



Unmet Workforce Demand for Biomanufacturing Jobs in LA County

Labor Market Supply and Demand for Biomanufacturing
Baccalaureate of Science (B.S.) degree at
LA Pierce College

*Prepared by: Los Angeles Center of Excellence for Labor Market Research
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Table of Contents

Key Findings	3
Introduction	4
Key Biomanufacturing Occupations	5
Labor Market Demand for Biomanufacturing Jobs	5
Historical employment in LA County.....	5
Projected annual job openings, 2022-2027	6
Average hourly wages for key biomanufacturing occupations.....	7
Industry employment of key biomanufacturing occupations	9
Job postings for key biomanufacturing occupations.....	9
Educational Supply: Training Programs for Biomanufacturing	11
Bachelor’s degrees related to biomanufacturing	11
Gap Analysis	12
Recommendations & Discussion	14
Methodology	15
Appendix	16

Key Findings

Demand:

- Employment for the key biomanufacturing occupations in this report has varied over the last 20 years, experiencing both growth and decline over two decades, with 3% overall growth since 2003.
- Over the next five years, nearly 600 biomanufacturing jobs are projected to be available annually in Los Angeles County.
- Average hourly wages for each of the three biomanufacturing jobs in this report are higher than the average across all occupations. For instance, industrial production managers earn \$13 more per hour at the 10th percentile, \$18 more at the 25th percentile, \$25 more at the median, \$41 more at the 75th percentile, and \$51 more per hour at the 90th percentile.

Supply:

- Between 2019 and 2021, educational providers in the region conferred an average of 368 bachelor's degrees from programs related to biomanufacturing.

Gap Analysis:

- With 368 average annual bachelor's degrees issued in the county and 580 projected annual job openings for these key biomanufacturing occupations, all which typically require a bachelor's degree for entry, the potential supply gap at this level of education is 212 unfilled jobs annually in Los Angeles County.

Key Biomanufacturing Occupations

The key biomanufacturing occupations analyzed in this report were selected from the 2018 Standard Occupational Classification (SOC) system. These occupations are classified under three separate occupational major groups:

- Management occupations (11-0000)
- Architecture and engineering occupations (17-000)
- Life, physical, and social science occupations (19-0000)

Exhibit 1: Key biomanufacturing occupations

SOC Code	Description	Typical Entry-Level Education
11-3051	Industrial Production Managers	Bachelor's degree
11-3051.01	Quality Control Systems Managers	Emerging occupation; data collection underway
17-2031	Bioengineers and biomedical engineers	Bachelor's degree
19-4021	Biological Technicians	Bachelor's degree

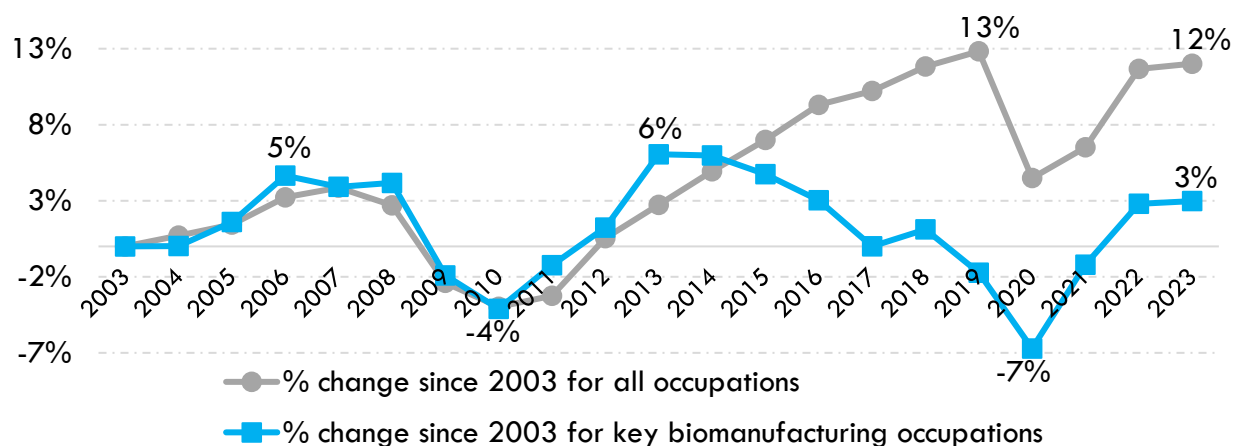
Source: [2018 Standard Occupational Classification \(SOC\) system](#)

