Computer Programming (0707.10)
Computer Software Development (0707)

March 2018

Prepared by the South Central Coast Center of Excellence for Labor Market Research

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Program Recommendation

This report was compiled by the South Central Coast[1] Center of Excellence to provide regional labor market data for the program recommendation of computer programming. This report can help determine whether there is demand in the local labor market that is not being met by the supply from programs of study (CCC and non-CCC) that align with this occupation group.

- Over the next five years there will be over 8,400 job opportunities available annually for occupations related to Computer Programming
- On average, in the past three years there have been an average of 10 completions each year for the Computer Programming/Programmer, General program in the South Central Coast region
- Most employers overwhelmingly seek candidates with a bachelor's degree
- Completers of the Computer Software Development program (TOP 0707) from the 2015-2016 academic year had annual earnings of $29,342, and 60% of completers earned a living wage. Over 50% of completers are employed within six months of completing a program.

Occupation Codes and Descriptions

Currently, there are four occupation in the standard occupational classification (SOC) system that are related to computer programming (TOP 0707.10). The occupation titles and descriptions, as well as reported job titles are included in Exhibit 1.

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[1] The South Central Coast Region consists of San Luis Obispo County, Santa Barbara County, Ventura County, and the following cities from North Los Angeles County: Canyon Country, Castaic, Lake Hughes, Lancaster, Littlerock, Llano, Newhall, Palmdale, Pearblossom, Santa Clarita, Stevenson Ranch, and Valencia.

Exhibit 1 – Occupation, description, and sample job titles

SOC Code	Title	Description	Sample of Reported Job Titles
15-1131	Computer Programmers	Create, modify, and test the code, forms, and script that allow computer applications to run. Work from specifications drawn up by software developers or other individuals. May assist software developers by analyzing user needs and designing software solutions. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.	Analyst Programmer, Applications Developer, Computer Programmer, Computer Programmer Analyst, Internet Programmer, Java Developer, Programmer, Programmer Analyst, Software Developer, Web Programmer
15-1132	Software Developers, Applications	Develop, create, and modify general computer applications software or specialized utility programs. Analyze user needs and develop software solutions. Design software or customize software for client use with the aim of optimizing operational efficiency. May analyze and design databases within an application area, working individually or coordinating database development as part of a team. May supervise computer programmers.	Application Developer, Application Integration Engineer, Applications Developer, Computer Consultant, Information Technology Analyst (IT Analyst), Software Architect, Software Developer, Software Development Engineer, Software Engineer, Technical Consultant
15-1133	Software Developer, Systems Software	Research, design, develop, and test operating systems-level software, compilers, and network distribution software for medical, industrial, military, communications, aerospace, business, scientific, and general computing applications. Set operational specifications and formulate and analyze software requirements. May design embedded systems software. Apply principles and techniques of computer science, engineering, and mathematical analysis.	Developer, Infrastructure Engineer, Network Engineer, Publishing Systems Analyst, Senior Software Engineer, Software Architect, Software Developer, Software Engineer, Systems Coordinator, Systems Engineer
15-1134	Web Developers	Design, create, and modify Web sites. Analyze user needs to implement Web site content, graphics, performance, and capacity. May integrate Web sites with other computer applications. May convert written, graphic, audio, and video components to compatible Web formats by using software designed to facilitate the creation of Web and multimedia content.	Designer, Technology Applications Engineer, Web Architect, Web Design Specialist, Web Designer, Web Developer, Web Development Director, Web Development Instructor, Webmaster

Source: O*NET Online

Current and Future Employment

In the South Central Coast region, the number jobs related to computer programming (TOP 0707.10) is expected to remain steady over the next five years. Over 8,400 job opportunities will be available annually for this occupation through 2022. Exhibit 2 contains detailed employment projections data for this occupation.

Exhibit 2 – Five-year projections for computer programming in the South Central Coast region

SOC	Occupation	2017 Jobs	2022 Jobs	2017-2022 Change	2017-2022 % Change
15-1131	Computer Programmers	1,369	1,360	-9	-1%
15-1132	Software Developers, Applications	2,850	3,290	440	15%
15-1133	Software Developer, Systems Software	2,972	3,147	175	6%
15-1134	Web Developers	1,251	1,371	120	10%

Source: Economic Modeling Specialists International (EMSI)

Earnings

In the South Central Coast region, the average wage for the listed occupations is $47.61 per hour. The average annual earnings is $42,370 per year, assuming full-time employment.

