CENTER OF EXCELLENCE FOR LABOR MARKET RESEARCH
LOS ANGELES

Labor Market Analysis: 0430.00 – Biotechnology and Biomedical Technology

Environmental Monitoring in Biomanufacturing

Certificate requiring 16 to fewer than 30 semester units

Los Angeles Center of Excellence, June 2025

Program Endorsement:	Endorsed: All Criteria Met ☐	Endorsed: Some Criteria Met ☒	Not Endorsed ☐

Program Endorsement Criteria		
Supply Gap:	Yes ☑	No ☐
Living Wage: (Entry-Level, 25th)	Yes ☐	No ☑
Education:	Yes ☑	No ☐
Emerging Occupation(s)		
Yes ☑		No ☐

SUMMARY

This report analyzes whether local labor market demand is being met by community college programs aligned with the identified middle-skill occupations[1] or whether a shortage of workers exists. Labor market demand is measured by annual job openings while education supply is measured by the number of awards (degrees and certificates) conferred on average each year.

Based on the available data, there appears to be a supply gap for the four identified middle-skill occupations in the region. While entry-level wages are lower than the self-sufficiency standard wage in both Los Angeles and Orange counties, more than one-third of current workers in the field have completed an associate degree or less education as their highest level of educational attainment.

<u>Recommendation:</u> Due to two of three program endorsement criteria being met, the Los Angeles Center of Excellence for Labor Market Research (LA COE) endorses this proposed program.

Key Findings

Supply Gap

- 3,769 annual job openings are projected in the region through 2028. This number is greater than the three-year average of 231 awards conferred by educational institutions in the region.

[1] Middle-skill occupations typically require some postsecondary education, but less than a bachelor's degree. The COE classifies middle-skill jobs as the following:

- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

- However, the *inspectors, testers, sorters, samplers, and weighers* (51-9061) occupation is employed across various manufacturing and scientific industries, including the emerging field of biotechnology. Since the SOC code does not solely represent this occupation within the biotechnology field, **the number of annual job openings is likely overstated.**
- Over the past 12 months, there were 10,778 online job postings related to these biotechnology occupations. Of these job postings, **149 mentioned "environmental monitoring" and/or "biomanufacturing" as a specialized skill.** The top job postings were for quality assurance technicians, laboratory technicians, quality control technicians, quality control inspectors, and quality control laboratory technicians.

Living Wage

- All four occupations have entry-level wages **below** Los Angeles County's self-sufficiency standard hourly wage ($24.03/hour).[2]

Educational Attainment

- 65% of the annual job openings typically require a high school diploma or equivalent for middle-skill occupations related to biotechnology in the LA/OC region.
- 49%-83% of workers in the field have completed some college/associate degree or less educational attainment, according to national educational attainment data.

Community college supply

- 13 community colleges issued awards related to biotechnology in the greater LA/OC region.
- 215 awards (degrees and certificates) were conferred on average each year between 2021 and 2023.

Other postsecondary supply

- 3 educational institutions in the LA/OC region have conferred awards in programs related to biotechnology over the past three years.
- 16 awards were conferred on average each year by other postsecondary institutions throughout the greater LA/OC region between 2020 and 2022.

TARGET OCCUPATIONS

LA COE prepared this report to provide regional labor market and postsecondary supply data related to four middle-skill and one emerging occupation. Although some of the occupations in this report typically require a bachelor's degree, they are considered middle-skill because approximately one-third of workers in the field have completed some college or an associate degree. For full occupation descriptions, please see Appendix.

