** Technical Design & Computational Design Occupations Labor Market Information Report**

**Chabot College**

Prepared by the San Francisco Bay Center of Excellence

for Labor Market Research

July 2019

# Recommendation

Based on all available data, there appears to be a significant undersupply of Technical Design & Computational Design workers compared to the demand for this cluster of occupations in the Bay region and in the East Bay sub-region (Alameda and Contra Costa Counties.) There is a projected annual gap of about 1,404 students in the Bay region and 362 students in the East Bay Sub-Region.

This report also provides student outcomes data on employment and earnings for programs on TOP 0924.00 - Engineering Technology, General (requires Trigonometry) 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 Chabot College and in the region.

# Introduction

This report profiles Technical Design & Computational Design Occupations in the 12 county Bay region and in the East Bay sub-region for a proposed new program at Chabot College.

|  |
| --- |
| * **Electrical and Electronics Engineering Technicians (SOC 17-3023):** Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions. Excludes “Broadcast Technicians" (27-4012).
 |
| Entry-Level Educational Requirement: Associate's degree |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 53% |
| * **Industrial Engineering Technicians (SOC 17-3026):** Apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May perform time and motion studies on worker operations in a variety of industries for purposes such as establishing standard production rates or improving efficiency.
 |
| Entry-Level Educational Requirement: Associate's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 53*%* |
| * **Mechanical Engineering Technicians (SOC 17-3027):** Apply theory and principles of mechanical engineering to modify, develop, test, or calibrate machinery and equipment under direction of engineering staff or physical scientists.
 |
| Entry-Level Educational Requirement: Associate's *degree* |
| Training Requirement: None |
| Percentage of Community College Award Holders or Some Postsecondary Coursework: 53*%* |
| * **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*%* |

# Occupational Demand

**Table 1. Employment Outlook for Technical Design & Computational Design Occupations in Bay Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation  | 2017 Jobs | 2022 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Average Annual Open-ings | 10% Hourly Wage | Median Hourly Wage |
| Electrical and Electronics Engineering Technicians | 9,569 | 9,756 | 188  | 2% | 4,415 | 883 | $18.12  | $30.22  |
| Industrial Engineering Technicians | 1,189 | 1,338 | 148  | 12% | 689 | 138 | $20.40  | $31.07  |
| Mechanical Engineering Technicians | 1,127 | 1,245 | 118  | 10% | 623 | 125 | $19.77  | $32.89  |
| Engineering Technicians, Except Drafters, All Other | 2,707 | 2,869 | 163  | 6% | 1,350 | 270 | $21.41  | $35.77  |
|  |  |  |  |  |  |  |  |  |
| **Total** | **14,591** | **15,208** | **617**  | **4%** | **7,077** | **1,415** | **$19.05**  | **$31.52**  |

*Source: EMSI 2019.2*

**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 Technical Design & Computational Design Occupations in East Bay Sub-Region**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Occupation  | 2017 Jobs | 2022 Jobs | 5-Yr Change | 5-Yr % Change | 5-Yr Open-ings | Average Annual Open-ings | 10% Hourly Wage | Median Hourly Wage |
| Electrical and Electronics Engineering Technicians | 2,316 | 2,358 | 43  | 2% | 1,053 | 211 | $16.87  | $29.19  |
| Industrial Engineering Technicians | 470 | 508 | 38  | 8% | 255 | 51 | $20.45  | $33.10  |
| Mechanical Engineering Technicians | 309 | 339 | 31  | 10% | 174 | 35 | $19.75  | $28.61  |
| Engineering Technicians, Except Drafters, All Other | 690 | 728 | 38  | 6% | 344 | 70 | $20.17  | $36.87  |
|  |  |  |  |  |  |  |  |  |
| **TOTAL** | **3,784** | **3,934** | **150**  | **4%** | **1,826** | **366** | **$18.15**  | **$31.03**  |

*Source: EMSI 2019.2*

**East Bay Sub-Region** includes Alameda and Contra Costa Counties

### Job Postings in Bay Region and East Bay Sub-Region

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

| Occupation | Bay Region | East Bay |
| --- | --- | --- |
|  Engineering Technicians, Except Drafters, All Other | 2,336 | 797 |
|  Manufacturing Production Technicians | 2,231 | 789 |
|  Industrial Engineering Technicians | 2,003 | 508 |
|  Electronics Engineering Technicians | 1,594 | 450 |
|  Mechanical Engineering Technicians | 481 | 197 |
|  **Total** | **8,763** | **2,773** |

