** Biotechnology 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 an undersupply of Biotechnology 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 3,082 students in the Bay region and 795 students in the Mid-Peninsula Sub-Region.

This report also provides student outcomes data on employment and earnings for programs on TOP 0430.00 - Biotechnology and Biomedical Technology 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 Biotechnology Occupations in the 12 county Bay region and in the Mid-Peninsula sub-region for a proposed new Lab Assistant certificate; Biotechnology certificate program at City College of San Francisco. Labor market information (LMI) is not available at the eight-digit SOC Code level for Manufacturing Production Technicians (17-3029.09), therefore, the data shown in Tables 1 and 2 is for Engineering Technicians, Except Drafters, All Other(at the six digit SOC level) and likely overstates demand for Manufacturing Production Technicians. Tables 3, 4, 6, 9, 10 and 11 use job postings data from Burning Glass at the eight-digit SOC Code level for Manufacturing Production Technicians (17-3029.09).

|  |
| --- |
| * **Biological Technicians (SOC 19-4021):** Assist biological and medical scientists **in** laboratories. Set up, operate, and maintain laboratory instruments and equipment, monitor experiments, make observations, and calculate and record results. May analyze organic substances, such as blood, food, and drugs. |
| Entry-Level Educational Requirement: Bachelor's degree |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 35% |
| * **Engineering Technicians, Except Drafters, All Other (SOC 17-3029):** All engineering technicians, except drafters, not listed separately. |
| Entry-Level Educational Requirement: Associate's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 53*%* |
| * **Clinical Laboratory Technologists and Technicians** **(SOC 29-2018):** Perform routine medical laboratory tests for the diagnosis, treatment, and prevention of disease. May work under the supervision of a medical technologist. |
| Entry-Level Educational Requirement: Associate's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 0*%* |
| * **Life, Physical, and Social Science Technicians, All Other (SOC 19-4099):** All life, physical, and social science technicians not listed separately. |
| Entry-Level Educational Requirement: Associate's *degree* |
| Training Requirement: None |
| * **Inspectors, Testers, Sorters, Samplers, and Weighers (SOC 51-9061):** Inspect, test, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled parts or products for defects, wear, and deviations from specifications. May use precision measuring instruments and complex test equipment. |
| Entry-Level Educational Requirement: High *school diploma or equivalent* |
| Training Requirement: Moderate-term *on-the-job training* |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 37*%* |

# Occupational Demand

**Table 1. Employment Outlook for Biotechnology 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 |
| Biological Technicians | 3,739 | 4,228 | 490 | 13% | 2,352 | 470 | $21.37 | $27.02 |
| Engineering Technicians, Except Drafters, All Other | 3,006 | 3,181 | 175 | 6% | 1,486 | 297 | $25.71 | $33.49 |
| Clinical Laboratory Technologists and Technicians | 6,650 | 7,492 | 842 | 13% | 2,968 | 594 | $22.32 | $28.80 |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 13,977 | 13,897 | -79 | -1% | 8,520 | 1,704 | $16.50 | $21.91 |
| Life, Physical, and Social Science Technicians, All Other | 1,840 | 2,025 | 185 | 10% | 1,288 | 258 | $22.63 | $29.08 |
| **Total** | **29,211** | **30,823** | **1,613** | **6%** | **16,613** | **3,323** | **$19.78** | **$25.78** |

*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 Biotechnology 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 |
| Biological Technicians | 1,225 | 1,506 | 281 | 23% | 908 | 182 | $22.53 | $27.64 |
| Engineering Technicians, Except Drafters, All Other | 650 | 740 | 90 | 14% | 381 | 76 | $30.07 | $39.03 |
| Clinical Laboratory Technologists and Technicians | 2,098 | 2,519 | 421 | 20% | 1,108 | 222 | $25.13 | $31.94 |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 2,275 | 2,406 | 131 | 6% | 1,509 | 302 | $18.14 | $23.93 |
| Life, Physical, and Social Science Technicians, All Other | 530 | 626 | 96 | 18% | 421 | 84 | $25.31 | $32.75 |
| **TOTAL** | **6,778** | **7,796** | **1,018** | **15%** | **4,327** | **865** | **$22.80** | **$29.22** |