Exhibit 3 contains hourly wages and annual average earnings for this occupation. Entry-level hourly earnings is represented by the 25th percentile of wages, median hourly earnings is represented by the 50th percentile of wages, and experienced hourly earnings is represented by the 75th percentile of wages, demonstrating various levels of employment.

Exhibit 3 – Earnings for computer programming in the South Central Coast region

SOC	Occupation	Entry-Level Hourly Earnings	Median Hourly Earnings	Experienced Hourly Earnings
15-1131	Computer Programmers	$29.08	$38.80	$50.91
15-1132	Software Developers, Applications	$36.10	$47.92	$60.12
15-1133	Software Developer, Systems Software	$41.30	$54.70	$69.17
15-1134	Web Developers	$18.33	$22.69	$35.72

Source: Economic Modeling Specialists International (EMSI)

Employer Job Postings

In this research brief, real-time labor market information is used to provide a more nuanced view of the current job market, as it captures job advertisements for occupations relevant to the field of study. Employer job postings are consulted to understand who is employing computer programmers, and what they are looking for in potential candidates. To identify job postings related to computer programming, the following standard occupational classifications were used:

15-1131	Computer Programmers
15-1132	Software Developers, Applications
15-1133	Software Developer, Systems Software
15-1134	Web Developers

Top Occupations

In 2017, there were 3,128 employer postings for occupations related to computer programming. There were 3,210 job postings for the same occupations in 2016, and 4,731 job postings in 2015.

Exhibit 4 – Top occupations in job postings

SOC Code	Occupation	Job Postings, Full Year 2017
15-1131	Computer Programmers	234
15-1132	Software Developers, Applications	2,323
15-1133	Software Developer, Systems Software	49
15-1134	Web Developers	522

Source: Labor Insight/Jobs (Burning Glass)

Top Titles

The top job titles for employers posting ads for computer programmers are listed in Exhibit 5. Software development engineer is mentioned as the job title in 28% of all relevant job postings (3,197 postings).

Exhibit 5 –Job titles

Title	Job Postings, Full Year 2017
Software Development Engineer	882
Net Developer	131
Java Software Developer	125
Software Developer	124
Programmer/Analyst	63

Source: Labor Insight/Jobs (Burning Glass)

Top Employers

Exhibit 6 lists the major employers hiring professionals in the computer programming field. The top employer posting job ads was Krg Technologies. The top worksite cities in the region for these occupations were Valencia, Goleta, San Luis Obispo, Palmdale, and Santa Barbara.

Exhibit 6 – Top employers (n=3,197)

Employer	Job Postings, Full Year 2017
Krg Technologies	256
Lockheed Martin	50
Northrop Grumman	50
Mindbody Software	45
Raytheon	35

Source: Labor Insight/Jobs (Burning Glass)

Skills

Software engineering is the most sought after skill for employers hiring computer programming.
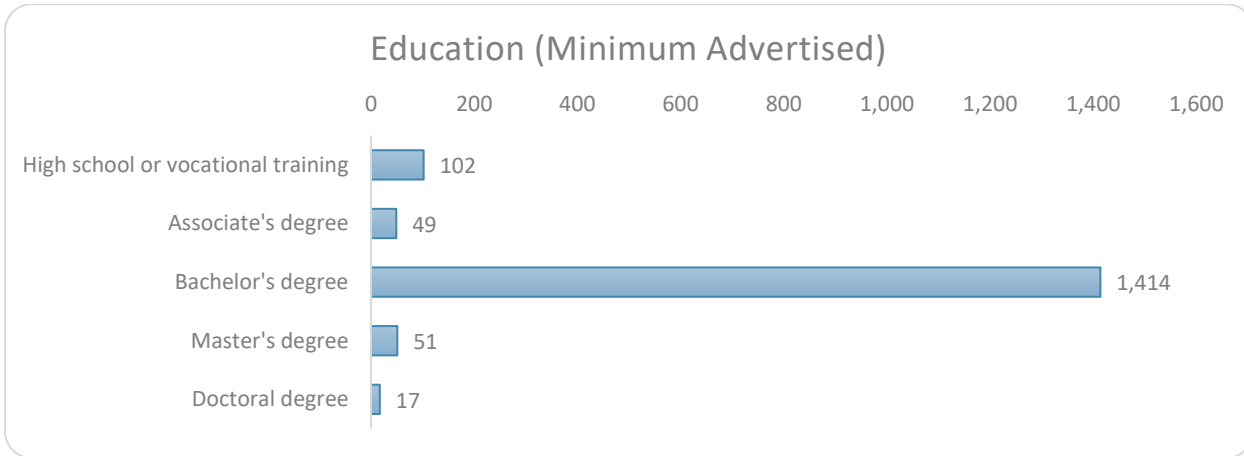
Exhibit 7 –Job skills (n=3,197)

