

## Program Endorsement Brief:

# Data and Business Analysts: SAS, Python, Hadoop, SQL, Tableau for Sierra College and Sacramento City College

## INTRODUCTION

Sierra College and Sacramento City College are exploring program opportunities related to technical data analysis and data visualization for business using programming languages and applications including SAS, Python, Hadoop, SQL and Tableau.

This report's research methods incorporate labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau from EMSI and job posting data from Burning Glass.

The report provides estimates and indicators of the labor market outlook for students exiting related programs. It contains the following sections:

- Occupational demand and Earnings
- Job posting data related to skills, employers and job titles;
- Educational supply;
- Student wages and employment outcomes; and
- Findings and recommendations
- Student wage and employment outcomes
- Findings and recommendations

## OCCUPATIONAL DEMAND

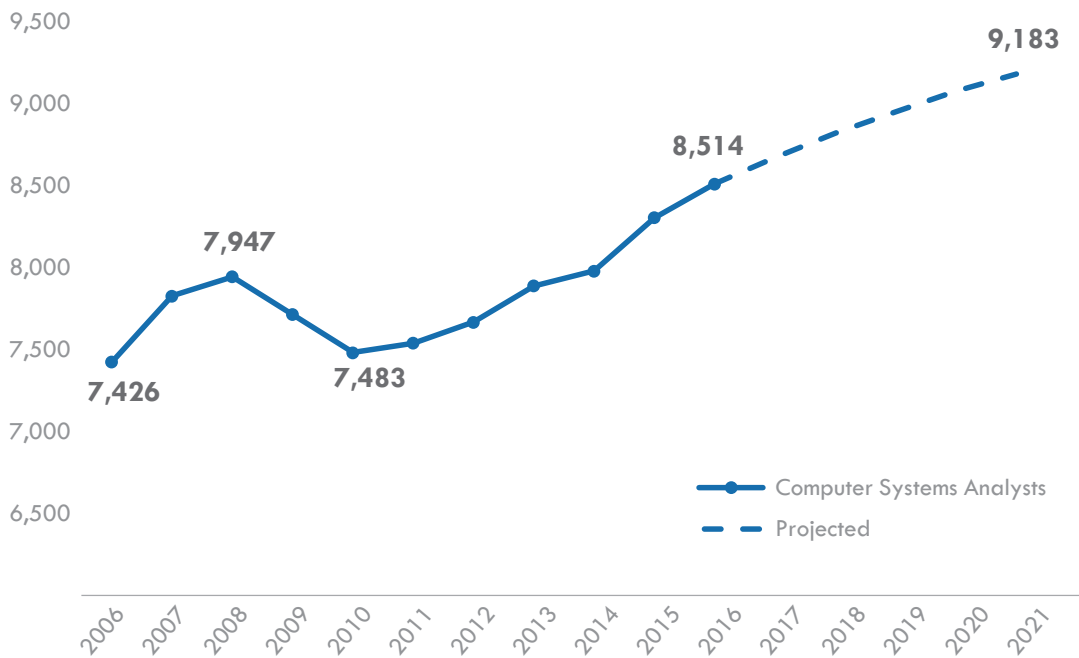
The closest Standard Occupational Classification (SOC) code related to business occupations that specialize in software and programming languages with the appropriate education level is Computer Systems Analysts, SOC 15-1121. (See Appendix A.)

This SOC code provides an indication of the size and performance of the labor market for this occupation between 2006 and 2016, and the projected labor market demand from 2016 through 2021.

