C·O·E   CENTERS OF EXCELLENCE
FOR LABOR MARKET RESEARCH

Information Technology Project Management

Inland Empire/Desert Region (Riverside and San Bernardino counties)

This workforce demand report uses state and federal job projection data developed before the economic impact of COVID-19. The COE is monitoring the situation and will provide more information as it becomes available. Please consult with local employers to understand their current employment needs.

Summary

- The community college computer information systems program provides the knowledge, skills, and abilities that lead to six occupations. These occupations are considered **essential critical infrastructure occupations**.
- In the Inland Empire/Desert Region, this occupation is projected to have 1,095 annual job openings, increasing employment by 8% through 2024.
- The **50th percentile hourly wages** for these occupations are between **$27.81 and $55.72 per hour, above the regional $21.78 per hour self-sustainable standard** for a single adult with one child.
- Nine community colleges in the Inland Empire/Desert Region conferred an annual average of **151 awards** in computer information systems programs over the last three academic years.

Introduction

This report provides informational technology (IT) project management occupational data related to California Community College computer information systems (TOP 0702.00) programs. Computer information systems programs prepare students for employment through general instruction related to data and information storage and processing, including hardware, software, basic design principles, and user requirements (Taxonomy of Programs, 2012). The knowledge, skills, and abilities trained by **computer information systems** programs lead to the following six occupations, referred to as the IT project management occupational group, in this report:

- Computer Systems Analysts (SOC 15-1211)
- Information Security Analysts (15-1212)
- Computer User Support Specialists (15-1232)
- Computer Network Architects (15-1241)
- Network and Computer Systems Administrators (15-1244)
- Computer Occupations, All Other (15-1299)

These occupations are essential critical infrastructure occupations as identified by the Public Policy Institute of California. This classification of occupation is vital in supporting California's basic health, safety, and economic needs or may have the ability to social distance (Bohn et al.).

Please note that all the occupations in the IT project management occupational group, except c*omputer user support specialists,* typically require workers to obtain a four-year degree before employment, indicating that community college program completers may not be qualified for employment in these occupations. However, national-level educational attainment data suggests that between 21% and 41% of workers in the field have completed some college or an associate degree as their highest level of educational attainment.

Job Opportunities

In 2019, there were 11,638 jobs in the IT project management occupational group in the Inland Empire/Desert Region. This occupational group is projected to have 1,095 annual job openings to fill new or backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). This occupational group is expected to increase employment by 8% through 2024, less than the previous five years (2014-2019) of job growth at 22%. Exhibit 1 displays five-year projected job growth for these occupations.

Exhibit 1: Five-year projections, 2019-2024

Occupation	2019 Jobs	2024 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
Computer User Support Specialists	3,561	3,916	10%	2,245	374	16%
Computer Occupations, All Other	3,234	3,423	6%	1,780	297	18%
Computer Systems Analysts	2,126	2,293	8%	1,136	189	20%
Network and Computer Systems Administrators	1,733	1,849	7%	874	146	14%
Computer Network Architects	679	711	5%	327	55	13%
Information Security Analysts	304	364	20%	210	35	~13%
Total	**11,638**	**12,555**	**8%**	**6,572**	**1,095**	**17%**

Source: Emsi 2020.4

Job Advertisements

A search of online job advertisements (ads) for occupations in the IT project management group were limited to positions that require "project management" skills and "project management certifications." Project management certifications, issued by the Project Management Institute (PMI), ensure that workers have the knowledge and competency to work as project management professionals. For more information regarding project management certifications, please visit the PMI website (PMI, 2021).

Searching online job ads for IT project management group in the Inland Empire/Desert Region revealed 197 total results over the last 12 months. To ensure generalizable online job ad data was available for analysis, this search was expanded to include all California ads. Regional job ads accounted for approximately 3% of the 7,525 total statewide job advertisements for the IT project management occupational group.

