** Music and Computers Occupations**

**Labor Market Information Report**

**City College of San Francisco**

Prepared by the San Francisco Bay Center of Excellence

for Labor Market Research

December 2019

# Recommendation

Based on all available data, there appears to be a significant undersupply of Music and Computers workers compared to the demand for this cluster of occupations in the Bay region and in the Mid-Peninsula sub-region (San Francisco and San Mateo Counties.) There is a projected annual gap of about 12,296 students in the Bay region and 4,541 students in the Mid-Peninsula Sub-Region.

This report also provides student outcomes data on employment and earnings for programs on TOP 1005.00 - Commercial Music in the state and region. It is recommended that these data be reviewed to better understand how outcomes for students taking courses on this TOP code compare to potentially similar programs at colleges in the state and region, as well as to outcomes across all CTE programs at City College of San Francisco and in the region.

# Introduction

This report profiles Music and Computers Occupations in the 12 county Bay region and in the Mid-Peninsula sub-region for the review of an existing program at City College of San Francisco.

|  |
| --- |
| * **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: 21% |
| * **Software Developers, Applications (SOC** **15-1132):** 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.
 |
| Entry-Level Educational Requirement: Bachelor's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 13*%* |
| * **Music Directors and Composers (SOC 27-2041):** Conduct, direct, plan, and lead instrumental or vocal performances by musical groups, such as orchestras, bands, choirs, and glee clubs. Includes arrangers, composers, choral directors, and orchestrators.
 |
| Entry-Level Educational Requirement: Bachelor's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 25*%* |
| * **Audio and Video Equipment Technicians** **(SOC 27-4011):** Set up, or set up and operate audio and video equipment including microphones, sound speakers, video screens, projectors, video monitors, recording equipment, connecting wires and cables, sound and mixing boards, and related electronic equipment for concerts, sports events, meetings and conventions, presentations, and news conferences. May also set up and operate associated spotlights and other custom lighting systems. Excludes "Sound Engineering Technicians" (27-4014).
 |
| Entry-Level Educational Requirement: Postsecondary *nondegree award* |
| Training Requirement: Short-term *on-the-job training* |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 46*%* |
| * **Multimedia Artists and Animators (SOC 27-1014):** Create special effects, animation, or other visual images using film, video, computers, or other electronic tools and media for use in products or creations, such as computer games, movies, music videos, and commercials.
 |
| Entry-Level Educational Requirement: Bachelor's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 27*%* |

# Occupational Demand

**Table 1. Employment Outlook for Music and Computers Occupations in Bay Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation  | 2018 Jobs | 2023 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Average Annual Open-ings | 25% Hourly Wage | Median Hourly Wage |
| Computer Programmers |  11,815  |  12,599  | 784 | 7% |  4,678  |  936  | $38.06 | $49.75 |
| Software Developers, Applications |  93,746  |  113,800  | 20,054 | 21% |  52,135  |  10,427  | $49.53 | $63.41 |
| Music Directors and Composers |  1,391  |  1,433  | 42 | 3% |  734  |  147  | $15.71 | $24.84 |
| Audio and Video Equipment Technicians |  3,529  |  3,798  | 269 | 8% |  1,927  |  385  | $18.91 | $25.63 |
| Multimedia Artists and Animators |  4,976  |  5,284  | 309 | 6% |  2,328  |  466  | $29.22 | $40.35 |
| **Total** |  **115,457**  |  **136,914**  | **21,457** | **19%** |  **61,802**  |  **12,360**  | **$46.14** | **$59.40** |

*Source: EMSI 2019.3*

**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 Music and Computers Occupations in Mid-Peninsula Sub-Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation  | 2018 Jobs | 2023 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Average Annual Open-ings | 25% Hourly Wage | Median Hourly Wage |
| Computer Programmers |  4,605  |  5,086  | 481 | 10% |  1,982  |  396  | $41.54 | $53.23 |
| Software Developers, Applications |  29,204  |  37,798  | 8,594 | 29% |  18,855  |  3,771  | $55.43 | $69.54 |
| Music Directors and Composers |  395  |  401  | 6 | 2% |  201  |  40  | $17.65 | $27.30 |
| Audio and Video Equipment Technicians |  1,338  |  1,444  | 106 | 8% |  730  |  146  | $21.28 | $28.53 |
| Multimedia Artists and Animators |  1,982  |  2,119  | 137 | 7% |  938  |  188  | $30.87 | $41.98 |
| **TOTAL** |  **37,524**  |  **46,848**  | **9,324** | **25%** |  **22,706**  |  **4,541**  | **$50.81** | **$64.18** |