Skills	Job Postings, Full Year 2017
Software Engineering	1,116
Software Development	1,049
JavaScript	963
SQL	906
Microsoft C#	767

Source: Labor Insight/Jobs (Burning Glass)

Advertised Education Levels

Exhibit 8 displays the education level requested by employers in online job ads. The majority of employers were looking for a candidate with a bachelor's degree. Approximately 50% of job postings did not specify a level of education.

Exhibit 8 – Minimum advertised education requirements for computer programming

Education (Minimum Advertised)

Education level	Value
High school or vocational training	102
Associate's degree	49
Bachelor's degree	1,414
Master's degree	51
Doctoral degree	17

Source: Labor Insight/Jobs (Burning Glass)

Industry Concentration

Exhibit 9 shows the industries where most computer programmers are employed in the South Central Coast region. Note: 62% of records have been excluded because they do not include an industry. As a result, the chart below may not be representative of the full sample.

Exhibit 9 – Industries employing the most computer programmers, 2017

NAICS (4-Digit)	Industry	Occupation Group Jobs in Industry	% of Occupation Group in Industry
5619	Other Support Services	256	21%
3364	Aerospace Product and Parts Manufacturing	141	12%
5112	Software Publishers	73	6%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	67	5%
6113	Colleges, Universities, and Professional Schools	62	5%

Education and Training

Exhibit 10 shows the typical entry-level education requirement for the occupation of interest, along with the typical on-the-job training.

Exhibit 10 – Education and training requirements

SOC	Occupation	Typical entry-level education	Typical on-the-job training
15-1131	Computer Programmers	Bachelor's Degree	None
15-1132	Software Developers, Applications	Bachelor's Degree	None
15-1133	Software Developer, Systems Software	Bachelor's Degree	None
15-1134	Web Developers	Associate's Degree	None

Source: Bureau of Labor Statistics Employment Projections (Educational Attainment)

Currently, there is one community college in the South Central Coast region that trains students in computer programming (CIP 1101.01).

3	**10**	**1,277**
Regional Institutions	**Regional Program Completions (2016)**	**Annual Openings (2016)**
had Completions in the last 14 years		

In 2016 there were 10 regional program completions and 1,277 annual openings for CIP Code 1101.01, Computer Programming/Programmer, General. See Exhibit 11.

Exhibit 11 – CCC Student Completions (by TOP and College)

TOP Code	Program	College	2012 – 2017 Annual Completions				
			2012-13	2013-14	2014-15	2014-15	2016-17
0707.10	Computer Programming	Antelope Valley College	4	2	11	10	10

Source: California Community Colleges Chancellor's Office MIS Data Mart

It is important to note that computer programmers may receive training from alternative programs such as computer science, computer engineering, and computer systems networking and telecommunications, among others.

Student Outcomes

The CTE LaunchBoard provides student outcome data on the effectiveness of CTE programs. The following student outcome information was collected from exiters of the computer software development program (TOP Code: 0707.00) in the South Central Coast region for the 2015-16 academic year.

- The median annual wage after program completion is $29,342
- 60% of students are earning a living wage
- 58% of students are employed within six months after completing a program

Source: CTE LaunchBoard

Sources

O*Net Online, Labor Insight/Jobs (Burning Glass), Economic Modeling Specialists International (EMSI), MIT Living Wage Calculator, Bureau of Labor Statistics (BLS) Education Attainment, California Community Colleges Chancellor's Office Management Information Systems (MIS) Data Mart, CTE LaunchBoard, Statewide CTE Outcomes Survey, Employment Development Department Unemployment Insurance Dataset

Notes

Data included in this analysis represents the labor market demand for positions most closely related to computer programming. Standard occupational classification (SOC) codes were chosen based on the national education level required for employment (associate degree and postsecondary certificate) as well as the proportion of current workers who hold a community college award or have had some community college training. This selection process narrows the labor market analysis to the most relevant employment opportunities for students with community college education and/or training.

Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study and should not be used to establish current job openings, because the numbers may include duplicate job postings or postings intended to gather a pool of applicants. Real-time labor market information can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.