- ***Biological Technicians*** **(19-4021)**[3]

[2] Center for Women's Welfare, University of Washington. (2024). *The self-sufficiency standard for California 2024.* http://selfsufficiencystandard.org/California.
[3] Biological Technicians (bls.gov)

- ***Chemical Technicians* (19-4031)**[4]
- ***Clinical Laboratory Technologists and Technicians* (29-2018)** This occupation includes the 2018 SOC occupations:[5]
    - ***Medical and Clinical Laboratory Technologists* (29-2011)**
    - ***Medical and Clinical Laboratory Technicians* (29-2012)**
- ***Inspectors, Testers, Sorters, Samplers, and Weighers* (51-9061)**[6]

and one emerging occupation:

- ***Quality Control Analysts* (19-4099.01)** Conduct tests to determine quality of raw materials, bulk intermediate and finished products. May conduct stability sample tests.[7]

OCCUPATIONAL DEMAND

Exhibit 1 shows the five-year occupational demand projections for these middle-skill biotechnology occupations. In the greater Los Angeles/Orange County region, the number of jobs related to these occupations is projected to decrease by 1% through 2028. However, there will be nearly 3,800 job openings per year through 2028 due to retirements and workers leaving the field. It is important to note that the *inspectors, testers, sorters, samplers, and weighers* (51-9061) occupation is employed across various manufacturing and scientific industries, including the emerging field of biotechnology. Therefore, the data in Exhibit 1 is likely overstated for biotechnology *inspectors, testers, sorters, samplers, and weighers*. The majority of jobs in 2023 for these middle-skill biotechnology occupations (68%) were located in Los Angeles County.

Exhibit 1: Current employment and occupational demand, Los Angeles and Orange counties[8]

Geography	2023 Jobs	2028 Jobs	2023-2028 Change	2023-2028 % Change	Annual Openings
Los Angeles	25,310	24,801	(509)	(2%)	2,557
Orange	11,791	11,760	(31)	(0%)	1,212
Total	**37,101**	**36,561**	**(540)**	**(1%)**	**3,769**

Detailed Occupation Data

Exhibit 2 displays the current employment and projected occupational demand for each of the target occupations in Los Angeles County. Positive scores for automation resilience[9] reflect a lower-than-average threat of the occupation(s) being replaced by automation, while negative scores reflect a greater-than-average risk of automation. The average percentage of workers aged 55+ across all occupations in the Los Angeles/Orange County region is 26%; occupations with a larger share of workers aged 55 and older typically have greater replacement needs to

[4] Chemical Technicians (bls.gov)
[5] Clinical Laboratory Technologists and Technicians (bls.gov)
[6] Quality Control Inspectors (bls.gov)
[7] Quality Control Analysts (onetonline.org)
[8] Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.
[9] Automation risk is calculated based on the percentage of time spent on high-risk compared to low-risk work, the number of high-risk jobs in compatible occupations, and the overall industry automation risk.

offset the amount of impending retirements. On average, 81% of workers across all occupations in California are employed full-time.

Exhibit 2: Detailed employment and occupational demand, Los Angeles County[10]

Occupation	2023 Jobs	2028 Jobs	5-Yr % Change	Annual Openings	Automation Resilience	% Aged 55 and older	% Full Time Workers
Biological Technicians	1,362	1,442	6%	188	9.6	15%	N/A
Chemical Technicians	1,639	1,571	(4%)	185	(4.6)	27%	100%
Clinical Laboratory Technologists and Technicians	7,340	7,539	3%	510	2.1	23%	100%
Inspectors, Testers, Sorters, Samplers, and Weighers	14,970	14,250	(5%)	1,674	(6.1)	34%	91%
Total	**25,310**	**24,801**	**(2%)**	**2,557**	**-**	**-**	**-**

WAGES

The labor market endorsement in this report considers the entry-level hourly wages for these middle-skill biotechnology occupations in Los Angeles County as they relate to the county's self-sufficiency standard wage. Orange County wages are included below in order to provide a complete analysis of the greater Los Angeles/Orange County region.

Los Angeles County

All target occupations in this report have entry-level wages below the self-sufficiency standard wage for one adult ($24.03 in Los Angeles County). Typical entry-level hourly wages are in a range between $18.35 and $23.62 (Exhibit 3). Experienced workers can expect to earn wages between $29.21 and $39.12, which are higher than the self-sufficiency standard.