On average, statewide employers fill online job ads for the IT project management occupational group within 48 days. The emerging occupation, *information technology project managers* (15-1299.09), embedded within the broad occupational code, *computer occupations, all other* (15-1299), accounted for two-thirds (66%) of statewide demand for IT project manager positions. Exhibit 2 displays the number of online job ads posted over the last 12 months, along with the statewide average time to fill for IT project management positions. Detailed job advertisement for this emerging occupation begins on page 9.

Exhibit 2: Job ads and time to fill

Occupations	Job Ads	California Average Time to Fill (Days)
Computer Occupations, All Other	5,991	48
Computer Systems Analysts	581	49
Information Security Analysts	433	51
Computer User Support Specialists	273	46
Network and Computer Systems Administrators	134	48
Computer Network Architects	113	51
Total	**7,525**	**48**

Source: Burning Glass – Labor Insights

Exhibit 3 displays the employers posting the most online job advertisements for the IT project management occupational group with project management certifications during the last 12 months in the state.

Exhibit 3: Employers posting the most online job ads

Occupations	Employers	
Computer Occupations, All Other (n=4,401)	• Deloitte • Anthem Blue Cross	• Science Applications International Corporation (SAIC) • Public Consulting Group
Computer Systems Analysts (n=441)	• Anthem Blue Cross • ICW Group	• Amazon
Information Security Analysts (n=352)	• Anthem Blue Cross • Deloitte	• CrowdStrike
Computer User Support Specialists (n=204)	• Silicon Valley Bank • University of California • Raytheon	• Cogent Infotech Corporation • Deloitte
Network and Computer Systems Administrators (n=107)	• Science Applications International Corporation (SAIC) • Cox Communications • Stanford University	• Spectrum • Booz Allen Hamilton, Inc.
Computer Network Architects (n=79)	• Booz Allen Hamilton, Inc. • Starry, Inc.	

Source: Burning Glass – Labor Insights

Exhibit 4 displays the cities with more than 100 online job advertisements posted for the IT project management occupational group over the last 12 months in the state. The three cities in the Inland Empire/Desert Region with the most advertisements were Ontario (41 job ads), Loma Linda (36 ads), and San Bernardino (27 ads).

Exhibit 4: Cities with the most online job ads

Cities	Job Ads
San Francisco	973
Los Angeles	870
San Diego	799
San Jose	399
Irvine	320
Sacramento	316
Sunnyvale	250
Santa Clara	169
El Segundo	152
Torrance	139
Oakland	103

| Cities	Job Ads
All other cities	*3,035*
Total	**7,525**

Source: Burning Glass – Labor Insights

Earnings and Benefits

Community colleges should ensure their training programs lead to employment opportunities that provide a self-sustainable income level. The Family Needs Calculator estimates that a self-sustainable wage for a single adult with one school-age child is $21.78 per hour or $45,992 annually in Riverside County, $21.24 per hour or $44,867 annually in San Bernardino County (Pearce, 2020). For this study, the higher hourly wage requirement in Riverside County is adopted as the self-sufficiency standard for the two-county region.

The 10th percentile hourly wages for *network and computer systems administrators, computer systems analysts, computer network architects*, and *information security analysts* exceeds the Family Needs Calculator self-sustainability rate, indicating that the top 90% of workers in these occupations earn self-sufficient hourly wages. Wages for *computer occupations, all other* surpasses the self-sustainability rate at the 25th percentile. Wages for *computer user support specialists* do not exceed the self-sustainability rate until the 50th percentile, indicating that only the top 50% of workers in the field earn a self-sustainable wage. Exhibit 5 displays the hourly earnings for the IT project management occupational group in the Inland Empire/Desert Region.