Labor Market Demand for Biomanufacturing Jobs

Historical employment in LA County

Exhibit 2 demonstrates that since 2003, employment for the key biomanufacturing occupations in this report has varied over the past twenty years. On average, these key biomanufacturing occupations experienced a positive rate of growth from 2003 until the Great Recession (2007-2009), increasing by 5% from 2003-2006. Employment for these occupations rebounded after the Great Recession and hit a twenty-year high in 2013 at 6% growth since 2003. From 2013 to 2019, employment in these occupations dwindled and sharply declined, most likely due to the COVID-19 pandemic (2020). Since the pandemic, average employment for these three occupations increased to 3% job growth in 2023, as compared to the number of jobs in 2003. All jobs across Los Angeles County dipped during the Great Recession (2007-2009), and experienced economic shock during the COVID-19 pandemic (2020-2021), which significantly decreased employment for nearly all occupations. However, the number of jobs in Los Angeles County has increased by 12% since 2003 (on average), which is more than the average of biomanufacturing jobs.

Exhibit 2: Percent change in employment since 2003



Source: Lightcast, Datarun 2024.1

Projected annual job openings, 2022-2027

Exhibit 3 displays detailed 2022 job counts, projected employment figures through 2027, five-year percentage change in employment, and projected annual job openings for the key biomanufacturing occupations in this report. In Los Angeles County, there will be nearly 600 annual job openings through 2027. There will be the most job openings for industrial production managers (405 job openings), even though this occupation is projected to decline slightly in number of jobs by 2027. Biological technicians are projected to grow the fastest comparatively by 2027, growing 8% in Los Angeles County and 9% across California. In California, nearly 3,900 job openings are projected to be available annually for these three key biomanufacturing occupations. These occupations are expected to grow by 6% in the next few years throughout the state, surpassing 42,000 jobs by 2027.

Exhibit 3: Occupational demand in Los Angeles County

SOC	Occupation	Region	2022 Jobs	2027 Jobs	5-Year % Change	Annual Openings
11-3051	Industrial Production Managers	Los Angeles	6,049	5,959	(1%)	405
		California	25,457	26,622	5%	2,007
17-2031	Bioengineers and Biomedical Engineers	Los Angeles	545	548	0%	31
		California	3,144	3,401	8%	231
19-4021	Biological Technicians	Los Angeles	1,015	1,092	8%	144
		California	11,124	12,143	9%	1,621
TOTAL		Los Angeles	7,609	7,599	(0%)	580
		California	39,725	42,166	6%	3,859

Source: Lightcast, Datarun 2024.1

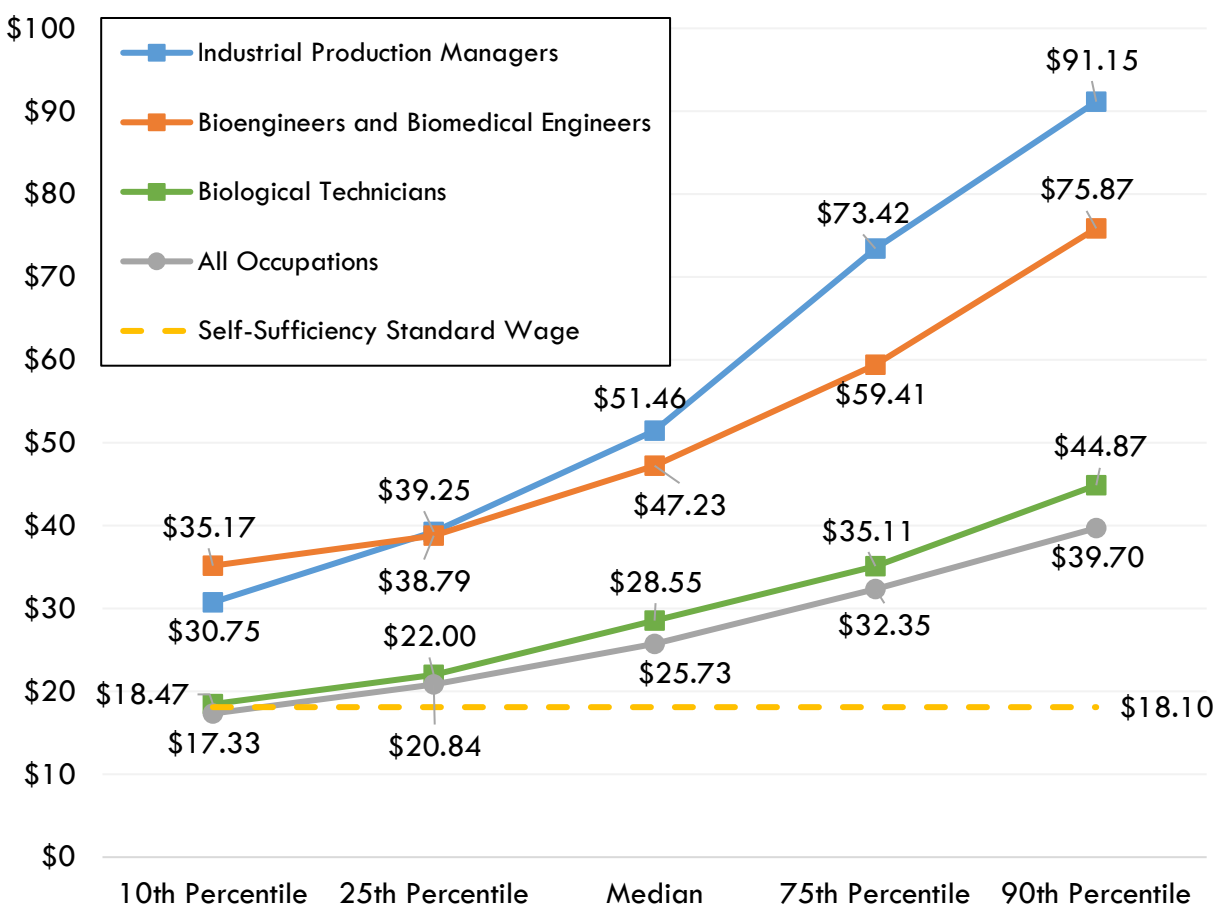
Average hourly wages for key biomanufacturing occupations