*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 (December 2018 - November 2019)**

| Occupation | Bay Region | Mid-Peninsula |
| --- | --- | --- |
| Inspectors, Testers, Sorters, Samplers, and Weighers | 3,762 | 861 |
| Medical and Clinical Laboratory Technicians | 3,630 | 1,036 |
| Quality Control Analysts | 2,527 | 676 |
| Manufacturing Production Technicians | 2,358 | 313 |
| Biological Technicians | 1,404 | 852 |
| Life, Physical, and Social Science Technicians, All Other | 66 | 12 |
| Precision Agriculture Technicians | 24 | 5 |
| Remote Sensing Technicians | 6 | 3 |
| **Total** | **13,777** | **3,758** |

*Source: Burning Glass*

**Table 4a. Top Job Titles for Biotechnology Occupations for latest 12 months (December 2018 - November 2019) Bay Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | Bay | Common Title | Bay |
| Laboratory Technician | 1,897 | Quality Coordinator | 197 |
| Manufacturing Technician | 1,124 | Test Engineer | 187 |
| Laboratory Assistant | 734 | Quality Control Specialist | 177 |
| Quality Assurance Specialist | 661 | Operations Technician | 158 |
| Research Associate | 567 | Tester | 152 |
| Production Technician | 500 | Process Technician | 149 |
| Quality Control Inspector | 423 | Inspector | 127 |
| Quality Control Analyst | 417 | Sorter | 119 |
| Quality Inspector | 405 | Medical Technician | 98 |
| Quality Specialist | 360 | Development Associate | 98 |
| Quality Assurance Technician | 334 | Clinical Lab Assistant | 96 |
| Quality Control Technician | 315 | Medical Laboratory Technician | 89 |
| Quality Assurance Inspector | 241 | Manual Tester | 85 |
| Quality Technician | 204 | Catheterization Laboratory Technician | 82 |

**Table 4b. Top Job Titles for Biotechnology Occupations for latest 12 months (December 2018 - November 2019) Mid-Peninsula Sub-Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | Mid-Peninsula | Common Title | Mid-Peninsula |
| Laboratory Technician | 532 | Clinical Lab Assistant | 44 |
| Research Associate | 353 | Research Technician | 43 |
| Quality Assurance Specialist | 243 | Quality Coordinator | 40 |
| Laboratory Assistant | 213 | Operations Technician | 40 |
| Manufacturing Technician | 146 | Tester | 36 |
| Quality Specialist | 136 | Quality Control Technician | 35 |
| Quality Control Analyst | 106 | Staff Research Associate | 33 |
| Development Associate | 64 | Manual Tester | 30 |
| Quality Inspector | 59 | Quality Analyst | 28 |
| Quality Control Specialist | 59 | Senior Research Associate | 27 |
| Quality Assurance Inspector | 58 | Quality Technician | 27 |
| Production Technician | 53 | Medical Laboratory Technician | 26 |
| Quality Control Inspector | 51 | Test Engineer | 25 |
| Quality Assurance Technician | 44 | Inspector | 23 |

*Source: Burning Glass*

# Industry Concentration

**Table 5. Industries hiring Biotechnology 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) |
| Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715) | 2,365 | 2,589 | 9% | 8% |
| General Medical and Surgical Hospitals (622110) | 1,972 | 1,923 | -2% | 7% |
| Research and Development in Biotechnology (except Nanobiotechnology) (541714) | 1,383 | 1,880 | 36% | 5% |
| Medical Laboratories (621511) | 1,248 | 1,588 | 27% | 4% |
| Semiconductor and Related Device Manufacturing (334413) | 1,177 | 1,023 | -13% | 4% |
| Temporary Help Services (561320) | 1,155 | 1,165 | 1% | 4% |
| Pharmaceutical Preparation Manufacturing (325412) | 1,112 | 1,076 | -3% | 4% |
| Testing Laboratories (541380) | 940 | 968 | 3% | 3% |
| Electronic Computer Manufacturing (334111) | 913 | 930 | 2% | 3% |
| Hospitals (Local Government) (903622) | 700 | 745 | 6% | 2% |
| Colleges, Universities, and Professional Schools (State Government) (902612) | 651 | 643 | -1% | 2% |
| Engineering Services (541330) | 579 | 614 | 6% | 2% |
| Federal Government, Civilian, Excluding Postal Service (901199) | 533 | 525 | -2% | 2% |
| HMO Medical Centers (621491) | 526 | 676 | 29% | 2% |
| Colleges, Universities, and Professional Schools (611310) | 506 | 559 | 10% | 2% |
| Diagnostic Imaging Centers (621512) | 370 | 451 | 22% | 1% |
| Offices of Physicians (except Mental Health Specialists) (621111) | 375 | 365 | -3% | 1% |
| Surgical and Medical Instrument Manufacturing (339112) | 348 | 345 | -1% | 1% |
| Machine Shops (332710) | 320 | 292 | -9% | 1% |
| Automobile Manufacturing (336111) | 291 | 362 | 24% | 1% |