Exhibit 5: Hourly earnings by percentile
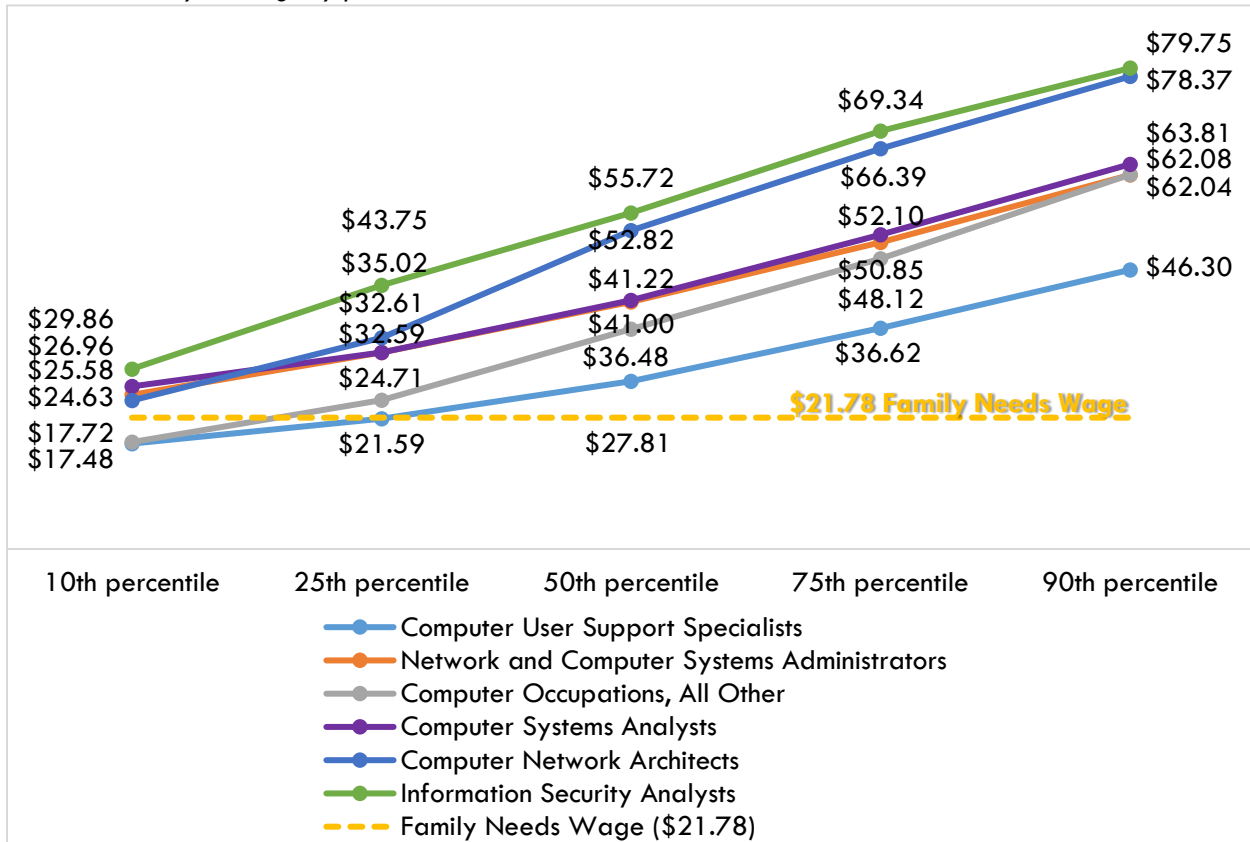
Source: Emsi 2020.4

Benefits information is not available for *computer occupations, all other*. According to the occupational guides developed by the California Labor Market Information Division, most employers offer workers in the IT project management occupational group benefits packages that include health, dental, and vision insurance, holidays, vacation, and retirement plans (Detailed Occupational Guides, 2020).

Exhibit 6 displays advertised salary data for IT project management positions listed over the last 12 months in the state. Advertised salary information reveals that employers are willing to pay IT project management positions with project management certifications between $72,000 and $106,000 annually. Advertised wages are well above the $45,992 ($21.78 hourly) required annually for a family of one adult with a school-age child to be self-sufficient in Riverside County ($44,867 annually in San Bernardino County). Consider the salary information with caution since only 22% (1,663 out of 7,525) online job advertisements for these occupations provided salary information.