The average hourly wage for these three key biomanufacturing occupations in Los Angeles County at the 10th, 25th, median, 75th, and 90th percentile is displayed in Exhibit 4. Since there is some wage disparity between the three occupations in this report, wages are displayed by occupation. Biological technicians have wage projections that look similar to the average wages of all employers across Los Angeles County. At the lowest percentile available (i.e., the 10th), workers employed as biological technicians earn \$1.14 per hour more than the regional average across all occupations. Progressing to the 25th percentile, biological technicians earn \$1.16 per hour more than the average worker in the region, \$2.82 more at the median level, \$2.76 more at the 75th percentile, and \$5.17 more per hour at the 90th percentile, on average.

However, there is a much more prominent wage gap when comparing industrial production managers and bioengineers and biomedical engineers to the average Los Angeles County worker, as these occupations have significantly higher wages. Bioengineers and biomedical engineers earn markedly more than the regional average across all occupations. Starting at the 10th percentile, workers employed as bioengineers and biomedical engineers earn \$17.84 per hour more than the average worker in the region, \$17.95 at the 25th percentile, \$21.50 at the medial level, \$27.06 at the 75th percentile, and \$36.17 more per hour at the 90th percentile, on average.

The same is true for industrial production managers in comparison to the average Los Angeles County worker. Starting at the 10th percentile, industrial production managers earn \$13.42 per hour more than the average worker in the region, \$18.41 at the 25th percentile, \$25.73 at the medial level, \$41.07 at the 75th percentile, and \$51.45 more per hour at the 90th percentile, on average. While earnings may vary depending on employer, industry, and city of employment, these represent average wages across Los Angeles County. Exhibit 4 provides a visual display of these wage projections for Los Angeles County.

Exhibit 4: Hourly wage range for key biomanufacturing occupations in Los Angeles County



Source: Lightcast, Datarun 2024.1 and the [Self-Sufficiency Standard for California](#)

Detailed median hourly and annual wages are displayed in Exhibit 5 for these three key biomanufacturing occupations in Los Angeles County. While biological technicians earn well above Los Angeles County’s self-sufficiency standard annual wage (\$38,217), bioengineers and biomedical engineers make more than double the county’s self-sufficiency standard. The median annual earnings for industrial production managers is more than \$100,000 annually, which far exceeds the self-sufficiency standard wage.