*Source: Burning Glass*

**Table 4a. Top Job Titles for Technical Design & Computational Design Occupations for latest 12 months (July 2018 - June 2019) Bay Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | Bay | Common Title | Bay |
| Manufacturing Technician | 1,046 | Manufacturing Specialist | 82 |
| Maintenance Technician | 1,003 | Maintenance Engineer | 79 |
| Engineering Technician | 785 | Technician | 73 |
| Production Technician | 515 | Senior Engineer | 73 |
| Test Technician | 412 | Low Voltage Technician | 59 |
| Maintenance Worker | 314 | Electromechanical Technician | 54 |
| Engineer | 280 | Maintenance Sanitation Team Member, Retail Industry | 53 |
| Electronics Technician | 253 | Laboratory Technician | 45 |
| Mechanical Technician | 233 | Cable Technician | 44 |
| Electrical Technician | 206 | Technical Solutions Engineer | 42 |
| Operations Technician | 161 | Technician, Support | 40 |
| Process Technician | 128 | Machine Operator | 39 |
| Test Operator | 110 | Maintenance Associate | 36 |
| Mechanical Inspector | 83 | Systems Engineer | 35 |

**Table 4b. Top Job Titles for Technical Design & Computational Design Occupations for latest 12 months (July 2018 - June 2019) East Bay Sub-Region**

|  |  |  |  |
| --- | --- | --- | --- |
| Common Title | East Bay | Common Title | East Bay |
| Maintenance Technician | 420 | Maintenance Engineer | 29 |
| Manufacturing Technician | 389 | Electromechanical Technician | 27 |
| Engineering Technician | 212 | Manufacturing Specialist | 25 |
| Production Technician | 202 | Technician | 20 |
| Mechanical Technician | 89 | Low Voltage Technician | 19 |
| Maintenance Worker | 89 | Electronics Technologist | 18 |
| Electrical Technician | 88 | Automation Technician | 18 |
| Electronics Technician | 86 | Maintenance Associate | 17 |
| Test Technician | 73 | Mechanic | 15 |
| Process Technician | 68 | Maintenance Sanitation Team Member, Retail Industry | 15 |
| Engineer | 48 | Maintenance Helper | 15 |
| Mechanical Inspector | 38 | Technician, Support | 14 |
| Operations Technician | 36 | Certified Technician, Manufacturing Industry | 14 |
| Test Operator | 33 | Cable Technician | 14 |

*Source: Burning Glass*

# Industry Concentration

**Table 5. Industries hiring Technical Design & Computational Design 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) |
| Semiconductor and Related Device Manufacturing (334413) | 2,199 | 2,047 |  (7.0%) | 15.2% |
| Electronic Computer Manufacturing (334111) | 1,475 | 1,574 | 7.0% | 10.2% |
| Engineering Services (541330) | 1,030 | 1,137 | 10.0% | 7.1% |
| Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology) (541715) | 737 | 728 |  (1.0%) | 5.1% |
| Custom Computer Programming Services (541511) | 484 | 548 | 13.0% | 3.3% |
| Other Electronic Component Manufacturing (334419) | 448 | 351 |  (22.0%) | 3.1% |
| Research and Development in Biotechnology (except Nanobiotechnology) (541714) | 422 | 588 | 39.0% | 2.9% |
| Testing Laboratories (541380) | 413 | 412 | 0.0% | 2.9% |
| Printed Circuit Assembly (Electronic Assembly) Manufacturing (334418) | 409 | 485 | 19.0% | 2.8% |
| Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals (334515) | 330 | 303 |  (8.0%) | 2.3% |
| Federal Government, Civilian, Excluding Postal Service (901199) | 320 | 314 |  (2.0%) | 2.2% |
| Bare Printed Circuit Board Manufacturing (334412) | 301 | 226 |  (25.0%) | 2.1% |
| Computer Systems Design Services (541512) | 287 | 317 | 10.0% | 2.0% |
| Local Government, Excluding Education and Hospitals (903999) | 232 | 244 | 5.0% | 1.6% |
| Temporary Help Services (561320) | 228 | 246 | 8.0% | 1.6% |
| Analytical Laboratory Instrument Manufacturing (334516) | 214 | 203 |  (5.0%) | 1.5% |
| Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing (334220) | 204 | 169 |  (17.0%) | 1.4% |
| Electromedical and Electrotherapeutic Apparatus Manufacturing (334510) | 202 | 265 | 31.0% | 1.4% |
| US Postal Service (901149) | 182 | 156 |  (14.0%) | 1.3% |
| Semiconductor Machinery Manufacturing (333242) | 177 | 196 | 11.0% | 1.2% |
| Corporate, Subsidiary, and Regional Managing Offices (551114) | 175 | 187 | 7.0% | 1.2% |
| Other Measuring and Controlling Device Manufacturing (334519) | 153 | 187 | 22.0% | 1.1% |