Exhibit 6: Advertised salary information

Occupations	Real-Time Salary Information					
	Number of job ads	Less than $35,000	$35,000 to $49,999	$50,000 to $74,999	More than $75,000	Average Annual Salary
Computer Occupations, All Other	1,366	8%	1%	6%	85%	$104,000
Computer Systems Analysts	116	6%	-	10%	84%	$100,000
Information Security Analysts	85	7%	5%	10%	78%	$106,000
Computer User Support Specialists	49	4%	24%	33%	39%	$72,000
Network and Computer Systems Administrators	21	5%	-	9%	86%	$100,000
Computer Network Architects	26	11%	-	12%	77%	$105,000

Source: Burning Glass – Labor Insights

Advertised salary data reveals that employers are willing to pay IT project management positions more when project management certifications are required. The average advertised salaries for these positions without certification requirements are between $56,000 and $99,000, which is less than the $72,000 to $106,000 wage range for positions with certification requirements. The salary figures are prorated to reflect full-time, annual wage status.

Education, Work Experience, and Skills

Exhibit 7 displays the entry-level education typically required to enter employment in the IT project management occupational group according to the Bureau of Labor Statistics (BLS), educational attainment for incumbent workers with "some college, no degree" and an "associate degree" according to the U.S. Census (2016-17) and the real-time minimum advertised education requirements from employer job ads for IT project management positions. Job advertisements reveal that employers primarily sought candidates with a bachelor's degree or higher to fill open positions related to IT project management.

Exhibit 7: Typical entry-level education, educational attainment, and minimum advertised education requirements

Occupation	Typical Entry-Level Education Requirement	CC-Level Educational Attainment*	Real-Time Minimum Advertised Education Requirement		
			Number of Job Ads	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Computer Occupations, All Other	Bachelor's degree	35%	4,664	2%	2%	96%
Computer Systems Analysts	Bachelor's degree	21%	508	3%	2%	95%
Information Security Analysts	Bachelor's degree	27%	321	4%	1%	95%
Computer User Support Specialists	Some college, no degree	41%	217	13%	4%	83%
Network and Computer Systems Administrators	Bachelor's degree	37%	107	6%	4%	90%
Computer Network Architects	Bachelor's degree	37%	90	11%	3%	86%

Source: Emsi 2020.4, Burning Glass – Labor Insights
*Percentage of incumbent workers with a Community College Award or Some Postsecondary Coursework

Exhibit 8 displays the work experience typically required for the IT project management occupational group and the real-time work experience requirements from employer job ads for IT project management positions. The majority of employers sought candidates with three years or more of previous work experience.

Exhibit 8: Work experience required and real-time work experience requirements

Occupation	Work Experience Typically Required	Real-Time Work Experience			
		Number of Job Ads	0 – 2 years	3 – 5 years	6+ years
Computer Occupations, All Other	None	*4,857*	8%	45%	47%
Computer Systems Analysts	None	*495*	10%	53%	37%
Information Security Analysts	Less than 5 years	*357*	9%	50%	41%
Computer User Support Specialists	None	*235*	24%	40%	36%
Network and Computer Systems Administrators	None	*101*	4%	49%	47%
Computer Network Architects	5 years or more	*88*	10%	47%	43%

Source: Emsi 2020.4, Burning Glass – Labor Insights

Exhibit 9 displays a sample of specialized, employability, and software and programming skills employers seek when looking for workers to fill IT project management positions. Specialized skills are occupation-specific skills that employers are requesting for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is often referred to as "soft skills." The skills requested in job ads may be utilized to guide curriculum development. The software and programming skill, Microsoft Office, represents a suite of Microsoft products, including Excel, Word, Project, PowerPoint, and Outlook. Approximately 23% of job advertisements sought candidates with Microsoft Project skills.

