Computer Science & Information Systems – Digital Web and Mobile Development Occupations
Labor Market Information Report

Prepared by the San Francisco Bay Center of Excellence
for Labor Market Research
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Recommendation

Based on all available data, there appears to be an undersupply of Computer Science and Information Systems workers focused on Digital Web and Mobile Development, compared to the demand for this cluster of occupations in the Bay region and the Santa Cruz-Monterey sub-region (Monterey, San Benito and Santa Cruz Counties). The annual gap between demand and supply (or undersupply) is about 3,690 in the region and 63 in the SC-Monterey sub-region. Bachelor's degrees are included in the supply number.

This report also provides student outcomes data on employment and earnings for Website Design and Development programs (TOP 0614.30) in the region and state. It is recommended that this data be reviewed to better understand how outcomes for students taking courses on this TOP code compare to outcomes for students across all CTE TOP codes at Hartnell College and in the region.

Introduction

This report profiles Computer Science (CS) and Information Systems occupations, with a focus on Digital Web and Mobile Development in the 12 county Bay region and the SC-Monterey sub-region for a proposed new CS and Information Systems – Digital Web and Mobile Development program at Hartnell College.

- **Computer Programmers (SOC 15-1131):** 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.
  Entry-Level Educational Requirement: Bachelor's Degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 22%

- **Web Developers (SOC 15-1134):** 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.
  Entry-Level Educational Requirement: Associate Degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 25%

- **Computer Occupations, All Other (SOC 15-1199):** All computer occupations not listed separately.
  - **Web Administrators (SOC 15-1199.03):** Manage web environment design, deployment, development and maintenance activities. Perform testing and quality assurance of web sites and web applications.
  Entry-Level Educational Requirement: Bachelor's Degree
  Training Requirement: None
  Percentage of Community College Award Holders or Some Postsecondary Coursework: 35%

Occupational Demand

Table 1. Employment Outlook for CS & Information Systems Occupations in Bay Region

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-year Open-ings	Annual Open-ings	10% Hrly Wage	Median Hrly Wage
Computer Programmers	17,127	17,870	743	4%	6,402	1,280	$25.88	$47.72
Web Developers	11,299	13,730	2,431	22%	6,727	1,345	$19.32	$39.07
Computer Occupations, All Other	13,595	15,044	1,449	11%	6,188	1,238	$25.33	$52.40
Total	**42,021**	**46,644**	**4,623**	**11%**	**19,317**	**3,863**	**$23.94**	**$46.91**

Source: EMSI 2018.1
Bay Region includes Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma Counties

Table 2. Employment Outlook for CS & Information Systems Occupations in SC-Monterey Sub-Region

Occupation	2017 Jobs	2022 Jobs	5-Yr Change	5-Yr % Change	5-Yr Openings	Annual Openings	10% Hrly Wage	Median Hrly Wage
Computer Programmers	340	319	(21)	(6%)	104	21	$22.51	$34.83
Web Developers	273	290	17	6%	114	23	$15.72	$21.29
Computer Occupations, All Other	571	572	1	0%	194	39	$30.80	$47.75
Total	**1,184**	**1,181**	**(3)**	**(0%)**	**411**	**82**	**$24.95**	**$37.94**

Source: EMSI 2018.1
SC-Monterey Sub-Region includes Monterey, San Benito, and Santa Cruz Counties

Job Postings in Bay Region and Santa Cruz-Monterey Sub-Region

Table 3. Number of Job Postings by Occupation for latest 12 months (April 2017 – March 2018)

Occupation at 8 Digit SOC Code Level	Bay	SC-Monterey
Web Developers (15-1134.00)	15,597	87
Computer Programmers (15-1131.00)	2,800	29
Web Administrators (15-1199.03)	176	4
Total	**18,573**	**120**

Source: Burning Glass

Table 4. Top Job Titles for CS & Information Systems Occupations for latest 12 months (April 2017 – March 2018)

Common Title	Bay	SC-Monterey	Common Title	Bay	SC-Monterey
User Experience (UX) Designer	1,320	7	Ux Researcher	198	0
Web Developer	1,183	12	Front End Web Developer	192	1
Front End Developer	1,079	14	User Interface (UI) Designer	184	2
User Interface (UI) Developer	839	7	Javascript Developer	177	0
Software Development Engineer	815	4	Backend Engineer	171	0
PHP Developer	510	1	Senior Backend Engineer	169	0
Front End Engineer	449	0	Web Designer	156	6
User Interface (UX)/User Experience (UX) Designer	439	0	Developer	147	0
Programmer/Analyst	409	5	Java Developer	145	0
Senior Front End Engineer	342	0	Javascript Engineer	139	0
Web Engineer	329	3	Web Producer	135	0
Senior Engineer	318	0	Web Applications Developer	132	2
Ruby on Rails Developer	245	1	Back End Engineer	115	0
Senior Javascript Engineer	219	0	Senior Ui Engineer	112	0
Engineer	200	1	Ui Engineer	111	0