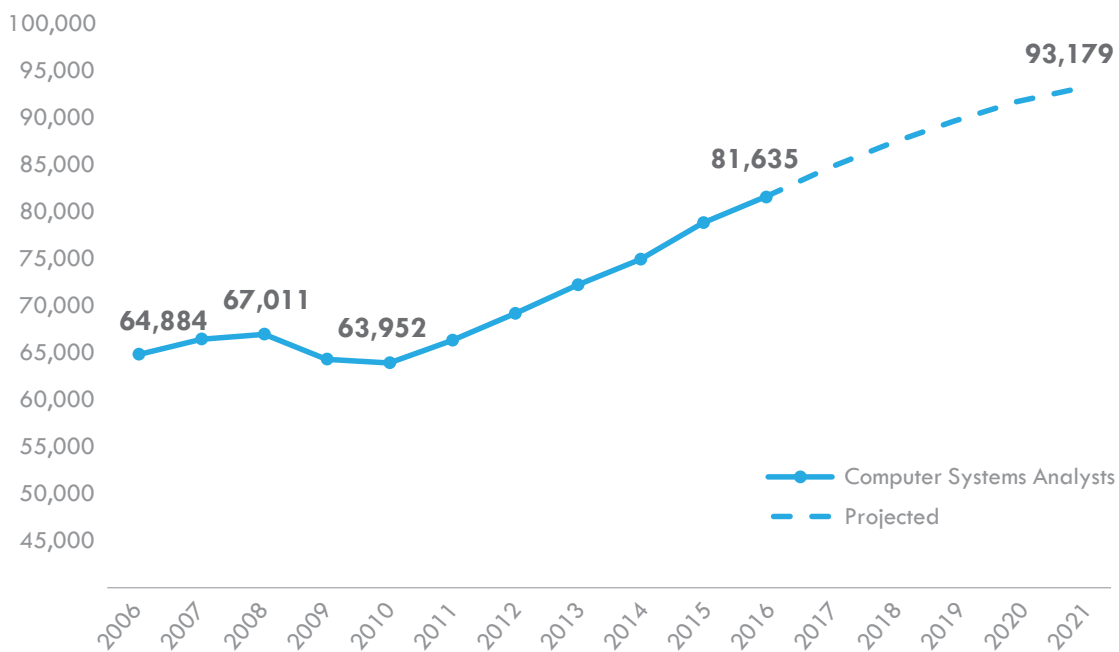
Computer systems analysts are projected to increase 7 percent, adding nearly 670 new jobs, over the next five years in the greater Sacramento region (Exhibit 1a). The occupation will grow by 11,500 jobs across the state, an increase of 14 percent, over the next five years (Exhibit 1b).

# OCCUPATIONAL DEMAND

**Exhibit 1a: Number of jobs by occupation in the greater Sacramento region (2006–2021)<sup>1</sup>**



**Exhibit 1b: Number of jobs by occupation in California (2006–2021)<sup>2</sup>**



<sup>1</sup> EMSI. 2017.3 QCEW Employees, Non-QCEW Employees and Self-Employed. The seven-county Sacramento region includes Sacramento, El Dorado, Placer, Sutter, Yolo and Yuba counties.

<sup>2</sup> Ibid.

# OCCUPATIONAL DEMAND

Five-year projected growth for computer systems analysts in the greater Sacramento region and the state is robust, 7 percent and 14 percent, respectively. There are more than 660 projected annual openings in the greater Sacramento region and nearly 7,000 in the state (Exhibit 2).

**Exhibit 2: Occupational demand in the greater Sacramento region and California<sup>3</sup>**

SOC	Description/Geography	2016 Jobs	2021 Jobs	2016–2021 Change	2016–2021 % Change	Annual Openings
15-1121	Computer Systems Analysts (Greater Sacramento)	8,514	9,183	669	7%	666
15-1121	Computer Systems Analysts (California)	81,635	93,179	11,544	14%	6,957

## EARNINGS

Entry-level and experienced wages for computer systems analysts are higher than the self-sufficient wage for one adult and one child of preschool age in Sacramento County, \$20.98 per hour (Exhibit 3a). Experienced workers earn more than \$40 per hour in the region. Across the state, the median and experienced wages for workers in this occupation are dramatically higher than in the Sacramento region (Exhibit 3b).