Exhibit 5: Median hourly and annual wages for key biomanufacturing occupations

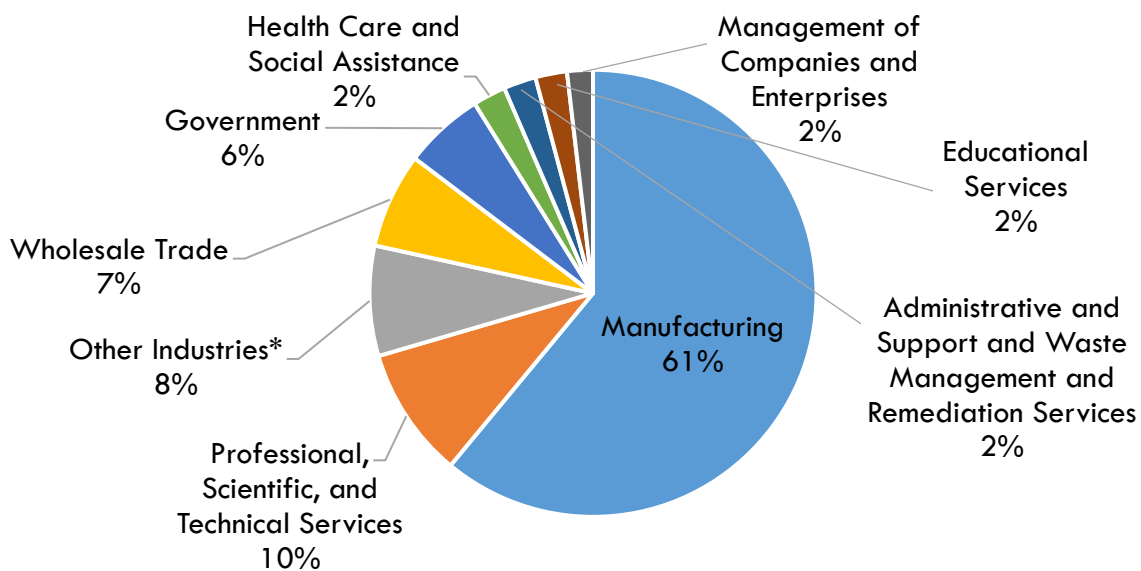
SOC Code	Description	Median Hourly Earnings	Median Annual Earnings
11-3051	Industrial Production Managers	\$51.46	\$107,032
17-2031	Bioengineers and Biomedical Engineers	\$47.23	\$98,240
19-4021	Biological Technicians	\$28.55	\$59,374

Source: Lightcast, Datarun 2024.1

Industry employment of key biomanufacturing occupations

Exhibit 6 displays the portion of key biomanufacturing occupations working within each industry sector. Unsurprisingly, industry sector with the largest share of key biomanufacturing occupations is manufacturing at 61%. The second highest concentration of biomanufacturing occupations is professional, scientific, and technical (54) at 10%, which includes the research and development in the physical, engineering, and life sciences (NAICS 541715) industry subsector. Combined, these two industry sectors account for 71% of the employment for these key biomanufacturing occupations Los Angeles County.