*Source: EMSI 2019.3*

**Mid-Peninsula Sub-Region** includes San Francisco and San Mateo Counties

### Job Postings in Bay Region and Mid-Peninsula Sub-Region

**Table 3. Number of Job Postings by Occupation for latest 12 months (November 2018 - October 2019)**

| Occupation | Bay Region | Mid-Peninsula |
| --- | --- | --- |
|  Software Developers, Applications | 133,392 | 49,174 |
|  Computer Programmers | 5,647 | 1,804 |
|  Audio and Video Equipment Technicians | 796 | 341 |
|  Music Composers and Arrangers | 14 | 8 |
|  **Total** | **139,849** | **51,327** |

*Source: Burning Glass*

**Table 4a. Top Job Titles for Music and Computers Occupations for latest 12 months (November 2018 - October 2019) Bay Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | Bay | Common Title | Bay |
| Software Development Engineer | 37,229 | Engineer | 1,274 |
| Java Developer | 10,166 | .Net Developer | 1,188 |
| Devops Engineer | 4,893 | Software Engineering Manager | 1,053 |
| Software Developer | 3,753 | Salesforce Developer | 1,047 |
| Applications Engineer | 3,602 | Senior Engineer | 979 |
| Java Engineer | 2,910 | Software Architect | 837 |
| Python Developer | 2,422 | Full Stack Developer | 804 |
| Senior Developer | 2,071 | Full Stack Engineer | 706 |
| Android Developer | 2,044 | C++ Developer | 672 |
| Developer | 2,039 | Programmer/Analyst | 627 |
| Applications Developer | 1,664 | Business Intelligence Developer | 603 |
| Principal Software Engineer | 1,479 | Lead Developer | 591 |
| Senior Devops Engineer | 1,335 | Solutions Engineer | 574 |
| iOS Developer | 1,315 | Developer, Information And Technology Industry | 532 |

**Table 4b. Top Job Titles for Music and Computers Occupations for latest 12 months (November 2018 - October 2019) Mid-Peninsula Sub-Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | Mid-Peninsula | Common Title | Mid-Peninsula |
| Software Development Engineer | 15,598 | iOS Developer | 523 |
| Java Developer | 2,497 | Senior Engineer | 491 |
| Devops Engineer | 1,688 | Salesforce Developer | 488 |
| Software Developer | 1,223 | .Net Developer | 448 |
| Java Engineer | 930 | Engineer | 435 |
| Applications Engineer | 839 | Solutions Engineer | 384 |
| Senior Developer | 812 | Full Stack Engineer | 367 |
| Android Developer | 704 | Android Engineer | 282 |
| Developer | 699 | Senior Android Engineer | 269 |
| Principal Software Engineer | 626 | Software Architect | 264 |
| Python Developer | 610 | Full Stack Developer | 262 |
| Applications Developer | 609 | Senior Ios Engineer | 232 |
| Senior Devops Engineer | 599 | Ios Engineer | 205 |
| Software Engineering Manager | 538 | Machine Learning Engineer | 200 |

*Source: Burning Glass*

# Industry Concentration

**Table 5. Industries hiring Music and Computers Workers in Bay Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Industry – 6 Digit NAICS (No. American Industry Classification) Codes | Jobs in Industry (2018) | Jobs in Industry (2022) | % Change (2018-22) | % in Industry (2018) |
| Custom Computer Programming Services (541511) | 24,172 | 29,330 | 21% | 21% |
| Software Publishers (511210) | 14,803 | 18,874 | 28% | 13% |
| Computer Systems Design Services (541512) | 15,090 | 17,658 | 17% | 13% |
| Internet Publishing and Broadcasting and Web Search Portals  | 13,681 | 18,187 | 33% | 12% |
| Electronic Computer Manufacturing (334111) | 6,782 | 7,647 | 13% | 6% |
| Data Processing, Hosting, and Related Services (518210) | 4,591 | 6,069 | 32% | 4% |
| Other Computer Related Services (541519) | 3,224 | 4,036 | 25% | 3% |
| Corporate, Subsidiary, and Regional Managing Offices (551114) | 2,647 | 2,914 | 10% | 2% |
| Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715) | 1,250 | 1,387 | 11% | 1% |