Industry Concentration

Table 5. Industries hiring CS & Information Systems Workers in Bay Region

Industry – 6 Digit NAICS (No. American Industry Classification) Codes	Jobs in Industry (2017)	Jobs in Industry (2022)	% Change (2017-22)	% in Industry (2017)
Custom Computer Programming Services (541511)	9,749	10,496	8%	23.2%
Computer Systems Design Services (541512)	5,897	6,316	7%	14.0%
Internet Publishing & Broadcasting & Web Search Portals (519130)	4,574	5,894	29%	10.9%
Software Publishers (511210)	3,108	3,640	17%	7.4%
Federal Government, Civilian, Excluding Postal Service (901199)	1,526	1,511	(1%)	3.6%
Other Computer Related Services (541519)	1,489	1,706	15%	3.5%
Data Processing, Hosting, and Related Services (518210)	1,449	1,915	32%	3.4%
Corporate, Subsidiary, and Regional Managing Offices (551114)	1,065	1,095	3%	2.5%
Temporary Help Services (561320)	478	528	10%	1.1%
R&D in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotech) (541715)	437	442	1%	1.0%
Electronic Shopping and Mail-Order Houses (454110)	424	580	37%	1.0%
Local Government, Excluding Education and Hospitals (903999)	407	426	5%	1.0%

Source: EMSI 2018.1

Table 6. Top Employers Posting CS & Information Systems Occupations in Bay Region and SC-Monterey Sub-Region for latest 12 months (April 2017 – March 2018)

Employer	Bay	Employer	Bay	Employer	SC-Monterey
Capital Markets Placement	334	Etouch Systems Corporation	52	Nordic Naturals	5
Apple Inc.	305	Armada Group	50	Okaya	4
Oracle	167	Tesla Motors	50	SAIC	4
Amazon	126	Okaya Infocom	49	Amazon	3
Google Inc.	122	Wells Fargo	49	Csra	3
Accenture	89	Autodesk Incorporated	48	Looker Group	3
Salesforce	84	Infoobjects Inc	47	Market America	3
eBay	84	SAP	47	CA State University	2
Cisco Systems Inc	83	US Technical Solutions	47	Camber Corporation	2
Walmart / Sam's	79	Bayone Solutions	46	Corus Company Inc	2
Paypal	70	Infobahn Softworld Inc	45	General Dynamics	2
Redolent, Inc	69	Avesta Computer Services	44	Jtg Incorporated	2
Uber	63	Flexton Incorporated	44	Northrop Grumman	2
Facebook	59	JP Morgan Chase Company	44	R Systems Incorporated	2
Sony Electronics Inc	57	Khosla Ventures	44	Tasacom Technologies	2
Workday, Inc	55	Servicenow	44	University California	2

Source: Burning Glass

Educational Supply

On the supply side, for Website Design and Development (TOP 0614.30), there are 10 community college in the Bay region issuing 43 awards annually, and four other postsecondary institutions issuing 129 awards (105 Bachelor's Degrees, 21 Associate Degrees and three Certificates), for a total of 172 annual awards in the region.

Table 7. Website Design and Development Programs (TOP 0614.30) and Web Page, Digital/Multimedia and Information Resources Design (CIP 11.0801) in the Bay Region

College	Sub-Region	Headcount	No. of Transfers	Bachelor's	Associates	Certificates	Total Awards
Berkeley City	East Bay	215	19	0	1	6	7
Cabrillo	SC-Monterey	on another TOP	0	0	4	15	19
Canada	Mid-Peninsula	36	3	0	0	4	4
Gavilan	Silicon Valley	168	14	0	0	0	0
Hartnell	SC-Monterey	8	0	0	0	0	0
Marin	North Bay	55	3	0	0	0	0
Mission	Silicon Valley	139	17	0	0	2	2
Monterey	SC-Monterey	13	4	0	0	0	0
Ohlone	East Bay	27	5	0	0	2	2
San Francisco	Mid-Peninsula	376	5	0	0	1	1
San Jose City	Silicon Valley	34	5	0	1	2	3
Santa Rosa	North Bay	293	27	0	0	1	1
Skyline	Mid-Peninsula	on another TOP	1	0	2	1	3
West Valley	Silicon Valley	121	9	0	0	1	1
Academy of Art University	Mid-Peninsula	n/a	n/a	67	16	0	83
Argosy University-The Art Institute of CA-SF	Mid-Peninsula	n/a	n/a	15	3	2	20
Argosy University-The Art Institute of CA-Silicon Valley	Silicon Valley	n/a	n/a	12	2	1	15
Santa Clara University	Silicon Valley	n/a	n/a	11	0	0	11
Total Bay Region		**1,482**	**111**	**105**	**29**	**38**	**172**
Total SC-Monterey Sub-Region		**21**	**4**	**0**	**4**	**14**	**19**

Sources: IPEDS, Data Mart and Launchboard

NOTE: For Community Colleges, the annual average for Associate Degrees and Certificates is 2014-17. Headcount is for 2016-17, and number of transfer students is for 2015-16. For the other educational postsecondary institute, the annual average for awards is 2013-16 from IPEDS.