[10] Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Exhibit 3: Earnings for occupations in Los Angeles County

Occupation	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)	Median Annual Earnings*
Biological Technicians	$23.62	$31.29	$39.12	$65,100
Chemical Technicians	$21.64	$24.83	$31.59	$51,600
Clinical Laboratory Technologists and Technicians	$22.35	$28.84	$36.77	$60,000
Inspectors, Testers, Sorters, Samplers, and Weighers	$18.35	$22.73	$29.21	$47,300

*Rounded to the nearest $100

Orange County

All the target occupations in this report have entry-level wages below the self-sufficiency standard wage for one adult ($27.13 in Orange County). Typical entry-level hourly wages are in a range between $18.90 and $23.64 (Exhibit 4). Experienced workers can expect to earn wages between $30.00 and $38.88, which are higher than the self-sufficiency standard.

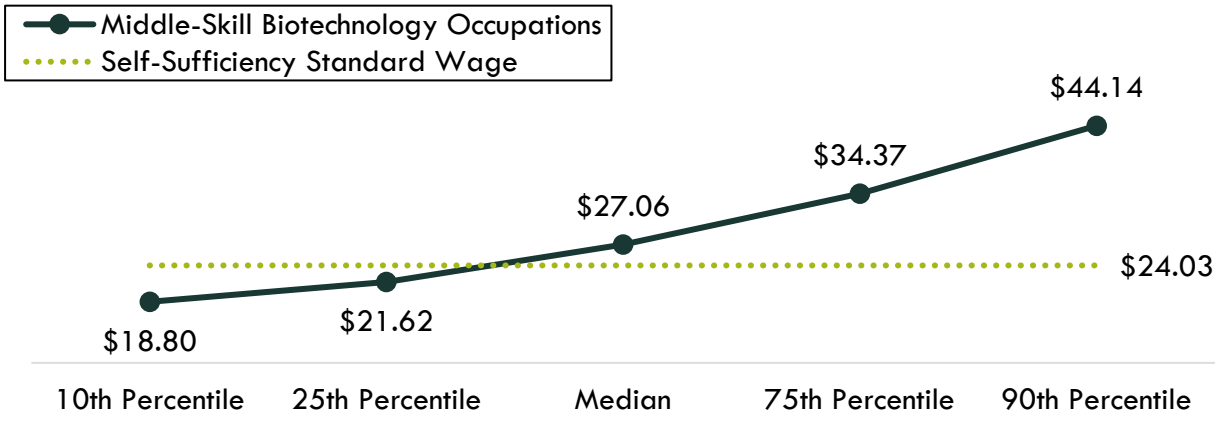
Exhibit 4: Earnings for occupations in Orange County

Occupation	Entry-Level Hourly Earnings (25th Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75th Percentile)	Median Annual Earnings*
Biological Technicians	$22.51	$29.82	$37.29	$62,000
Chemical Technicians	$22.36	$25.65	$32.63	$53,400
Clinical Laboratory Technologists and Technicians	$23.64	$30.49	$38.88	$63,400
Inspectors, Testers, Sorters, Samplers, and Weighers	$18.90	$23.38	$30.00	$48,600

*Rounded to the nearest $100

Across the greater Los Angeles and Orange County region, the average entry-level hourly earnings for the occupations in this report are $21.62; this is below the living wage for one single adult in Los Angeles County ($24.03). Exhibit 5 shows the average hourly wage for the occupations in this report, for entry-level to experienced workers.

