

# Computer Data Science

*Inland Empire/Desert Region (IEDR, Riverside and San Bernardino counties combined)*

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*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.*

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## Summary

- The community college **computer systems analysis** program provides the knowledge, skills, and abilities that lead to the **computer systems analyst occupation**. The *computer systems analysts* is a **four-year degree-level occupation** and is an **essential critical infrastructure occupation**.
- The *computer systems analysts* occupation is projected to have **189 annual job openings, increasing employment by 8%** through 2024.
- The **10<sup>th</sup> percentile hourly wage** for this occupation is **\$26.96 per hour, above the regional \$21.78 per hour self-sustainable wage standard** for a single adult with one child.
- One community college in the IEDR conferred an annual average of **2 awards** in programs related to computer systems analysis over the last three academic years.

## Introduction

This report provides data on programs and occupation related to computer data science; the related California Community College program is computer systems analysis (TOP 0707.30). Computer systems analysis programs prepare students for employment through the instruction of systems analysis and design, including the recognition, definition, and improvement of processes through the use of computer technology and methodologies (Taxonomy of Programs, 2012).

The knowledge, skills, and abilities trained by computer systems analysis programs lead to the *computer systems analyst* occupation. *Computer systems analysts* is a four-year degree-level occupation is a four year degree-level occupation. Employers typically require candidates to hold a bachelor's degree to enter employment in this field. The Public Policy Institute of California identifies this occupation as an essential critical infrastructure occupation. This classification of occupations is vital in supporting California's basic health, safety, and economic needs or may have the ability to social distance (Bohn et al.).

### **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%*

Aside from the occupation listed above, there are other occupations related to computer data science that have been omitted from this report. The occupations, *computer and information research scientists* (15-1221) and *data scientists and mathematical science occupations, all other* (15-2098), contain the common job title, data scientist. However, *computer and information research scientists* typically require a master's degree prior to employment, indicating that a community college computer systems analysis program would not prepare students for employment in this occupation. While *data scientists and mathematical science occupations, all other* may capture some demand for data scientists, this broad occupational code includes information for unrelated positions. These occupations have been omitted from this report to prevent an overstatement of demand.

## Job Opportunities

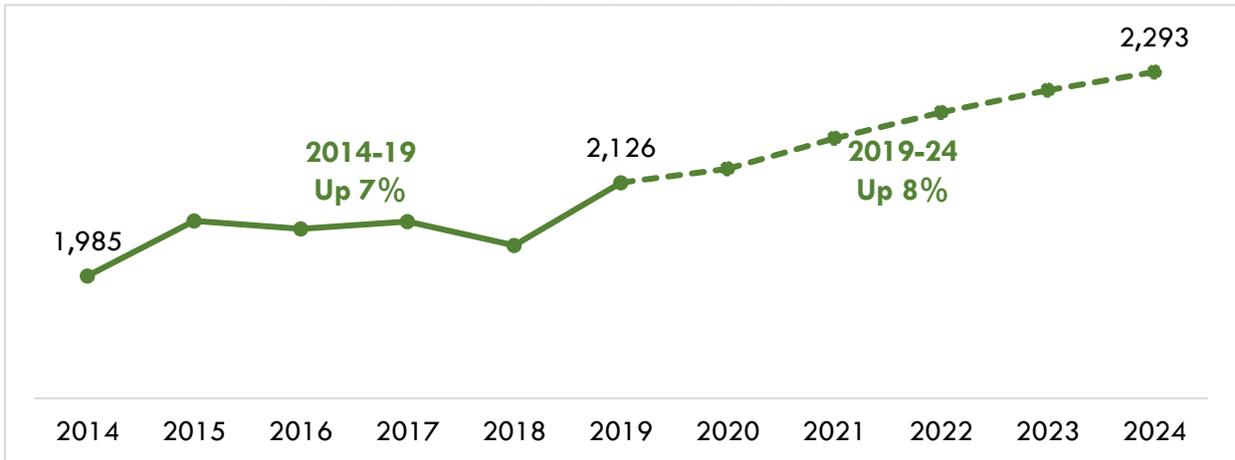
In 2019, there were 2,126 *computer systems analyst* jobs in the Inland Empire/Desert Region. The *computer systems analyst* occupation is projected to have 189 annual job openings to fill new or backfill jobs that workers are permanently vacating (includes occupational transfers and retirements). This occupation is expected to increase employment by 8% through 2024. Exhibit 1 displays five-year projected job growth, and Exhibit 2 displays historical (2014 to 2019) and projected (2019-2024) jobs for this occupation.