Exhibit 9: Sample of in-demand skills from employer online job ads

Occupation	Specialized Skills	Employability Skills	Software and Programming Skills
Computer Occupations, All Other *(n=5,951)*	• Budgeting • Scrum • Project Planning and Development • Scheduling	• Communication Skills • Teamwork/ Collaboration • Problem Solving • Organizational Skills	• Microsoft Office • Software Development • Jira • Systems Development Life Cycle (SDLC)
Computer Systems Analysts *(n=581)*	• Business Analysis • Business Systems • Information Systems • Scrum	• Communication Skills • Teamwork/ Collaboration • Planning • Problem Solving	• Microsoft Office • SQL • Software Development • SAP
Information Security Analysts *(n=432)*	• Information Systems • Budgeting • NIST Cybersecurity Framework • Customer Service	• Communication Skills • Planning • Organizational Skills • Problem Solving	• Microsoft Office • Linux • Systems Development Life Cycle (SDLC) • Oracle
Computer User Support Specialists *(n=273)*	• Technical Support • Scheduling • Budgeting • Project Planning and Development	• Communication Skills • Teamwork/ Collaboration • Problem Solving • Troubleshooting	• Microsoft Office • Macintosh OS • Virtual Private Networking (VPN) • Microsoft Operating Systems
Network and Computer Systems Administrators *(n=133)*	• Information Systems • Budgeting • Scheduling • Telecommunications	• Communication Skills • Troubleshooting • Planning • Problem Solving	• Microsoft SharePoint • Microsoft Office • SQL • Linux
Computer Network Architects *(n=113)*	• Network Engineering • Budgeting • Telecommunications • Scheduling	• Planning • Communication Skills • Troubleshooting • Writing	• Voice over IP (VoIP) • VMware • Linux • Microsoft Office

Source: Burning Glass – Labor Insights

Information Technology Project Management Job Advertisements

Exhibit 10 displays the number of online job ads posted over the last 12 months, along with the regional and statewide average time to fill for the emerging occupation, *information technology project managers* (15-1299.09). Job ads have been limited to positions that require project management skills and certifications. There were 96 advertisements posted over the last 12 months in the Inland Empire/Desert Region, representing approximately 2% of the 4,943 statewide job advertisements, indicating that there is greater demand for this emerging occupation outside of the region.

On average, local employers fill online job advertisements for *information technology project managers* within 51 days, three days longer than the statewide average of 48 days, indicating that local employers may face more challenges filling open positions than other employers in California as a whole.

Exhibit 10: Job ads and time to fill

Occupation	Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
Information Technology Project Managers	96	51	48

Source: Burning Glass – Labor Insights

Exhibit 11 displays the employers posting the most online job advertisements for *information technology project managers* requiring project management certifications during the last 12 months in the region.

Exhibit 11: Employers posting the most online job ads

Employers	Job Ads
Mantek Solutions Inc	8
VSolvit, LLC	5
Stater Bros Market	5
San Manuel Band of Mission Indians	4
Core & Main	4
Loma Linda University Medical Center	4
ConvergeOne	3
All other employers	*71*
Total	**96**

Source: Burning Glass – Labor Insights

Exhibit 12 displays the cities with the most online job advertisements posted for *information technology project managers* during the last 12 months in the region.

Exhibit 12: Cities with the most online job ads

Cities	Job Ads
Riverside	20
Ontario	14
Loma Linda	14
San Bernardino	13
Rancho Cucamonga	6
Apple Valley	5
Norco	4
Fontana	4
All other cities	*16*
Total	**96**

Source: Burning Glass – Labor Insights

Earnings and Benefits

Exhibit 13 displays advertised salary data for *information technology project managers* over the last 12 months in the Inland Empire/Desert Region. Advertised salary information reveals that employers are willing to pay *information technology project managers* with project management certifications $110,000 annually, well above the $45,992 ($21.78 hourly) required annually for a family of one adult with a school-age child to be self-sufficient in Riverside County ($44,867 annually in San Bernardino County). Consider the salary information with caution since only 21% (20 out of 96) online job advertisements for these occupations provided salary information. The salary figures are prorated to reflect full-time, annual wage status.

Advertised salary data reveals that employers are willing to pay *information technology project managers* more when the position required project management certifications. The average advertised salary for *information technology project managers* without project management certifications is $85,000, well below the $110,000 average advertised salary for positions with certification requirements.