*Source: EMSI 2019.2*

**Table 6. Top Employers Posting Technical Design & Computational Design Occupations in Bay Region and East Bay Sub-Region (July 2018 - June 2019)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Employer | Bay | Employer | Bay | Employer | East Bay |
| Whole Foods Market, Inc. | 109 | Cynet Systems Inc | 27 | Tesla Motors | 44 |
| Western Digital | 103 | Sandia Corporation | 25 | Tesla | 41 |
| Tesla | 78 | Amazon | 25 | Lawrence Livermore National Laboratory | 39 |
| Apple Inc. | 77 | PepsiCo Inc. | 24 | Finisar Corporation | 31 |
| Google Inc. | 71 | Infosys | 23 | Whole Foods Market, Inc. | 30 |
| Tesla Motors | 56 | Enterprise Rent-A-Car | 23 | Western Digital | 25 |
| Outsource | 51 | Facebook | 21 | Sandia Corporation | 25 |
| Sanmina Corporation | 49 | Workers Com | 20 | PepsiCo Inc. | 18 |
| Cisco Systems Incorporated | 49 | Dick's Sporting Goods Incorporated | 20 | Formfactor, Inc | 17 |
| Finisar Corporation | 46 | Danaher Corporation | 20 | Valassis | 16 |
| Varian Medical Systems | 43 | Formfactor, Inc | 19 | Outsource | 15 |
| Lawrence Livermore National Laboratory | 39 | Cobham | 19 | Nana Regional Corporation | 15 |
| Applied Materials | 39 | Aramark | 19 | Walgreens Boots Alliance Inc | 14 |
| Genentech | 36 | Valassis | 18 | Workers Com | 13 |
| Intel Corporation | 31 | Milestone Technologies Incorporated | 18 | Precision Castparts | 13 |
| Walgreens Boots Alliance Inc | 28 | Intellipro Incorporated | 18 | Essai | 13 |
| Ryzen Solutions | 28 | Encorps Stem Teachers Program | 18 | Jones Lang Lasalle Incorporated | 12 |

*Source: Burning Glass*

# Educational Supply

There are two community colleges in the Bay Region issuing 11 awards on average annually (last 3 years) on TOP 0924.00 - Engineering Technology, General (requires Trigonometry). There is one college (Las Positas College) in the East Bay Sub-Region issuing four awards on average annually (last 3 years) on this TOP code.

**Table 7. Awards on TOP 0924.00 - Engineering Technology, General (requires Trigonometry) in the Bay Region**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| College | Sub-Region | Associates | Certificates | Noncredit | Total |
| **Cabrillo** | Santa Cruz & Monterey | 1 | 6 |  | 7 |
| **Las Positas** | East Bay | 4 |  |  | 4 |
| **Total Bay Region** | **5** | **6** | **0** | **11** |
| **Total East Bay Sub-Region** | **4** | **0** | **0** | **4** |

# *Source: IPEDS, Data Mart and Launchboard*

NOTE: Headcount of students who took one or more courses is for 2016-17. The annual average for awards is 2014-17 unless there are only awards in 2016-17. The annual average for other postsecondary is for 2013-16.