*Source: EMSI 2019.3*

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Employer | Bay | Employer | Bay | Employer | Mid-Peninsula |
| University California | 112 | Thermo Fisher Scientific Inc | 43 | University California | 59 |
| Sutter Health | 105 | Fountain Group | 43 | University Of California San Francisco | 57 |
| Kaiser Permanente | 99 | Abbott Laboratories | 43 | Genentech | 38 |
| Uc San Diego | 82 | Della Infotech Inc | 40 | Bepc | 37 |
| Sutter Health Sacramento Sierra Region | 80 | Bepc | 39 | Gilead Sciences | 33 |
| Stanford Health Care | 75 | Western Digital | 36 | Gladstone Institutes | 32 |
| Genentech | 70 | Lenscrafters Incorporated | 36 | UC San Francisco Medical Center | 30 |
| University Of California Berkeley | 68 | Ascent | 34 | Sutter Health Sacramento Sierra Region | 30 |
| Amazon | 65 | Gladstone Institutes | 32 | Audentes Therapeutics | 29 |
| Biomarin Pharmaceutical Incorporated | 61 | Jabil Circuit | 31 | Fluidigm Corporation | 28 |
| Boehringer Ingelheim | 59 | UC San Francisco Medical Center | 30 | Sutter Health | 27 |
| University Of California San Francisco | 57 | Tesla | 30 | Fountain Group | 24 |
| Sanmina Corporation | 55 | Nursefly Travel Nursing | 29 | Vitalant | 22 |
| Sutter Medical Center | 54 | Audentes Therapeutics | 29 | Kaiser Permanente | 20 |
| Stanford University | 52 | Apple Inc. | 29 | Ascent | 20 |
| Integrated Resources Incorporated | 52 | Fluidigm Corporation | 28 | Academy Art University | 20 |
| Gilead Sciences | 52 | Alta Bates Summit | 28 | Pact Pharma | 19 |

*Source: Burning Glass*

# Educational Supply

There are nine (9) community colleges in the Bay Region issuing 241 awards on average annually (last 3 years) on TOP 0430.00 - Biotechnology and Biomedical Technology. There are three colleges in the Mid-Peninsula Sub-Region issuing 70 awards on average annually (last 3 years) on this TOP code.

**Table 7. Awards on TOP 0430.00 - Biotechnology and Biomedical Technology in Bay Region**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| College | Sub-Region | Associates | Certificate 18+ units | Total |
| Berkeley City | East Bay | 4 | 4 | 8 |
| Contra Costa | East Bay | 2 | 6 | 8 |
| Laney | East Bay | 9 | 41 | 50 |
| Merritt | East Bay |  | 3 | 3 |
| Ohlone | East Bay | 4 | 33 | 37 |
| San Francisco | Mid-Peninsula | 5 | 55 | 60 |
| San Mateo | Mid-Peninsula | 1 | 5 | 6 |
| Skyline | Mid-Peninsula | 4 | 0 | 4 |
| Solano | North Bay | 27 | 38 | 65 |
| **Total Bay Region** | | **56** | **185** | **241** |
| **Total Mid-Peninsula Sub-Region** | | **10** | **60** | **70** |

# *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 3,323 annual openings for the Biotechnology occupational cluster and 241 annual (3-year average) awards for an annual undersupply of 3,082 students. In the Mid-Peninsula Sub-Region, there is also a gap with 865 annual openings and 70 annual (3-year average) awards for an annual undersupply of 795 students.