**Exhibit 3a: Wages in the greater Sacramento region<sup>5</sup>**



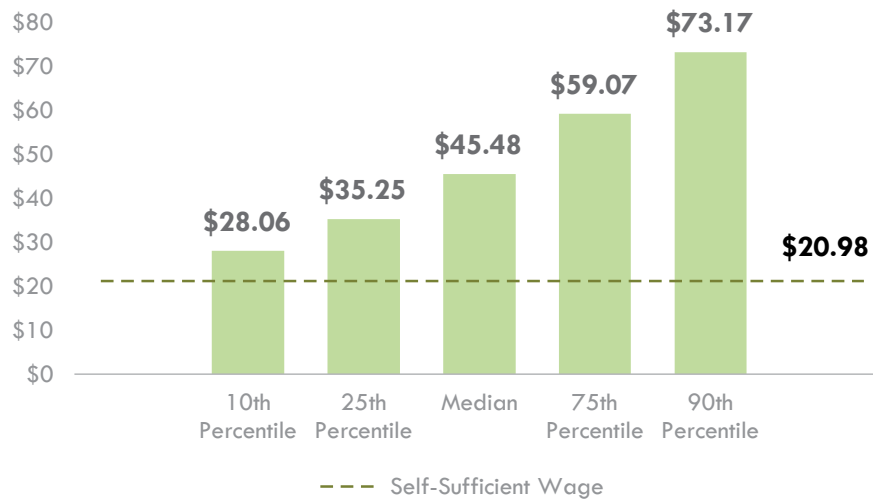
<sup>3</sup> Ibid. Five-year change represents new job additions to the workforce. Annual openings includes new jobs and replacement jobs that result from retirements and separations.

<sup>4</sup> Insight Center for Community Economic Development, Self-Sufficiency Standard tool for California. <https://insightcced.org/tools-metrics/self-sufficiency-standard-tool-for-california/>

<sup>5</sup> EMSI. 2017.3 QCEW Employees, Non-QCEW Employees and Self-Employed.

# EARNINGS

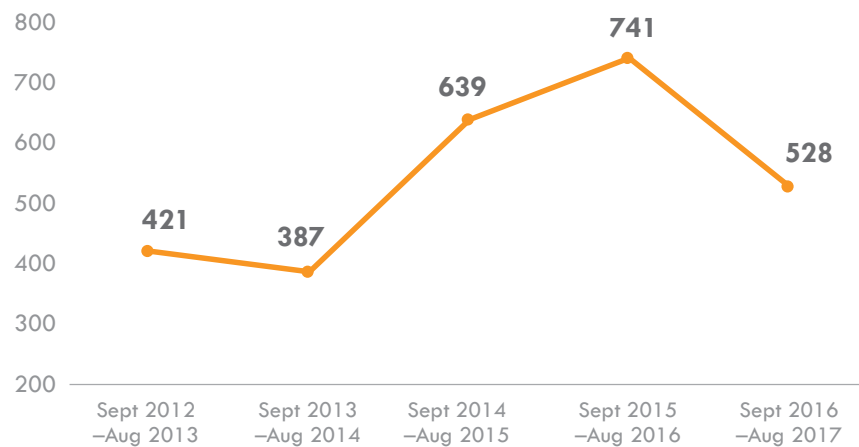
**Exhibit 3b: Wages in California<sup>6</sup>**



# JOB POSTINGS

Exhibit 4 illustrates the number of job postings for data and business analysts from September 2012 through August 2017 in the greater Sacramento region. The number of job postings increased dramatically between September 2014 and August 2016, there has been a decline in the number of postings over the last 12 months.

**Exhibit 4: Historical job postings in the greater Sacramento region<sup>8</sup>**



<sup>6</sup> Ibid.