Exhibit 6: Industry concentration of key biomanufacturing occupations in 2022

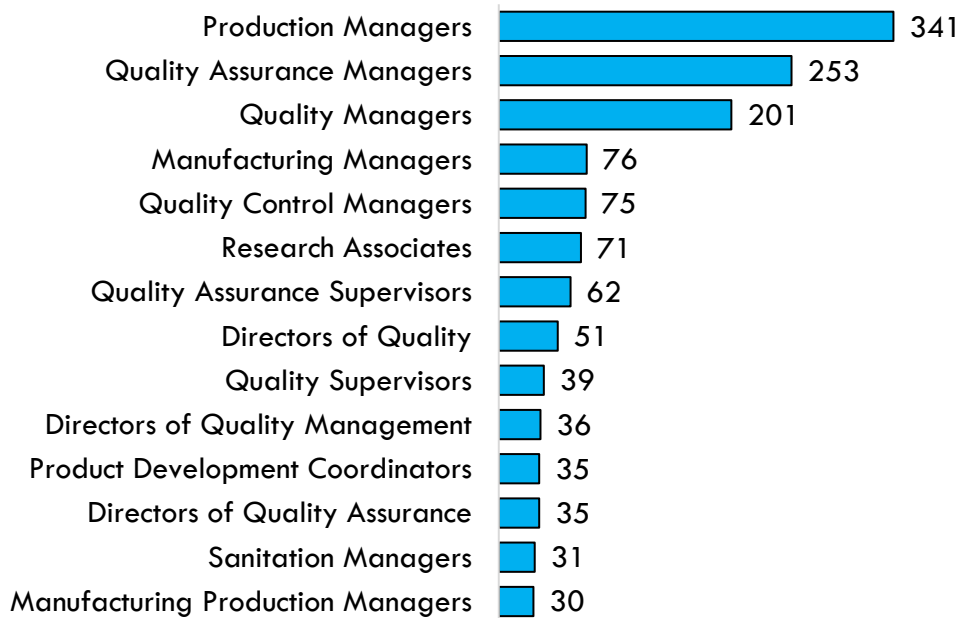


*Other industries include: Transportation and Warehousing (1%), Information (1%), Other Services (except Public Administration)(1%), Utilities (1%), Retail Trade (1%), Construction (1%), Real Estate and Rental and Leasing (0.2%), Agriculture, Forestry, Fishing, and Hunting (0.1%), Mining, Quarrying, and Oil and Gas Extraction (0.1%), Finance and Insurance (0.1%), Arts, Entertainment, and Recreation (0.1%), Accommodation and Food Services (0.0%), and Unclassified Industry (0.0%). Source: Lightcast, Datarun 2024.1

Job postings for key biomanufacturing occupations

Over the last 12 months (March 2023 through February 2024), there were 3,108 unique online job postings for these key biomanufacturing occupations and emerging occupations in Los Angeles County. The number of job postings by job title appear in Exhibit 7. The most common job titles from job postings were production managers, quality assurance managers, quality managers, manufacturing managers, and quality control managers. The employers posting the most job ads during this timeframe were The Judge Group (staffing company), University of California, Northrop Grumman, Actalent (staffing company), Medtronic, and UCLA Health Systems. The skills sought most frequently in these job ads were related to auditing, quality management, production management, project management, and quality management systems.

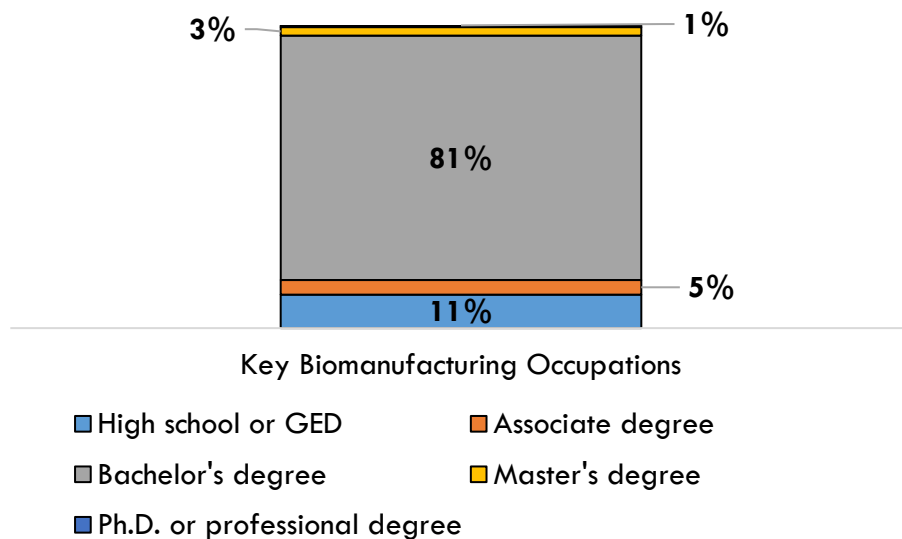
Exhibit 7: Job postings by job title (March 2023 – February 2024)



Source: Lightcast, Datarun 2024.1

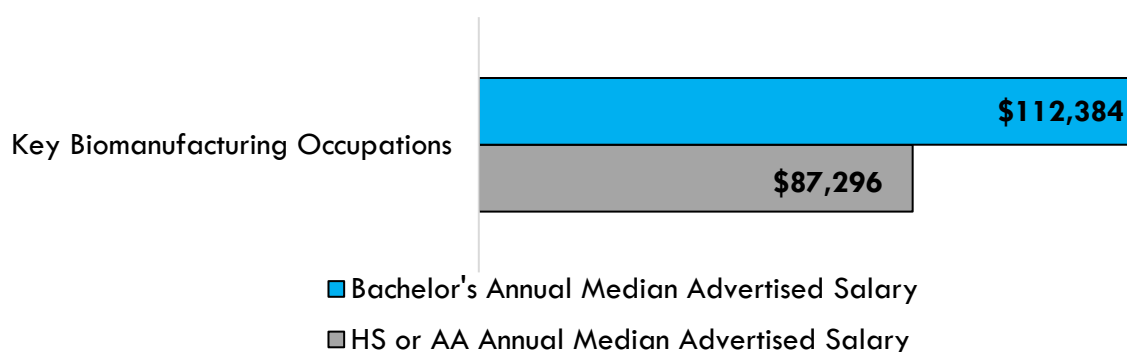
Of all the job postings that listed a minimum educational requirement, the majority of employers were seeking candidates with a bachelor’s degree (81% of total), demonstrating that employers postings job ads prefer candidates with a bachelor’s degree for these jobs. Exhibit 8 shows a breakdown of education levels listed in job postings for the key biomanufacturing occupations in this report. Only 16% of job postings desired a candidate with an associate degree or high school diploma, while 84% desired a candidate with a bachelor’s degree or more education.