Exhibit 13: Advertised salary information

Occupation	Real-Time Salary Information					
	Number of job ads	Less than $35,000	$35,000 to $49,999	$50,000 to $74,999	More than $75,000	Average Annual Salary
Information Technology Project Managers	*20*	-	-	10%	90%	$110,000

Source: Burning Glass – Labor Insights

Education, Work Experience, and Skills

Exhibit 14 displays the real-time minimum advertised education requirements from regional employer job ads for *information technology project managers*.

Exhibit 14: Minimum advertised education requirements

Occupation	Real-Time Minimum Advertised Education Requirement			
	Number of Job Ads	High school diploma or vocational training	Associate degree	Bachelor's degree or higher
Information Technology Project Managers	*85*	5%	-	95%

Source: Burning Glass – Labor Insights

Exhibit 15 displays the real-time work experience requirements from employer job ads for *information technology project managers*. The majority of employers sought candidates with three or more years of previous work experience.

Exhibit 15: Real-time work experience requirements

Occupation	Real-Time Work Experience			
	Number of Job Ads	0 – 2 years	3 – 5 years	6+ years
Information Technology Project Managers	*82*	21%	46%	33%

Source: Burning Glass – Labor Insights

Exhibit 16 displays a sample of specialized, employability, and software and programming skills that employers sought when looking for workers to fill *information technology project manager* positions. Specialized skills are occupation-specific skills that employers are requesting for industry or job competency. Employability skills are foundational skills that transcend industries and occupations; this category is often referred to as "soft skills." The skills requested in job ads may be utilized to guide curriculum development. The software and programming skill, Microsoft Office, represents a suite of

Microsoft products, including Excel, Word, Project, PowerPoint, and Outlook. Approximately 41% of job advertisements sought candidates with Microsoft Project skills.

Exhibit 16: Sample of in-demand skills from employer online job ads

Occupation	Specialized Skills	Employability Skills	Software and Programming Skills
Information Technology Project Managers (*n=96*)	• Budgeting • Project Planning and Development • Scheduling • Quality Assurance and Control	• Communication Skills • Organizational Skills • Writing • Problem Solving	• Microsoft Office • Microsoft SharePoint • Enterprise Resource Planning (ERP) • Software Development

Source: Burning Glass – Labor Insights

Student Completions and Program Outcomes

Exhibit 17 displays the annual average awards for computer information systems (TOP 0702.00) programs in the Inland Empire/Desert Region. Regional computer information systems programs do not provide training specific to IT project management. However, it should be noted that Barstow College and San Bernardino Valley College offer programs related to Management Information Systems, which may provide students with skills associated with IT project management.

Diablo Valley College, located in the San Francisco Bay Area, is the only college in California that provides a training program specific to IT project management, titled Computer Information Systems: Project Management. This program may satisfy the educational training requirement needed to obtain the Project Management Professional (PMP) certification from the Project Management Institute (PMI) (Diablo Valley College, 2020). For more information regarding project management certifications, visit the PMI website (PMI, 2021).

Exhibit 17: 2016-19, Annual average community college awards for the computer information systems programs in the Inland Empire/Desert Region

0702.00 – Computer Information Systems	Associate degree	Certificate requiring 30 to <60 semester units	Certificate requiring 18 to <30 semester units	Certificate requiring 6 to <18 semester units	Total CC Annual Average Awards, Academic Years 2016-19
Barstow	-	-	-	-	0
Chaffey	31	10	-	0	41
Copper Mountain	4	-	-	-	4
Crafton Hills	5	-	1	0	6
Desert	7	3	-	-	9

0702.00 – Computer Information Systems	Associate degree	Certificate requiring 30 to <60 semester units	Certificate requiring 18 to <30 semester units	Certificate requiring 6 to <18 semester units	Total CC Annual Average Awards, Academic Years 2016-19
Mt. San Jacinto	21	3	-	-	25
Palo Verde	1	-	-	35	37
San Bernardino	9	-	-	-	9
Victor Valley	19	-	-	0	19
Total	**98**	**16**	**1**	**36**	**151**

Source: MIS Data Mart

California program outcome data may provide a 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 18. The outcome methodology is available in the appendix section of this report. Dashes indicate there were too few students to obtain program outcome information.