<sup>7</sup> 2017.3. Burning Glass, Labor Insight. Note the change in terminology, data and business analysts compared to computer systems analysts, which is due to the more expansive search criteria in the job posting data. Job postings contain one or more of the following keywords: Big Data, Hadoop, Python, SAS, SQL and Tableau. Generally, these keywords appear together as a group in the postings as preferred or required skills. Search criteria filtered by occupation, expanding from the BLS data, are included above since Burning Glass allows for 8-digit O\*NET code search criteria. The search was filtered by computer systems analysts and Business Intelligence Analysts.

<sup>8</sup> Ibid. Criteria included 12-month data pulls for each year between September 1, 2016 and August 31, 2017.

# JOB POSTINGS

The colleges are considering offering programs with coursework in applications and programming languages that are strongly represented in the job postings data for data and business analysts (Exhibit 5).

## Exhibit 5: Top Skills in the greater Sacramento region<sup>9</sup>

Specialized Skills	Software/Programming Skills
• Data Analysis	• SQL
• Project Management	• Oracle (PL/SQL)
• Systems Analysis	• Microsoft Excel, Access, Word, PowerPoint
• Software Development	• Tableau
• Business Intelligence	• SAS
• Relational Databases	• JAVA
• Business Analysis	• Python

## TOP EMPLOYERS AND WORK LOCATIONS

Exhibit 6 lists the top industries for data and business analysts. Nearly half of the postings did not contain the name of the employer.

## Exhibit 6: Top industries and employers in the greater Sacramento region<sup>10</sup>

Top Industries	Top Employers
• Insurance Carriers	• Accenture
• General Medical and Surgical Hospitals	• Sutter Health
• Management, Scientific and Technical Consulting Services	• Anthem Blue Cross
• Computer Systems Design and Related Services	• Health Net Inc.
• Colleges, Universities and Professional Schools	• Blue Shield of California
	• University of California

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

# TOP EMPLOYERS AND WORK LOCATIONS

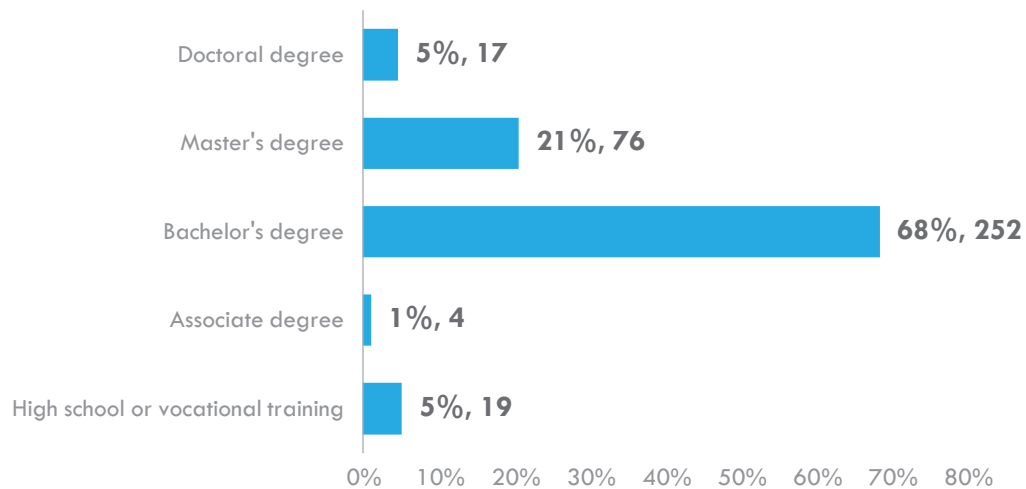
Exhibit 7 lists the top job titles for data and business analysts in the job posting data.