Exhibit 8: Education breakdown in job postings



Taking a closer look at job postings that listed a bachelor’s degree as the required level of education versus postings that listed a high school diploma or associate degree, employers seeking candidates with a bachelor’s degree for these key biomanufacturing occupations are advertising annual salaries that are more than \$25,000 higher per year than those seeking candidates with a high school diploma or associate degree. Exhibit 9 demonstrates that regional employers posting job ads for these key biomanufacturing occupations are willing to pay significantly more for candidates with a bachelor’s degree than for candidates with a high school diploma or associate degree.

Exhibit 9: Annual median advertised salary by education level



Source: Lightcast, Datarun 2024.1

Educational Supply: Training Programs for Biomanufacturing

Bachelor’s degrees related to biomanufacturing

In Los Angeles County, awards have been issued in two programs related to biomanufacturing at seven different 4-year colleges that award bachelor’s degrees (see Exhibit 10 below for summary data and Appendix for details). Between 2019 and 2021, there was an annual average of 368 bachelor’s degrees awarded. The program with the most awards was Bioengineering and Biomedical Engineering, conferring more than 86% of the biomanufacturing-related bachelor’s degrees in the county (318 awards).

Exhibit 10: Los Angeles County bachelor’s degrees, 2019-2021

Program (CIP)	2019-20	2020-21	2-Year Average
Bioengineering and Biomedical Engineering (14.0501)	285	350	318
Biomedical Technology/Technician (15.0401)	-	-	-
Biotechnology (26.1201)	41	60	51
Biology Technician/Biotechnology Laboratory Technician (41.0101)	-	-	-
Total	326	410	368

Source: [National Center for Education Statistics’ Integrated Postsecondary Education Data System](#)

In California, bachelor's degrees related to biomanufacturing have been issued in four programs at 24 different 4-year colleges and two community colleges (see Exhibit 11). Between 2019 and 2021, there was an average of 1,238 bachelor's degrees awarded annually. The program with the most awards was Bioengineering and Biomedical Engineering, conferring 85% of biomanufacturing-related bachelor's degrees in the state (1,057 awards).

Exhibit 11: California bachelor's degrees, 2019-2021

Program (TOP/CIP)	2019-20	2020-21	2-Year Average
Biotechnology and Biomedical Technology (0430.00)	39	51	41
Bioengineering and Biomedical Engineering (14.0501)	1,035	1,078	1,057
Biomedical Technology/Technician (15.0401)	2	1	2
Biotechnology (26.1201)	127	148	138
Biology Technician/Biotechnology Laboratory Technician (41.0101)	-	-	-
Total	1,203	1,278	1,238

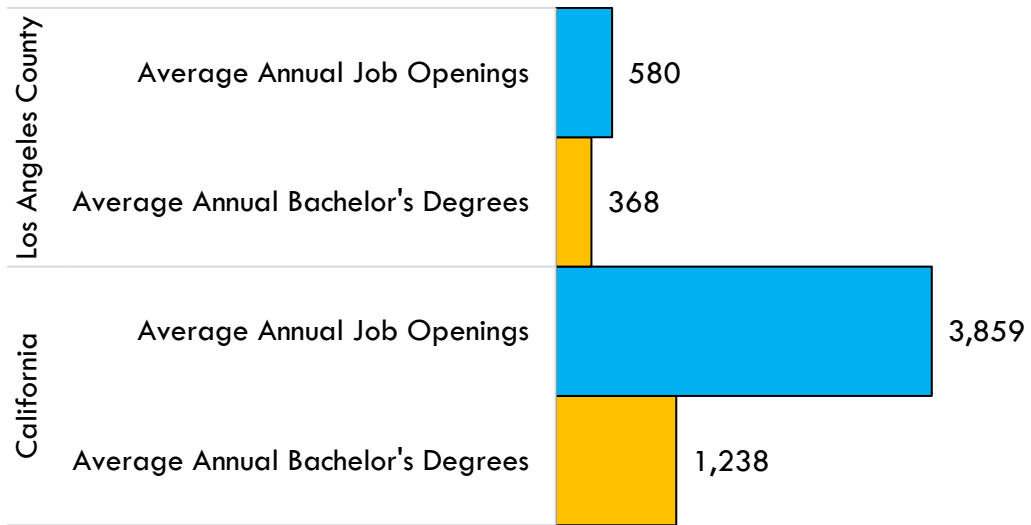
Source: [National Center for Education Statistics' Integrated Postsecondary Education Data System](#)