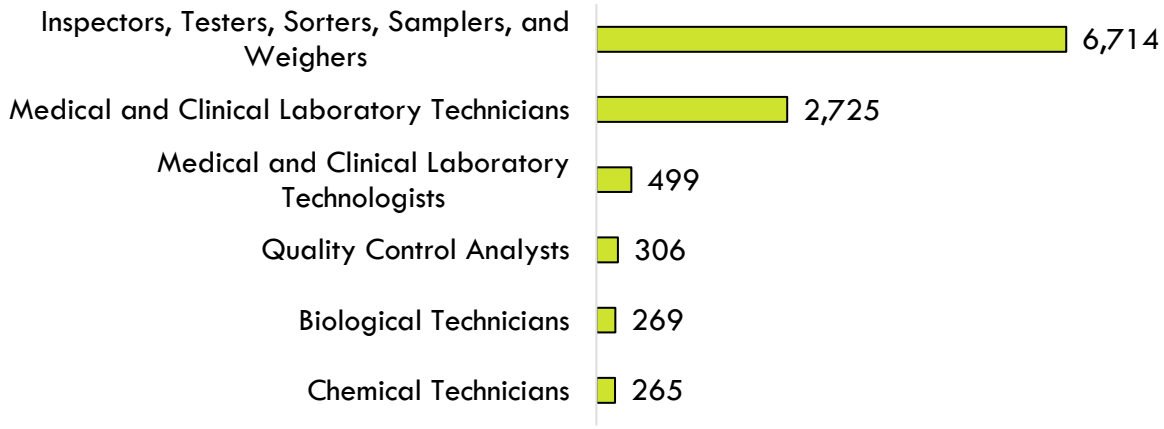
Exhibit 5: Average hourly earnings for middle-skill biotechnology occupations, Los Angeles and Orange counties



JOB POSTINGS BY OCCUPATION

There were 10,778 online job postings related to middle-skill biotechnology occupations listed in the past 12 months in Los Angeles and Orange counties. Exhibit 6 displays the number of job postings by occupation. The majority of job postings (62%) were for *inspectors, testers, sorters, samplers, and weighers*, followed by *medical and clinical laboratory technicians* (25%) and *medical and clinical laboratory technologists* (5%).

Exhibit 6: Job postings by occupation (last 12 months), Los Angeles and Orange counties



Job postings were analyzed for the most common job titles, skills, and employers associated with the target occupations in this report (Exhibit 7).

Exhibit 7: Most commonly requested job titles, skills and employers in job postings, Los Angeles and Orange counties

Top Job Titles	Top Skills	Top Employers
• Quality inspectors • Quality control inspectors • Laboratory technicians • Laboratory assistants • Quality control technicians • Quality assurance technicians • Quality assurance specialists • Quality technicians • Quality assurance inspectors • Medical laboratory technicians	• Auditing • Calipers • Micrometers • Good Manufacturing Practices (GMP) • Quality management • Quality management systems • Laboratory equipment	• Aerotek* • Actalent* • Volt* • University of California • Kelly Services* • Quest Diagnostics • Express Employment Professionals* • ManpowerGroup* • Vetted Health*

*Staffing company

In the greater Los Angeles/Orange County region, 57% of the middle-skill biotechnology job postings listed a minimum educational requirement. Exhibit 8 details the number and percentage of job postings by educational level.

Exhibit 8: Education levels requested in job postings for middle-skill biotechnology occupations, Los Angeles and Orange counties

Education Level	Job Postings	% of Job Postings
Bachelor's degree	1,509	25%
Associate degree	620	10%
High school diploma or vocational training	3,968	65%

JOB POSTINGS BY SKILL

Of the online middle-skill biotechnology job postings in the past 12 months in Los Angeles and Orange counties, **149 postings listed "environmental monitoring" and/or "biomanufacturing" as a specialized skill.** Job postings were analyzed for the most common job titles, skills, and employers associated with the target occupations and skills in this report (Exhibit 9).

Exhibit 9: Most commonly requested job titles, skills and employers in job postings, Los Angeles and Orange counties

Top Job Titles	Top Skills	Top Employers
• Quality assurance technicians • Laboratory technicians • Quality control technicians • Quality control inspectors • Quality control laboratory technicians • Microbiology technicians • Quality control microbiology analysts	• Environmental monitoring • Good manufacturing practices • Chemistry • Bioburden testing • Biology • Auditing	• Actalent* • The Oncology Institute of Hope and Innovation • AtWork Group* • iLink Business Management* • University of Southern California • Danone

*Staffing company

In the greater Los Angeles/Orange County region, 66% of the target biotechnology job postings listed a minimum educational requirement. Exhibit 10 details the number and percentage of job postings by educational level.