Exhibit 18: 0702.00 – Computer information systems strong workforce program outcomes

Strong Workforce Program Metrics: 0702.00 – Computer Information Systems Academic Year 2017-18, unless noted otherwise	Inland Empire/Desert Region	California
Unduplicated count of enrolled students (2018-19)	6,873	22,468
Completed 9+ career education units in one year (2018-19)	28%	31%
Perkins Economically disadvantaged students (2018-19)	85%	81%
Students who attained a noncredit workforce milestone in a year (2018-19)	-	13%
Students who earned a degree, certificate, or attained apprenticeship (2018-19)	97	464
Transferred to a four-year institution (transfers)	428	1,864
Job closely related to the field of study (2016-17)	62%	61%
Median annual earnings (all exiters)	$26,748	$30,868
Median change in earnings (all exiters)	26%	26%
Attained a living wage (completers and skills-builders)	54%	50%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

Recommendation

Community college computer information systems programs (0702.00) provide the knowledge, skills, and abilities that lead to employment in six occupations related to IT project management collectively referred to as the IT project management occupational group. Each of these occupations are considered essential critical infrastructure occupations. This classification of occupations is vital in supporting California's basic economic and safety needs. The IT project management occupational group is expected to grow by 8% and have 1,095 annual job openings over the next five years. Over this period, the community college-level occupation, *computer user support specialists*, is expected to grow by 10% and have 374 annual job openings.

The 50th percentile hourly wages for these occupations are between $27.81 and $55.72, above the $21.78 per hour self-sustainable wage standard needed for a single adult with one child in the region. Except for *computer user support specialists*, this group's occupations require a four-year degree to enter employment. While a third of incumbent workers hold a community college-level of education, most employer job ads request a candidate with a Bachelor's degree or higher. The project management professional (PMP) certification, issued by the Project Management Institute, correlates with higher wages in job advertisements.

Nine regional community colleges offer computer information systems programs, conferring an annual average of **151 awards** over the last three academic years. Regional programs do not provide IT project management training. However, two colleges in the region offer related programs, management information systems. The median annual earnings of all exiters were $26,748, and 54% attained a living wage. One community college in California, located in the San Francisco Bay Area, offers an IT project management program.

The **COE recommends** expanding existing computer information systems programs, but only if they are designed to continue their education at a four-year educational institution to achieve a Bachelor's degree or obtain their project management professional (PMP) certification. Colleges should inventory relevant programs at local four-year educational institutions and develop a transfer partnership for students.

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January 2021

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Appendix: Occupation definitions, sample job titles, five-year projections for information technology project management occupations

Computer Systems Analysts (15-1211)

Analyze science, engineering, business, and other data processing problems to develop and implement solutions to complex applications problems, system administration issues, or network concerns. Perform systems management and integration functions, improve existing computer systems, and review computer system capabilities, workflow, and schedule limitations. May analyze or recommend commercially available software.

Sample job titles: Applications Analyst, Business Systems Analyst, Computer Analyst, Computer Systems Analyst, Computer Systems Consultant, Information Systems Analyst (ISA), Information Technology Analyst (IT Analyst), System Analyst, Systems Analyst

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 21%

Information Security Analysts (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.

Sample job titles: Information Security Officer, Information Security Specialist, Information Systems Security Analyst, Information Systems Security Officer (ISSO), Information Technology Security Analyst (IT Security Analyst), Information Technology Specialist, Network Security Analyst, Security Analyst, Systems Analyst

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 27%

Computer User Support Specialists (15-1232)

Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, via telephone, or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.

Sample job titles: Computer Specialist, Computer Support Specialist, Computer Technician, Desktop Support Technician, Help Desk Analyst, Help Desk Technician, Information Technology Specialist (IT Specialist), Support Specialist, Technical Support Specialist

Entry-Level Educational Requirement: Some college, no degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 41%

Computer Network Architects (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.