Gap Analysis

Breaking down the educational supply and occupational demand for these key biomanufacturing jobs in Los Angeles County yields a clear pattern (see Exhibit 12). With 368 average annual bachelor's degrees issued in the county and 580 projected annual job openings for these key biomanufacturing occupations that typically require a bachelor's degree for entry, the potential supply gap at this level of education is 212 unfilled jobs annually. This projected workforce shortage facing Los Angeles County requires the attention of all regional education and training providers.

In California as a whole, there is a more pronounced gap between the average annual job openings and the annual bachelor's degrees awarded. While 3,859 biomanufacturing jobs are projected to be available annually in California, there are only 1,238 annual bachelor's awards conferred in related programs. Therefore, a statewide projected workforce shortage of 2,621 unfilled annual job openings for biomanufacturing is certainly a cause for conversation and planning among education and training providers.

Exhibit 12: Supply and demand gap analysis for key biomanufacturing occupations



Source: Lightcast, Datarun 2024.1; [California Community Colleges Chancellor's Office Management Information Systems Data Mart](#); [National Center for Education Statistics' Integrated Postsecondary Education Data System](#)

Recommendations & Discussion

This report demonstrates that the demand for projected jobs related to the key biomanufacturing occupations in this report is unmet by the talent supply from related education and training programs over the next five years, both in Los Angeles County and California as a whole. While this is a great starting point to engage in meaningful discussion about the prospects of a community college baccalaureate program helping to bridge the gap between talent supply and occupational demand in the labor market, it is not sufficient based on legislation.

Therefore, this report can be used as a launch board to validate these findings from traditional labor market information and job postings with regional employers and training providers in an effort to assess that the following are true (sub-bullets summarize key points of support from this report):

- **Evidence that employers are having difficulty filling positions that require a baccalaureate degree.**
 - With nearly 3,108 job postings for key biomanufacturing occupations in Los Angeles County over the last year, there is strong evidence that regional employers are actively seeking qualified individuals for these jobs.
- **Evidence that employers are willing to pay baccalaureate degree holders more than those with a related associate degree or no postsecondary degree.**
 - Regional employers seeking candidates with a bachelor's degree for these key biomanufacturing jobs are advertising annual salaries that are over \$25,000 higher per year than those seeking candidates with a high school diploma or associate degree.
- **Evidence that employers prefer candidates with the proposed baccalaureate degree.**
 - The majority of regional employers were seeking candidates with a bachelor's degree (81% of total), demonstrating that employers post job ads prefer candidates with a bachelor's degree for these jobs.
- **Evidence of job placement and/or promotion opportunities for candidates with a baccalaureate degree.**
 - The most common job titles from job postings were management level positions: production managers, quality assurance managers, quality managers, manufacturing managers, and quality control managers.
- **Evidence that the occupation/field the proposed baccalaureate degree is in will provide for higher-wage job opportunities.**
 - Average hourly wages for all three of the key biomanufacturing occupations in this report are higher than the average across all occupations at each of the percentiles. For instance, industrial production managers earn \$13 more than the average across all occupations at the 10th percentile, \$18 higher at the 25th percentile, \$25 higher at the median, \$41 higher at the 75th percentile, and \$51 more per hour at the 90th percentile.

Methodology

This report has three primary objectives:

1. Assess and quantify the labor market demand for key biomanufacturing occupations in Los Angeles County and California that typically require a bachelor's degree for entry.
2. Assess and quantify the educational supply for such jobs.
3. Calculate the potential unmet workforce demand for these jobs.