Exhibit 10: Education levels requested in job postings for target biotechnology occupations, Los Angeles and Orange counties

Education Level	Job Postings	% of Job Postings
Bachelor's degree	45	45%
Associate degree	10	10%
High school diploma or vocational training	44	44%

EDUCATIONAL ATTAINMENT

In the greater Los Angeles/Orange County region, the majority of annual job openings (65%) typically require a high school diploma or equivalent (Exhibit 11). However, the national-level data indicates between 49% and 83% of workers in the field have completed some college/an associate degree or less education as their highest level of educational attainment. The Bureau of Labor Statistics (BLS) lists the following typical entry-level education levels for the occupations in this report:

Exhibit 11: Entry-level education preferred by employers nationally, Bureau of Labor Statistics

Occupation	Education Level
Biological Technicians	Bachelor's degree
Clinical Laboratory Technologists and Technicians	Bachelor's degree
Chemical Technicians	Associate degree
Inspectors, Testers, Sorters, Samplers, and Weighers	High school diploma or equivalent

EDUCATIONAL SUPPLY

Community College Supply

Exhibit 12 shows the annual and three-year average number of awards conferred by community colleges in programs that have historically trained for the occupations of interest. The colleges with the most completions in the region are LA Mission, Pasadena, and Mt. San Antonio.

Exhibit 12: Regional community college awards (certificates and degrees), 2021-2023

TOP Code	Program	College	2020-21 Awards	2021-22 Awards	2022-23 Awards	3-Year Average
0430.00	Biotechnology and Biomedical Technology	Citrus	5	9	14	9
		East LA	7	4	-	4
		Glendale	-	-	12	4
		LA Mission	17	38	42	32
		LA Trade-Tech	6	13	3	7
		Pasadena	32	33	28	31
		West LA	-	-	7	2
		LA Subtotal	**67**	**97**	**106**	**90**
		Fullerton	13	3	12	9
		Irvine	14	23	11	16
		Santa Ana	5	13	20	13
		Santiago Canyon	9	16	57	27
		OC Subtotal	**41**	**55**	**100**	**65**
Supply Subtotal/Average			**108**	**152**	**206**	**155**
0954.00	Chemical Technology	East LA	3	2	1	2
		LA Trade-Tech	3	11	-	5
		LA Subtotal	**6**	**13**	**1**	**7**
Supply Subtotal/Average			**6**	**13**	**1**	**7**
0955.00		Mt San Antonio	5	4	2	4

TOP Code	Program	College	2020-21 Awards	2021-22 Awards	2022-23 Awards	3-Year Average
	Laboratory Science Technology	**LA Subtotal**	**5**	**4**	**2**	**4**
Supply Subtotal/Average			**5**	**4**	**2**	**4**
1205.00	Medical Laboratory Technology	Mt San Antonio	26	27	26	26
		LA Subtotal	**26**	**27**	**26**	**26**
		Saddleback	27	17	25	23
		OC Subtotal	**27**	**17**	**25**	**23**
Supply Subtotal/Average			**53**	**44**	**51**	**49**
Supply Total/Average			**172**	**213**	**260**	**215**

Other Postsecondary Supply

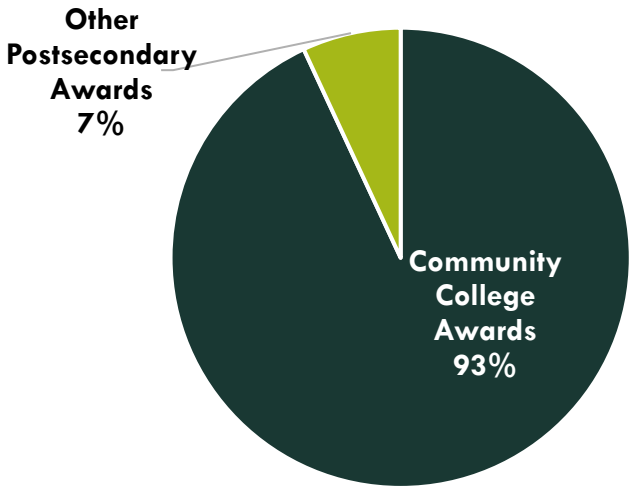
For a comprehensive regional supply analysis, it is important to consider the supply from other institutions in the region that provide training programs for middle-skill biotechnology occupations. Exhibit 13 shows the number of awards conferred by these institutions in relevant programs. Due to different data collection periods, the most recent data is from 2020 to 2022. Between 2020 and 2022, other postsecondary college institutions in the region conferred an average of 16 bachelor's and sub-baccalaureate awards. Sub-baccalaureate awards include associate degrees, postsecondary awards, and other academic awards that typically take fewer than four years to complete. Of the awards in Exhibit 11, the majority (83%) are bachelor's awards (13 awards), followed by sub-baccalaureate awards (3 awards).