# Gap Analysis

Based on the data included in this report, there is a labor market gap in the Bay region with 1,415 annual openings for the Technical Design & Computational Design occupational cluster and 11 annual (3-year average) awards for an annual undersupply of 1,404 students. In the East Bay Sub-Region, there is also a gap with 366 annual openings and 4 annual (3-year average) awards for an annual undersupply of 362 students.

# Student Outcomes

**Table 8. Four Employment Outcomes Metrics for Students Who Took Courses on TOP 0924.00 - Engineering Technology, General (requires Trigonometry)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2015-16 | Bay (All CTE Programs) | Chabot College (All CTE Programs) | State (0924.00) | Bay (0924.00) | East Bay (0924.00) | Chabot College (0924.00) |
| % Employed Four Quarters After Exit | 74% | 74% | 52% | 63% | n/a | n/a |
| Median Quarterly Earnings Two Quarters After Exit | $10,550 | $9,425 | $8,140 | $8,190 | n/a | n/a |
| Median % Change in Earnings | 46% | 71% | 69% | 59% | n/a | n/a |
| % of Students Earning a Living Wage | 63% | 60% | 52% | 53% | n/a | n/a |

*Source: Launchboard Pipeline (version available on 7/11/19)*

# Skills, Certifications and Education

**Table 9. Top Skills for Technical Design & Computational Design Occupations in Bay Region (July 2018 - June 2019)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Skill | Postings | Skill | Postings | Skill | Postings |
| Repair | 2,667 | Manufacturing Processes | 503 | Robotics | 290 |
| Test Equipment | 928 | Lifting Ability | 496 | Forklift Operation | 286 |
| Hand Tools | 870 | Python | 471 | SAP | 284 |
| Scheduling | 793 | Linux | 458 | Biotechnology | 284 |
| Predictive / Preventative Maintenance | 787 | Electronics Industry Knowledge | 458 | Power Supplies | 276 |
| Schematic Diagrams | 727 | Packaging | 451 | Current Good Manufacturing Practices (CGMP) | 276 |
| Cleaning | 659 | Wiring | 448 | Machining | 275 |
| Technical Support | 647 | Microscope | 429 | Manual Dexterity | 274 |
| Machinery | 647 | Good Manufacturing Practices (GMP) | 425 | Spreadsheets | 263 |
| Soldering | 635 | Welding | 393 | Debugging | 261 |
| Calibration | 607 | Experiments | 374 | Product Development | 256 |
| Quality Assurance and Control | 600 | Data Entry | 371 | Java | 253 |

*Source: Burning Glass*

**Table 10. Certifications for Technical Design & Computational Design Occupations in Bay Region (July 2018 - June 2019)**

Note: 81% 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 | 1,032 | CDL Class A | 26 |
| Security Clearance | 132 | Licensed Professional Engineer | 25 |
| Forklift Operator Certification | 63 | Certified A+ Technician | 25 |
| Biotechnology  | 46 | Airframe and Powerplant (A and P) Certification | 24 |
| Cdl Class C | 43 | IT Infrastructure Library (ITIL) Certification | 20 |
| Automotive Service Excellence (ASE) Certification | 39 | The American Society For Nondestructive Testing (ASNT) Certification | 19 |
| IPC Certification | 36 | Welding Certification | 16 |
| Cisco Certified Network Associate (CCNA) | 36 | CompTIA Network+ | 14 |
| Cisco Certified Internetwork Expert (CCIE) | 35 | Leadership In Energy And Environmental Design (LEED) Certified | 13 |
| Cisco Certified Network Professional (CCNP) | 34 | ITIL Certification | 13 |
| Electrician Certification | 29 | Microsoft Certified Solutions Associate (MCSA) | 12 |
| Pharmacy Technician Certification Board (PTCB) | 28 | Soldering Certification | 11 |

*Source: Burning Glass*

**Table 11. Education Requirements for Technical Design & Computational Design 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 | 2,374 | 48% |
| Associate Degree | 894 | 18% |
| Bachelor’s Degree or Higher | 1,503 | 34% |

*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

For more information, please contact:

* Doreen O’Donovan, Research Analyst, for Bay Area Community College Consortium (BACCC) and Centers of Excellence (CoE), doreen@baccc.net or (831) 479-6481
* John Carrese, Director, San Francisco Bay Center of Excellence for Labor Market Research, jcarrese@ccsf.edu or (415) 267-6544