*Exhibit 1: Computer systems analysts five-year projections, 2019-2024*

2019 Jobs	2024 Jobs	5-Yr % Change (New Jobs)	5-Yr Openings (New + Replacement Jobs)	Annual Openings (New + Replacement Jobs)	% of workers age 55+
2,126	2,293	8%	1,136	189	20%

Source: EMSI 2020.4

Exhibit 2: Historical and projected jobs for computer systems analysts, 2014 – 2024



Source: EMSI 2020.4

## Job Postings

Exhibit 3 displays the number of online job ads posted over the last 12 months, along with the regional and statewide average time to fill for computer data science positions. Data analyst is a common job title for the emerging occupation, business intelligence analysts. This emerging occupation has been included in this job ad search to increase the number of computer data science job advertisements from which to extract real-time information. Job ads have been limited to positions that require computer data science and data analysis skills and the key terms, "junior data analyst" and "junior data scientist" were included in the search criteria.

On average, local employers fill online job postings for computer data science positions within 64 days, 13 days longer than the statewide average of 51 days, indicating that it may be much harder for local employers to fill open positions than other employers in California as a whole. Job advertisements in the region account for 0.5% of the 11,074 statewide job advertisements.

Exhibit 3: Job ads and time to fill

Job Ads	Regional Average Time to Fill (Days)	California Average Time to Fill (Days)
245	64	51

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 10<sup>th</sup> percentile hourly wage for *computer systems analysts* exceeds the Family Needs Calculator self-sustainability rate, indicating that approximately the top 90% of workers in this occupation earn self-sufficient hourly wages. Exhibit 4 displays the hourly earnings for the region.

Exhibit 4: Hourly earnings by percentile



Source: EMSI 2020.4

According to occupational guides developed by the California Labor Market Information Division, most employers offer *computer systems analysts* benefit packages that include health, dental, and vision insurance, holidays, vacation, and retirement plans (Detailed Occupational Guides, 2020).

## Job Titles

Exhibit 5 displays the job titles most frequently included in employer advertisements for computer data science positions over the last 12 months. Only one advertisement sought candidates to fill positions with "junior" in the job title.

*Exhibit 5: Job titles most frequently included in job advertisements for computer data science positions*

Job Titles	Job Ads
Data Analyst	59
Data Analyst, Risk Adjustment	7
Business Information Analyst Senior	6
Business Information Analyst II	6
Data Analyst II	5
Data Analyst - Int	5
All other job titles	157
<b>Total</b>	<b>245</b>

Source: Burning Glass – Labor Insights

## Employers, Skills, Education, and Work Experience

Exhibit 6 displays the employers posting the most online job advertisements for computer data science positions during the last 12 months in the region.

*Exhibit 6: Employers posting the most online job ads*

Employers	Job Ads
Anthem Blue Cross	63
San Manuel Band of Mission Indians	10
SAC Health System	3
Citizens Business Bank	3
San Bernardino County	3
Riverside County	3
All other employers	160
<b>Total</b>	<b>245</b>

Source: Burning Glass – Labor Insights

Exhibit 7 displays a sample of specialized, employability, and software and programming skills employers seek when looking for workers to fill computer data science positions. Specialized skills are occupation-specific skills that employers request 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 postings may be utilized to guide curriculum development.

*Exhibit 7: Sample of in-demand skills from employer online job ads*

Specialized Skills	Employability Skills	Software and Programming Skills
<ul style="list-style-type: none"> <li>• Data Analysis</li> <li>• Decision Support</li> <li>• Ad Hoc Reporting</li> <li>• Business Analysis</li> <li>• Data Mining</li> </ul>	<ul style="list-style-type: none"> <li>• Problem Solving</li> <li>• Communication Skills</li> <li>• Writing Planning</li> <li>• Teamwork/Collaboration</li> <li>• Detailed-Oriented</li> </ul>	<ul style="list-style-type: none"> <li>• SQL</li> <li>• Microsoft Excel</li> <li>• Tableau</li> <li>• Statistical Analysis System (SAS)</li> <li>• Microsoft Access</li> </ul>

Source: Burning Glass – Labor Insights

Exhibit 8 displays the entry-level education typically required to enter employment as a *computer systems analyst* 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 requirement from employer job ads for computer data science positions. Most employers (89%) were seeking a candidate with a bachelor's degree or higher as a minimum education requirement.

*Exhibit 8: 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 Systems Analysts	Bachelor's degree	21%	173	8%	3%	89%

Source: EMSI 2020.4, Burning Glass – Labor Insights

\*Percentage of incumbent workers with a Community College Award or Some Postsecondary Coursework

Exhibit 9 displays the work experience typically required for *computer systems analysts* and the real-time work experience requirements from employer job ads for computer data science positions. The majority of employers sought candidates with three to five years of previous work experience. Most employers were seeking a candidate with 3-5 years of work experience.