For the first objective, the most recent datarun (2024.1) from Lightcast was analyzed using 2022 as a base year and a five-year projection period through 2027. This five-year period approximates the time it takes for a typical community college training program to be developed, approved, and for the first cohort of students to enroll, complete the program, and enter the workforce. The average annual job openings for these key biomanufacturing occupations that typically require a bachelor's degree for entry was the primary metric analyzed for this objective.

The second objective was calculated using the National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS). This dataset was queried for the number of bachelor's degrees issued from educational institutions in Los Angeles County and California during the most recent two academic years available (2019-20 and 2020-21). Reporting in IPEDS is organized by Classification of Instructional Programs (CIP).

The third objective was achieved by calculating the difference between the sum of annual job openings related to key biomanufacturing occupations and the number of baccalaureate awards issued from related programs. This calculation determines whether there is demand in the labor market is not being met by the supply from educational programs that align with the relevant occupation.

Appendix

Table A: Los Angeles County bachelor's awards issued related to biomanufacturing

CIP - Program	Institution	2019-20 Awards	2020-21 Awards	2-Year Average
14.0501 - Bioengineering and Biomedical Engineering	California Institute of Technology	5	10	8
	California State University-Long Beach	24	40	32
	Southern California Institute of Technology	19	10	15
	University of California-Irvine	120	135	128
	University of California-Los Angeles	66	81	74
	University of Southern California	51	74	63
Subtotal/Average		285	350	318
15.0401 - Biomedical Technology/Technician	N/A	-	-	-
Subtotal/Average		0	0	0
26.1201 – Biotechnology	California State Polytechnic University-Pomona	41	60	51
Subtotal/Average		41	60	51
41.0101 - Biology Technician/Biotechnology Laboratory Technician	N/A	-	-	-
Subtotal/Average		0	0	0
Grand Total/Average		326	410	368

Table B: California bachelor's awards issued related to biomanufacturing

TOP/CIP - Program	Institution	2019-20 Awards	2020-21 Awards	2-Year Average
0430.00 – Biotechnology and Biomedical Technology*	MiraCosta College	25	23	19
	Solano Community College	14	28	22
Subtotal/Average		39	51	41
14.0501 - Bioengineering and Biomedical Engineering	California Baptist University	13	9	11
	California Institute of Technology	5	10	8
	California Polytechnic State University-San Luis Obispo	102	80	91
	California State University-Long Beach	24	40	32
	San Diego State University	1	1	1
	San Jose State University	66	54	60
	Santa Clara University	37	39	38
	Southern California Institute of Technology	19	10	15
	Stanford University	35	24	30

TOP/CIP - Program	Institution	2019-20 Awards	2020-21 Awards	2-Year Average
	University of California-Berkeley	86	107	97
	University of California-Davis	116	109	113
	University of California-Irvine	120	135	128
	University of California-Los Angeles	66	81	74
	University of California-Merced	34	36	35
	University of California-Riverside	76	97	87
	University of California-San Diego	92	123	108
	University of California-Santa Cruz	72	37	55
	University of Southern California	51	74	63
	University of the Pacific	20	12	16
Subtotal/Average		1,035	1,078	1,057
15.0401 - Biomedical Technology/Technician	DeVry University-California	2	1	2
Subtotal/Average		2	1	2
26.1201 - Biotechnology	California State Polytechnic University-Pomona	41	60	51
	California State University-San Marcos	30	36	33
	University of California-Davis	56	50	53
	University of California-Santa Cruz	-	2	1
Subtotal/Average		127	148	138
41.0101 - Biology Technician/Biotechnology Laboratory Technician	N/A	-	-	-
Subtotal/Average		0	0	0
Grand Total		1,203	1,278	1,238

*Baccalaureate programs in biomanufacturing have also recently been approved at Los Angeles Mission College (approved 11/15/23) and Moorpark College (approved 3/12/24).

About the Centers of Excellence for Labor Market Research

The Centers of Excellence (COE) is a statewide initiative supported by the California Community Colleges' Economic and Workforce Development program. The COE research team represents expertise in labor market analysis with a focus on research design, educational and training program mapping, and identifying skill sets for emerging occupations as well as geospatial analysis. The COE maintains strategic alliances with research organizations whose relationships and technical expertise enhance COE research efforts and with industry associations that assist in validating research findings, ensuring that the most recent industry and labor market conditions are captured. COE studies are used to inform policy discussions, industry-wide legislative efforts, and regional workforce and economic development strategies, as well as guide program and resource development efforts by the California Community Colleges. These reports can be accessed at www.coecc.net.