*Source: EMSI 2019.3*

**Table 6. Top Employers Posting Music and Computers Occupations in Bay Region and Mid-Peninsula Sub-Region (November 2018 - October 2019)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Employer | Bay | Employer | Bay | Employer | Mid-Peninsula |
| Apple Inc. | 2,097 | Wipro | 316 | Amazon | 577 |
| Amazon | 1,349 | Splunk | 315 | Facebook | 558 |
| Cisco Systems Inc | 1,127 | Intuit | 291 | Scoop Technologies | 428 |
| Scoop Technologies | 956 | Uber | 288 | Oracle | 372 |
| Google Inc. | 694 | Adobe Systems | 282 | Salesforce | 327 |
| Facebook | 626 | Verizon Communications Incorporated | 280 | Visa | 284 |
| Workday, Inc | 600 | Intel Corporation | 277 | Uber | 221 |
| Oracle | 599 | Xoriant Incorporated | 256 | Google Inc. | 209 |
| Vmware Incorporated | 551 | Accenture | 255 | SAP | 201 |
| IBM | 502 | Linkedin Limited | 249 | Twitter | 194 |
| Nvidia Corporation | 417 | Splunk, Inc | 237 | Airbnb | 158 |
| SAP | 413 | Intelliswift Software | 228 | Accenture | 150 |
| Walmart / Sam's | 382 | Neuvo Usa | 226 | Sony Electronics Incorporated | 147 |
| Paypal | 362 | eBay | 225 | AppDynamics | 145 |
| Visa | 348 | Samsung America, Inc. | 206 | Cisco Systems Incorporated | 138 |
| Salesforce | 340 | Cadence Design Systems Incorporated | 202 | Capital One | 134 |
| Microsoft Corporation | 335 | Twitter | 201 | Republic Bancorp | 132 |

*Source: Burning Glass*

# Educational Supply

There are five community colleges in the Bay Region issuing 64 awards on average annually (last 3 years) on TOP 1005.00 - Commercial Music. There are no colleges in the Mid-Peninsula Sub-Region issuing awards on this TOP code.

**Table 7. Awards on TOP 1005.00 - Commercial Music in Bay Region**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| College | Sub-Region | Associates | Certificate 18+ units | Certificate Low unit | Total |
| Cabrillo College  | Santa Cruz - Monterey |  1  |  0  |  2  |  3  |
| Diablo Valley College  | East Bay |  10  |  9  |  0  |  19  |
| Foothill College  | Silicon Valley |  11  |  2  |  0  |  13  |
| Los Medanos College  | East Bay |  5  |  5  |  12  |  22  |
| West Valley College | Silicon Valley |  |  7  |  |  7  |
| **Total Bay Region** |  **27**  |  **23**  |  **14**  |  **64**  |
| **Total Mid-Peninsula Sub-Region** | **0** | **0** | **0** | **0** |

# *Source: Data Mart*

Note: The annual average for awards is 2015-16 to 2017-18.

# Gap Analysis

Based on the data included in this report, there is a large labor market gap in the Bay region with 12,360 annual openings for the Music and Computers occupational cluster and 64 annual (3-year average) awards for an annual undersupply of 12,296 students. In the Mid-Peninsula Sub-Region, there is also a gap with 4,541 annual openings and no annual (3-year average) awards, for an annual undersupply of 4,541 students.