Exhibit 13: Other regional postsecondary awards, 2020-2022

CIP Code	Program	Postsecondary Institution	2019-20 Awards	2020-21 Awards	2021-22 Awards	3-Year Average
15.0702	Quality Control Technology/ Technician	CSU-Dominguez Hills	1	3	3	2
26.1104	Computational Biology	USC	7	8	16	10
51.1004	Clinical/Medical Laboratory Technician	Regan Career Institute	-	1	8	3
Supply Total/Average			**8**	**12**	**27**	**16**

Exhibit 14 shows the proportion of community college awards conferred in the greater Los Angeles/Orange County region compared to the number of other postsecondary awards for the programs in this report. The majority of awards conferred in these programs are awarded by community colleges in the greater Los Angeles/Orange County region.

Exhibit 14: Percentage of community college awards compared to other postsecondary institution awards in the Los Angeles/Orange County region



APPENDIX: OCCUPATION DESCRIPTIONS

LA COE prepared this report to provide regional labor market supply and demand data related to these target occupations:

- ***Biological Technicians* (19-4021)** Assist biological and medical scientists. Set up, operate, and maintain laboratory instruments and equipment, monitor experiments, collect data and samples, make observations, and calculate and record results. May analyze organic substances, such as blood, food, and drugs.[11]
- ***Chemical Technicians* (19-4031)** Conduct chemical and physical laboratory tests to assist scientists in making qualitative and quantitative analyses of solids, liquids, and gaseous materials for research and development of new products or processes, quality control, maintenance of environmental standards, and other work involving experimental, theoretical, or practical application of chemistry and related sciences.[12]
- ***Clinical Laboratory Technologists and Technicians* (29-2018)** This occupation includes the 2018 SOC occupations: Medical and Clinical Laboratory Technologists (29-2011) and Medical and Clinical Laboratory Technicians (29-2012).[13]
    - ***Medical and Clinical Laboratory Technologists* (29-2011)** Perform complex medical laboratory tests for diagnosis, treatment, and prevention of disease. May train or supervise staff.
    - ***Medical and Clinical Laboratory Technicians* (29-2012)** Perform routine medical laboratory tests for the diagnosis, treatment, and prevention of disease. May work under the supervision of a medical technologist.
- ***Inspectors, Testers, Sorters, Samplers, and Weighers* (51-9061)** Inspect, test, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled

[11] Biological Technicians (bls.gov)
[12] Chemical Technicians (bls.gov)
[13] Clinical Laboratory Technologists and Technicians (bls.gov)

parts or products for defects, wear, and deviations from specifications. May use precision measuring instruments and complex test equipment.[14]

and one emerging occupation:

- ***Quality Control Analysts*** **(19-4099.01)** Conduct tests to determine quality of raw materials, bulk intermediate and finished products. May conduct stability sample tests.[15]

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DATA SOURCES

- O*NET Online
- Lightcast (formerly Emsi)
- Bureau of Labor Statistics (BLS)
- California Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- Self-Sufficiency Standard at the Center for Women's Welfare, University of Washington
- Chancellor's Office Curriculum Inventory (COCI 2.0)

[14] Quality Control Inspectors (bls.gov)
[15] Quality Control Analysts (onetonline.org)