## Exhibit 7: Top titles in the greater Sacramento region<sup>11</sup>

Top Titles
• Data Analyst
• Systems Analyst
• Business Systems Analyst
• Business Intelligence Developer
• Information Technology Analyst
• Business Intelligence Analyst

The BLS lists a bachelor’s degree as the typical entry-level education for computer systems analysts. In the more than 250 job postings for data and business analysts in the greater Sacramento region containing education levels, more than 90 percent of postings cited at least a bachelor’s degree. Only four postings over the last year (September 2016-August 2017) cited an associate degree (Exhibit 8).

## Exhibit 8: Education level in job postings in the greater Sacramento region (n=278)<sup>13</sup>



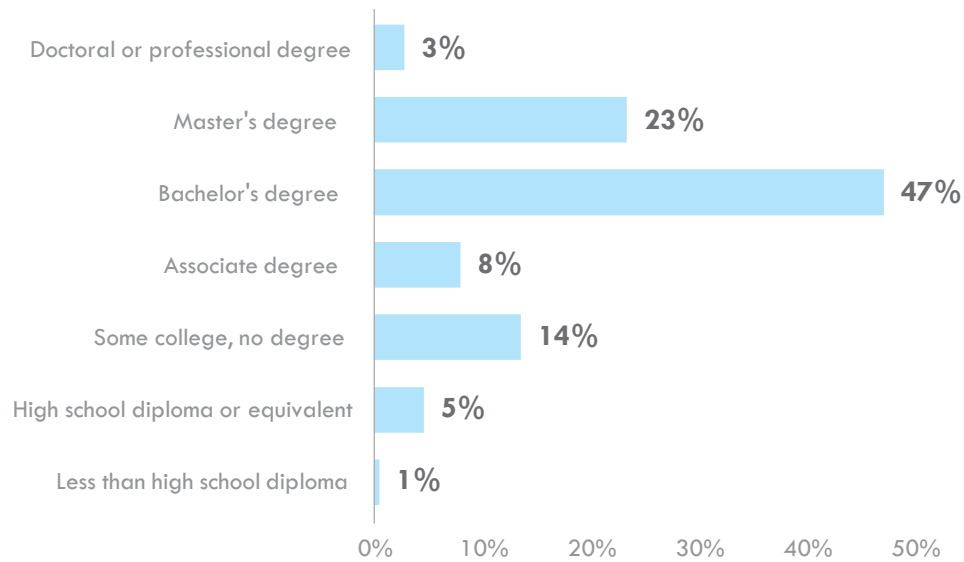
<sup>11</sup> Ibid.

<sup>12</sup> EMSI. 2017.3 QCEW Employees, Non-QCEW Employees and Self-Employed.

<sup>13</sup> 2017.3. Burning Glass, Labor Insight.

