for *Computer Information Systems Occupations* in San Diego County[22]

Specialized Skills	Soft Skills	Software Skills
• Computer Science • Software Engineering • Python • Software Development • Agile Methodology • Java • SQL • C++ • Automation • Amazon Web Services • Debugging • JavaScript • Application Programming Interface • C • Linus	• Communication • Management • Problem Solving • Leadership • Troubleshooting • Operations • Writing • Research • Planning • Innovation • Mathematics • Interpersonal Communications • Self-Motivation • Customer Service • Detail Oriented	• Python • Java • SQL • C++ • Amazon Web Services • JavaScript • Application Programming Interface • C • Linux • Git • C# • Microsoft Azure • React.js • Kubernetes • Docker

[21] Lightcast 2024.03; "Job Posting Analytics." 2022-2024.
[22] Lightcast 2024.03; "Job Posting Analytics." 2022-2024.

Prepared by:

Tina Ngo Bartel, Executive Director (tngobartel@miracosta.edu)
John Edwards, Research Analyst (jedwards@miracosta.edu)
San Diego & Imperial Center of Excellence

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