# Student Outcomes

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 1005.00 - Commercial Music**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2015-16 | Bay (All CTE Programs) | City College of San Francisco (All CTE Programs) | State (1005.00) | Bay (1005.00) | Mid-Peninsula (1005.00) | City College of San Francisco (1005.00) |
| % Employed Four Quarters After Exit | 74% | 72% | 63% | 64% | 71% | 72% |
| Median Quarterly Earnings Two Quarters After Exit | $10,550 | $10,170 | $4,540 | $4,867 | $10,032 | $10,111 |
| Median % Change in Earnings | 46% | 31% | 71% | 61% | 47% | 49% |
| % of Students Earning a Living Wage | 63% | 65% | 23% | 29% | 52% | 53% |

*Source: Launchboard Pipeline (version available on 11/21/19)*

# Skills, Certifications and Education

**Table 9. Top Skills for Music and Computers Occupations in Bay Region (November 2018 - October 2019)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Skill | Postings | Skill | Postings | Skill | Postings |
| Java | 57,690 | Continuous Integration (CI) | 11,016 | Machine Learning | 8,231 |
| Software Engineering | 53,103 | Scrum | 10,945 | Extensible Markup Language (XML) | 8,118 |
| Software Development | 38,945 | Data Structures | 10,942 | Big Data | 7,975 |
| Python | 38,187 | NoSQL | 10,827 | Relational Databases | 7,932 |
| SQL | 29,766 | UNIX | 10,650 | JavaScript Object Notation (JSON) | 7,824 |
| JavaScript | 29,705 | Web Application Development | 10,535 | React Javascript | 7,812 |
| Linux | 22,739 | Agile Development | 9,996 | Apache Hadoop | 7,776 |
| C++ | 22,576 | Docker Software | 9,601 | Project Management | 7,546 |
| Git | 17,078 | Microsoft C# | 9,571 | Salesforce | 7,458 |
| DevOps | 16,285 | MySQL | 9,564 | Node.js | 7,122 |
| Debugging | 15,437 | Software Architecture | 9,289 | Ruby | 6,968 |
| Object-Oriented Analysis and Design (OOAD) | 14,969 | Quality Assurance and Control | 9,000 | HTML5 | 6,956 |
| Oracle | 13,134 | Apache Kafka | 8,911 | Product Development | 6,720 |
| Unit Testing | 12,691 | Scalability Design | 8,661 | Product Management | 6,632 |
| Kubernetes | 11,221 | AngularJS | 8,641 | PERL Scripting Language | 6,446 |

*Source: Burning Glass*

**Table 10. Certifications for Music and Computers Occupations in Bay Region (November 2018 - October 2019)**

Note: 95% of records have been excluded because they do not include a certification. As a result, the chart below may not be representative of the full sample.

|  |  |  |  |
| --- | --- | --- | --- |
| Certification | Postings | Certification | Postings |
| Security Clearance | 2,192 | Cisco Certified Network Professional (CCNP) | 198 |
| IT Infrastructure Library (ITIL) Certification | 700 | SANS/GIAC Certification | 190 |
| Driver's License | 570 | CompTIA Security+ | 172 |
| Certified Salesforce Platform Developer | 356 | Certified Salesforce Advanced Administrator | 124 |
| Project Management Certification | 336 | Certified Salesforce Platform Developer I | 123 |
| Salesforce Developer | 324 | Project Management Professional (PMP) | 121 |
| Certified Information Systems Security Professional (CISSP) | 319 | Certified Information Systems Auditor (CISA) | 106 |
| Cisco Certified Network Associate (CCNA) | 253 | Salesforce Platform App Builder | 105 |
| ITIL Certification | 243 | Certified ScrumMaster (CSM) | 102 |
| Cisco Certified Internetwork Expert (CCIE) | 223 | MBE Certified | 98 |
| Certified Salesforce Platform Developer II | 221 | Certified Salesforce Advanced Developer | 90 |
| Certified Salesforce Administrator | 213 | Certified Scrum Professional (CSP) | 83 |

*Source: Burning Glass*

**Table 11. Education Requirements for Music and Computers Occupations in Bay Region**

Note: 46% 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 | Percent 12 Mos. Postings |
| High school or vocational training | 1,058 | 1% |
| Associate Degree | 417 | 1% |
| Bachelor’s Degree or Higher | 67,544 | 98% |

*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/](http://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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