# TOP EMPLOYERS AND WORK LOCATIONS

**Exhibit 9: Educational attainment in the United States** (SOC 15-1121, Computer Systems Analysts)<sup>14</sup>

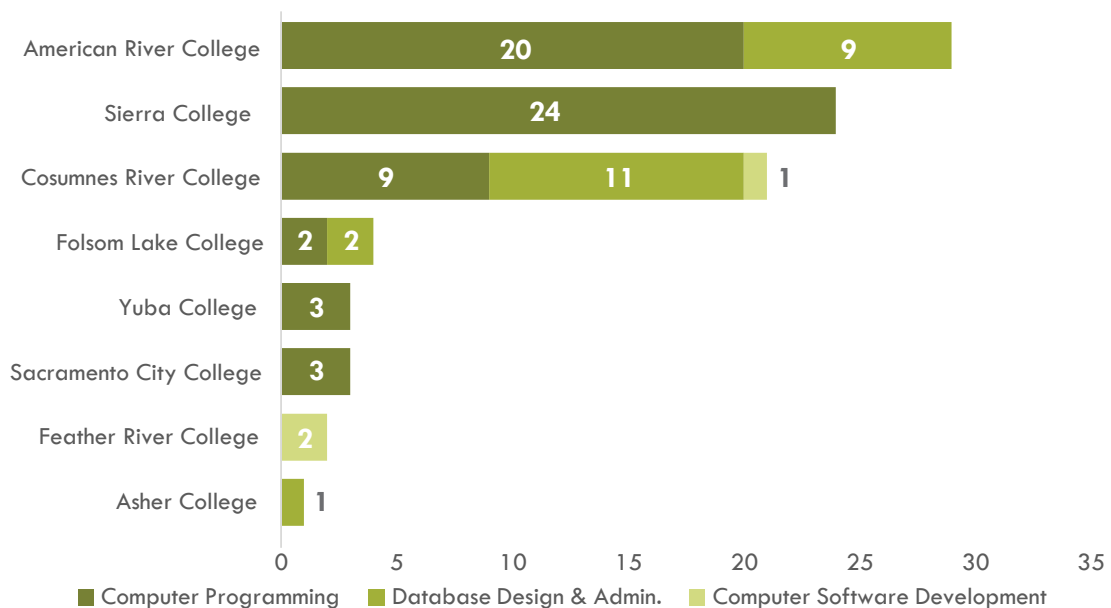


## EDUCATIONAL SUPPLY

Exhibit 10 displays the three-year average for awards conferred by community college programs with related TOP codes. The exhibit also includes one private technical/proprietary program provider, Asher College.

American River College, Sierra College and Cosumnes River College had the most completions in the region. The three-year annual average is fewer than 90 awards for all institutions. Exhibit 11 provides the detailed counts for each program, institution and academic year between 2013 and 2016.

**Exhibit 10: Three-year average awards (certificates and degrees), 2013–2016**<sup>15</sup>



<sup>14</sup> Current Population Survey, Educational Attainment for Workers 25 Years and Older by Detailed Occupation, 2014-2015. [https://www.bls.gov/emp/ep\\_table\\_111.htm](https://www.bls.gov/emp/ep_table_111.htm) Data is based on SOC 15-1121, Computer Systems Analysts

<sup>15</sup> COE Supply Tables, California Community Colleges Chancellor's Office DataMart.

# EDUCATIONAL SUPPLY

**Exhibit 11: Regional community college awards (certificates and degrees), 2013–2016<sup>16</sup>**

TOP Code	Description/College	2013–2014	2014–2015	2015–2016	3-Year Average
<b>0707.00</b>	<b>Computer Software Development Total</b>	<b>1</b>	<b>4</b>	<b>6</b>	<b>4</b>
	Cosumnes River	1	3		1
	Feather River		1	6	2
<b>0707.10</b>	<b>Computer Programming Total</b>	<b>59</b>	<b>55</b>	<b>72</b>	<b>62</b>
	American River	20	20	19	20
	Cosumnes River	11	5	12	9
	Folsom Lake	1	1	4	2
	Sacramento City	3	2	5	3
	Sierra	24	23	26	24
	Yuba		4	6	3
<b>0707.20</b>	<b>Database Design and Administration Total</b>	<b>18</b>	<b>23</b>	<b>29</b>	<b>23</b>
	Asher College		2		1
	American River	7	11	10	9
	Cosumnes River	10	9	14	11
	Folsom Lake	1	1	4	2
	Sacramento City			1	0
	<b>TOTAL</b>	<b>78</b>	<b>82</b>	<b>107</b>	<b>89</b>

<sup>16</sup> COE Supply Tables, California Community Colleges Chancellor's Office DataMart.



# STUDENT OUTCOMES

Exhibit 12 summarizes employment and wage outcomes for the three relevant TOP codes based on the Career Technical Education Outcomes Survey (CTEOS) conducted by Santa Rose Junior College. Respondents report significant wage increases, an average increase of at least \$5 per hour. Most report finding employment in a field that close to the field of study.