Gap Analysis

The labor market gap is significant in the Bay region for this cluster of occupation with total annual openings of 3,863 and annual supply of 172 awards. This represents an annual undersupply of 3,691. In the SC-Monterey sub-region, there is also a gap with total annual openings of 82 and annual supply of 19 awards, resulting in an undersupply of 63.

Student Outcomes

Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0614.30 - Website Design and Development

2015-16	Bay Region (All CTE Programs)	Hartnell (All CTE Programs)	State (0614.30)	Bay Region (0614.30)	Top Colleges on TOP 0614.30 in Bay Region	
% Employed Four Quarters After Exit	74%	81%	60%	62%	Berkeley Santa Rosa	69% (29 students) 69% (87 students)
Median Earnings Two Quarters After Exit	$10,310	$24,415	$7,485	$8,500	San Francisco	$16,790 (7 students)
Median % Change in Earnings	46%	20%	52%	56%	Berkeley	576% (14 to 22 students)
% of Students Earning a Living Wage	63%	79%	55%	57%	Berkeley	72% (18 students)

Source: Launchboard (version available on 4/9/18)

Skills, Certifications and Education

Table 9. Top Skills for CS & Information Systems Occupations in Bay Region (April 2017 – March 2018)

Skill	Postings	Skill	Postings	Skill	Postings
JavaScript	8,420	JavaScript Object Notation (JSON)	1,259	DevOps	651
Teamwork/Collaboration	5,128	Agile Development	1,208	.NET	648
Java	4,332	Scrum	1,207	Big Data	644
HTML5	3,809	Interaction Design	1,163	Adobe Creative Suite	643
Web Application Development	3,544	Quality Assurance & Control	1,150	GitHub	635
AngularJS	3,439	Oracle	1,134	Adobe Illustrator	620
Software Engineering	3,340	Debugging	1,020	Information Architecture	604
Web Development	3,121	Scalability Design	1,014	Frontend Technology	600
CSS	2,828	Backbone.js	972	Product Design	599
Software Development	2,729	Extensible Markup Language (XML)	969	Scheduling	588
jQuery	2,631	User Research	964	Apache Webserver	587
SQL	2,318	Ruby	959	MongoDB	583
Python	2,314	Continuous Integration (CI)	905	Test Driven Development (TDD)	562
Front-end Development	2,280	C++	885	Customer Service	550
Git	2,075	Product Development	877	Version Control	541
User Interface (UI) Design	2,007	UNIX	873	Machine Learning	521
Node.js	1,849	NoSQL	861	Jasmine	516
Adobe Photoshop	1,814	Relational Databases	821	Copying	508
Hypertext Preprocessor (PHP)	1,682	PostgreSQL	808	Psychology	503
E-Commerce	1,600	Graphic Design	807	Atlassian JIRA	492
Object-Oriented Analysis and Design (OOAD)	1,592	Microsoft C#	803	Django	492
AJAX	1,559	Software as a Service (SaaS)	799	Information Technology Industry Knowledge	492
Product Management	1,532	Grunt (JavaScript)	789	Ember.js	460
Unit Testing	1,452	Adobe Indesign	780	Customer Contact	449
Web Site Design	1,412	Gulp.js	761	Docker Software	449
Syntactically Awesome Style Sheets (SASS)	1,377	Data Structures	713	Active Server Pages (ASP)	447
MySQL	1,359	Software Architecture	705	Redis	440
UX Wireframes	1,352	Human Computer Interaction	678	Salesforce	436
Prototyping	1,295	Adobe Acrobat	671	Less.js	433
Ruby on Rails	1,291	Process Design	660	Systems Development Life Cycle (SDLC)	426
Visual Design	1,275	ECMAScript 2015 (ES2015/ES6)	652	Website Production	420

Source: Burning Glass

Table 10. Top Certifications for CS & Information Systems Occupations in Bay Region

Note: 98% of records have been excluded because they do not include a certification. As a result, the chart has not been included.

Table 11. Education Requirements for Advanced CS & Information Systems Occupations in Bay Region

Note: 55% of records have been excluded because they do not include a degree level. As a result, the chart below may not be representative of the full sample.

Education (minimum advertised)	Latest 12 Mos. Postings
High school or vocational training	170 (2%)
Associate Degree	102 (1%)
Bachelor's Degree	7,734 (92%)
Master's Degree	271 (3%)
Doctoral Degree	139 (2%)

Source: Burning Glass

Methodology

Occupations for this report were identified by use of skills listed in O*Net descriptions and job descriptions in Burning Glass. Labor demand data is sourced from Economic Modeling Specialists International (EMSI) occupation data and Burning Glass job postings data. Educational supply and student outcomes data is retrieved from multiple sources, including CTE Launchboard and CCCCO Data Mart.

Sources

O*Net Online

Labor Insight/Jobs (Burning Glass)

Economic Modeling Specialists International (EMSI)

CTE LaunchBoard www.calpassplus.org/Launchboard/

Statewide CTE Outcomes Survey

Employment Development Department Unemployment Insurance Dataset

Living Insight Center for Community Economic Development

Chancellor's Office MIS system

Contacts

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