*Exhibit 9: 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 Systems Analysts	None	198	34%	60%	6%

Source: EMSI 2020.4, Burning Glass – Labor Insights

## Advertised Salary

Exhibit 10 displays advertised salary data for computer data science positions over the 12 months. Advertised salary information reveals that employers are willing to pay data computer science positions with data science skills \$71,000 annually, 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% (51 out of 245) online job postings for these occupations provided salary information. The salary figures are prorated to reflect full-time, annual wage status.

*Exhibit 10: Advertised salary information*

Number of job postings	Real-Time Salary Information				Average Annual Salary
	Less than \$35,000	\$35,000 to \$49,999	\$50,000 to \$74,999	More than \$75,000	
51	4%	20%	37%	39%	\$71,000

Source: Burning Glass – Labor Insights

## Student Completions and Program Outcomes

Exhibit 11 displays the annual average awards for computer systems analysis (TOP 0707.30) programs in the Inland Empire/Desert Region. The training provided by this program is most closely aligned with the computer data science field. Please note that the Riverside City College's computer systems analysis program does not provide training specific to computer data science. No computer data science programs were found in the region.

*Exhibit 11: 2016-19, Annual average community college awards for the computer systems analysis programs in the Region*

<b>0707.30 – Computer Systems Analysis</b>	<b>Certificate requiring 6 to &lt; 18-semester units</b>	<b>Total CC Annual Average Awards, Academic Years 2016-19</b>
Riverside	2	2
<b>Total</b>	<b>2</b>	<b>2</b>

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 codes and region is provided in Exhibit 12. The outcome methodology is available in the appendix section of this report. Dashes indicate there were too few students from which to obtain program outcome information.

*Exhibit 12: 0707.30 – Computer systems analysis strong workforce program outcomes*

<b>Strong Workforce Program Metrics: 0707.30 – Computer Systems Analysis Academic Year 2017-18, unless noted otherwise</b>	<b>Inland Empire/Desert Region</b>	<b>California</b>
Unduplicated count of enrolled students (2018-19)	192	1,153
Completed 9+ career education units in one year (2018-19)	55%	45%
Perkins Economically disadvantaged students (2018-19)	86%	82%
Transferred to a four-year institution (transfers)	20	112
Job closely related to the field of study (2016-17)	-	63%
Median annual earnings (all exiters)	\$27,550	\$32,354
Median change in earnings (all exiters)	41%	30%
Attained a living wage (completers and skills-builders)	53%	58%

Sources: LaunchBoard Community College Pipeline and Strong Workforce Program Metrics

## Recommendation

The community college computer systems analysis program provides the knowledge, skills, and abilities that lead to the *computer systems analyst* occupation. The *computer systems analysts* occupation is projected to have 189 annual job openings, increasing employment by 8% through 2024. The 10<sup>th</sup> percentile hourly wage for this occupation is \$26.96 per hour, above the regional \$21.78 per hour self-sustainable earnings standard for a single adult with one child. The *computer systems analysts* is a four-year degree-level occupation *and* is an essential critical infrastructure occupation.

Riverside City College offers the computer systems analysis program, awarding two annual average certificates over the last three academic years. Riverside City's program does not provide computer data science training; no computer data science-specific programs were found in the region. The median annual earnings of all exiters were \$27,550, and 53% of completers and skills-builders attained a living wage.

The COE recommends expanding existing computer systems analysis programs to meet the regional need for more workers in this field. To be clear, community college program completers will likely need to transfer to a four-year educational institution to obtain a bachelor's degree before entering employment. Colleges considering this program should partner with four-year educational institutions and local employers to ensure their training provides the skills and certifications needed to transfer to a four-year educational institution and obtain a job in this field.

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January 2021

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## Appendix: Program Completion and Outcome Methodology

Exhibit 11 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, 2020a). 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, 2020a).

Job postings 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 postings 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 posting, or if they are collecting resumes for future hiring needs. A closed job posting 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 (10 <sup>th</sup> to 90 <sup>th</sup> percentile)	Median Hourly Wage (50 <sup>th</sup> percentile)	Average Annual Earnings	Typical Entry-Level Education & On-The-Job Training Required	Work Experience Required
Computer Systems Analysts (15-1211)	2,126	167	8%	189	\$26.96 to \$63.81	\$41.22	\$91,600	Bachelor's degree & None	None

Source: EMSI 2020.4