Sample job titles: Design Engineer, Network Analyst, Network and Security Engineer, Network Consultant, Network Systems Consultant, Networking Systems and Distributed Systems Engineer, Solutions Architect, Telecommunications Analyst

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 37%

Network and Computer Systems Administrators (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.

Sample job titles: Information Analyst, Information Systems Manager (IS Manager), Information Technology Specialist (IT Specialist), LAN Specialist (Local Area Network Specialist), Local Area Network Administrator (LAN Administrator), Network Administrator, Network Coordinator, Network Manager, Systems Administrator

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 37%

Computer Occupations, All Other (15-1299)

All computer occupations not listed separately.

Sample job titles: N/A

Entry-Level Educational Requirement: Bachelor's degree
Training Requirement: None
Incumbent workers with a Community College Award or Some Postsecondary Coursework: 35%

Information Technology Project Managers (15-1299.09)
Plan, initiate, and manage information technology (IT) projects. Lead and guide the work of technical staff. Serve as liaison between business and technical aspects of projects. Plan project stages and assess business implications for each stage. Monitor progress to assure deadlines, standards, and cost targets are met.
Sample job titles: Cloud Product Director, Cybersecurity Project Manager, Data Center Product Director, Information Systems Project Manager (IS Project Manager), IT Manager (Information Technology Manager), IT Program Manager (Information Technology Program Manager), IT Project Manager (Information Technology Project Manager), Scrum Master, Transition Program Manager

Appendix: Program Completion and Outcome Methodology

Exhibit 17 displays the average annual California Community College (CCC) awards conferred during the three academic years between 2016 and 2019, from the California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart. Awards are the combined total of associate degrees and certificates issued during the timeframe, divided by three in this case to calculate an annual average. This is done to minimize the effect of atypical variation 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 records provided by 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, 2021a). 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, 2021a).

Job advertisement data is limited to the information provided by employers and the ability of artificial intelligence search engines to identify this information. Additionally, preliminary calculations by Georgetown Center on Education and the Workforce found that "just 30 to 40 percent of openings for candidates with some college or an associate degree, and only 40 to 60 percent of openings for high school diploma holders appear online" (Carnevale et al., 2014). Online job advertisements often do not reveal the hiring intentions of employers; it is unknown if employers plan to hire one or multiple workers from a single online job ad, or if they are collecting resumes for future hiring needs. A closed job ad may not be the result of a hired worker.

Table 1: 2019 to 2024 job growth, wages, education, training, and work experience required, Inland Empire/Desert Region

Occupation (SOC)	2019 Jobs	5-Yr Change	5-Yr % Change	Annual Openings (New + Replacement Jobs)	Entry-Experienced Hourly Wage Range (10th to 90th percentile)	Median Hourly Wage (50th percentile)	Average Annual Earnings	Typical Entry-Level Education & On-The-Job Training Required	Work Experience Required
Computer User Support Specialists (15-1232)	3,561	355	10%	374	$17.48 to $46.30	$27.81	$62,700	Some college, no degree & None	None
Computer Occupations, All Other (15-1299)	3,234	189	6%	297	$17.72 to $62.08	$36.48	$80,700	Bachelor's degree & 1-12 months	None
Computer Systems Analysts (15-1211)	2,126	167	8%	189	$26.96 to $63.81	$41.22	$91,600	Bachelor's degree & None	None
Network and Computer Systems Administrators (15-1244)	1,733	115	7%	146	$25.58 to $62.04	$41.00	$87,100	Bachelor's degree & None	None
Computer Network Architects (15-1241)	679	31	5%	55	$24.63 to $78.37	$52.82	$107,300	Bachelor's degree & None	5 years or more
Information Security Analysts (15-1212)	304	60	20%	35	$29.86 to $79.75	$55.72	$114,700	Bachelor's degree & None	Less than 5 years
Total	**11,638**	**918**	**8%**	**1,095**	-	-	-	-	-

Source: Emsi 2020.4