# Student Outcomes

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0430.00 - Biotechnology and Biomedical Technology**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2015-16 | Bay  (All CTE Programs) | City College of San Francisco (All CTE Programs) | State (0430.00) | Bay (0430.00) | Mid-Peninsula (0430.00) | City College of San Francisco (0430.00) |
| % Employed Four Quarters After Exit | 74% | 72% | 72% | 73% | 78% | 77% |
| Median Quarterly Earnings Two Quarters After Exit | $10,550 | $10,170 | $9,134 | $9,871 | $9,120 | $9,127 |
| Median % Change in Earnings | 46% | 31% | 82% | 107% | 101% | 101% |
| % of Students Earning a Living Wage | 63% | 65% | 54% | 57% | 52% | 53% |

*Source: Launchboard Pipeline (version available on 12/5/19)*

# Skills, Certifications and Education

**Table 9. Top Skills for Biotechnology Occupations in Bay Region (December 2018 - November 2019)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Skill | Postings | Skill | Postings | Skill | Postings |
| Quality Assurance and Control | 4,988 | Cell Culturing | 874 | Spreadsheets | 489 |
| Chemistry | 1,647 | Record Keeping | 865 | Basic Mathematics | 488 |
| Good Manufacturing Practices (GMP) | 1,518 | Manufacturing Processes | 847 | Laboratory Testing | 488 |
| Quality Management | 1,473 | Microbiology | 770 | Lifting Ability | 484 |
| Biology | 1,422 | Packaging | 750 | Flow Cytometry | 480 |
| Experiments | 1,256 | Cleaning | 711 | Batch Records | 475 |
| Scheduling | 1,179 | Laboratory Equipment | 699 | Hand Tools | 467 |
| Molecular Biology | 1,164 | Data Analysis | 693 | Calipers | 464 |
| Biotechnology | 1,159 | DNA | 663 | Project Management | 457 |
| Current Good Manufacturing Practices (CGMP) | 1,151 | Customer Service | 643 | High-Performance Liquid Chromatography (HPLC) | 447 |
| Biochemistry | 1,115 | Cell Biology | 623 | Micrometers | 442 |
| Calibration | 972 | Biochemical and Cell-Based Assays | 542 | Immunology | 433 |
| Data Entry | 964 | Good Laboratory Practices (GLP) | 524 | Calculation | 432 |
| Microscope | 914 | Test Equipment | 501 | SAP | 432 |
| Repair | 912 | Process Improvement | 500 | Prepare Compounds and Reagents | 417 |

*Source: Burning Glass*

**Table 10. Certifications for Biotechnology Occupations in Bay Region (December 2018 - November 2019)**

Note: 84% 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 |
| Driver's License | 652 | Advanced Cardiac Life Support (ACLS) Certification | 55 |
| Phlebotomy Certification | 299 | American Registry of Radiologic Technologists (ARRT) Certification | 52 |
| IPC Certification | 115 | Clinical Laboratory Scientist (ClS) | 48 |
| Basic Life Saving (BLS) | 108 | Forklift Operator Certification | 47 |
| Security Clearance | 93 | Certified Meeting Planner | 42 |
| First Aid CPR AED | 73 | Registered Nurse | 40 |
| Biotechnology Certificate | 70 | American Society For Clinical Pathology (ASCP) Certification | 40 |
| Basic Cardiac Life Support Certification | 65 | Certified Quality Technician (CQT) | 38 |
| American Heart Association Certification | 64 | Global Food Safety Initiative (GFSI) | 28 |
| Certified Medical Laboratory Technician | 62 | Welding Certification | 27 |
| American Society For Quality (ASQ) Certification | 61 | Project Management Certification | 26 |
| Certified Quality Auditor (CQA) | 55 | Certified Quality Engineer (CQE) | 26 |

*Source: Burning Glass*

**Table 11. Education Requirements for Biotechnology Occupations in Bay Region**

Note: 34% 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 | 3,748 | 42% |
| Associate Degree | 936 | 10% |
| Bachelor’s Degree or Higher | 4,217 | 48% |

*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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