## Exhibit 12: CTEOS findings, California, 2013–2016<sup>17</sup>

Metric	Computer Software Development 0707.00 (n=106)	Computer Programming 0707.10 (n=1,069)	Database Design and Administration 0707.02 (n=27)
Higher wages <sup>18</sup>	74% (39)	75% (337)	73% (11)
Average hourly wage before coursework <sup>19</sup>	\$22.08	\$19.30	\$29.90
Average hourly wage after coursework <sup>20</sup>	\$28.12	\$27.10	\$37.75
“Very close” Relationship of current job to field of study <sup>21</sup>	34% (76)	45% (733)	30% (6)

<sup>17</sup> CTEOS is a survey of former students in CTE programs, conducted one year after exiting the community college system. Students either earned an award or took at least 9 units in the same 2-digit TOP code. The total sample size and total number of respondents for each question are included in parentheses. <https://cteos.santarosa.edu/>

<sup>18</sup> Percent of respondents reporting “higher wages” for the change after having taken courses in the field of study.

<sup>19</sup> Average wages from responses to the question, “What was your hourly wage before your coursework?”

<sup>20</sup> Average wages from responses to the question, “What was your hourly wage at your current job?”

<sup>21</sup> Percent of respondents based on the question, “If you are working, how closely related to your field of study is your current job?” Other answer choices include “Close” and “Not Close.”

# FINDINGS AND RECOMMENDATIONS

- Occupational demand for computer systems analysts has been strong and is expected to remain so, with 670 new jobs projected over the next five years in the greater Sacramento region. This occupation is expected to grow by 7 percent in the greater Sacramento region and by 14 percent in California through 2021.
- Wages for the related occupation are high, with a median wage above \$40/hour in the region. Wages are considerably higher in other parts of the state than in the greater Sacramento region.
- Job posting data shows there are many employers seeking the application and programming skills in the proposed programs. However, job postings have declined over the past year.
- Health care employers and the University of California are the top employers of data and business analysts in the region.
- Measuring just one occupation, and three related program areas, there is an indication that the community colleges are not meeting demand from employers in the greater Sacramento region. (Annual openings outweigh the number of credential completions.) Educational attainment data, however, suggests that workers in the related occupation mostly have at least a bachelor's degree. About 20 percent of existing workers have some college or an associate degree. Job posting analysis suggests most employers prefer or require applicants with at least a bachelor's degree. The research did not account for related coursework at four-year schools in the supply data. Regionally, related CIP codes did not reveal completions from Sacramento State University or UC Davis. It is likely that the four-year universities are supplying at least some of the labor market. Additional research should explore employer sources for hiring, and potential pathways for community college programs to support transfer; technical workers in transition or incumbent workers needing upskilling represent additional program targets.
- Students who have completed a significant amount of coursework in related programs report significant wage increases and finding employment in closely related fields.
- The community colleges should consider designing their programs with transfer in mind; similarly, programs can target post-baccalaureate students, incumbent workers, and workers in transition with technical backgrounds for upskilling opportunities.

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# APPENDIX A: DETAILED OCCUPATIONAL DESCRIPTION

## Computer Systems Analysts (SOC 15-1121.00):

Analyze science, engineering, business, and other data processing problems to implement and improve computer systems. Analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations. May analyze or recommend commercially available software. Sample reported job titles include:

- Applications Analyst
- Business Analyst
- Business Systems Analyst
- Computer Analyst
- Computer Systems Analyst
- Computer Systems Consultant
- Information Systems Analyst
- Information Technology Analyst
- Systems Analyst

# APPENDIX B: SOURCES

- O\*NET Online
- Labor Insight/Jobs (Burning Glass)
- Economic Modeling Specialists, International (EMSI)
- Employment Development Department, Labor Market Information Division, OES
- Employment Development Department, Unemployment Insurance Dataset
- Career Technical Education (CTE) LaunchBoard
- CTE Outcomes Survey (CTEOS)
- Living Insight Center for Community Economic Development
- California Community Colleges Chancellor's Office Management Information Systems (MIS)