



Middle-skill Biotechnology Occupations in Los Angeles and Orange Counties

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Introduction

Middle-skill jobs have been gaining increased attention due to the important role they play in national, regional and local economies. A middle-skill job is a job that requires less education than a bachelor's degree, but more than a high school diploma. Companies are finding that a shortage in middle-skill workers is affecting their overall performance, and more thought is being given toward developing pipelines that educate and train workers to close the skills gap.¹

To this end, the Centers of Excellence set out to determine whether community colleges in the Los Angeles/Orange County region are preparing enough students to fill middle-skill jobs in the biotechnology industry. Selected as a priority sector for the California Community Colleges system, the biotechnology industry is one of California's most promising industries, with strong projected growth and workers who earn salaries above the state's average.² The LA/Orange County region is the third largest biotechnology hub in the state, after the San Francisco Bay Area and San Diego County.

In addition to Amgen, the world's largest biotech firm, other notable companies in the region include Allergan, Baxter, Genzyme and Puma Biotechnology. Examples of startups in the region include C3Jian, Nanthealth and Xencor. In May, Cerebain Biotech, a medical device company, announced that it would relocate its corporate headquarters from Dallas, Texas to Costa Mesa.³

In a list of the top life science hubs by the firm Jones, Lang, LaSalle (JLL), the Los Angeles/Orange County metro area ranked 6th in the nation.⁴ According to the report, nearly 3,000 biotech establishments employ 118,643 workers in the region. A majority of biotech workers are employed by manufacturing companies that specialize in medical equipment and supplies, electromedical instruments, as well as pharmaceuticals and medicine.

Genetic Engineering & Biotechnology News recently noted that "if a ranking existed for recent biopharma attraction efforts, LA/Orange County would be closer to the top than the bottom."⁵ That's because the University of Southern California (USC) is planning a biotech park adjacent to its Health Sciences Campus that is expected to create as many as 3,000 new construction jobs and nearly 4,000 permanent jobs.⁶ In addition, the Los Angeles County Board of Supervisors has partnered with the Los Angeles County Economic Development Corporation and a number of academic institutions to advance bioscience regionally.⁷ And in April, Biocom, a biotech trade group based in San Diego, launched a new office in Los Angeles.

¹ Weber, Lauren. "Where are all the middle-skill jobs?" November 12, 2014. The Wall Street Journal.

<http://blogs.wsj.com/atwork/2014/11/12/us-jobswhere-are-all-the-middle-skill-workers/>

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⁴ "Life sciences cluster report: global 2014." 2014. Jones, Lang, LaSalle (JLL).

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⁵ Philipiddis, Alex. "Top 10 U.S. biopharma clusters." May 2, 2016. Genetic Engineering & Biotechnology News.

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⁶ USC News Staff. "Rep. Steny Hoyer praises USC's efforts to boost Los Angeles biotech industry." August 27, 2015. USC News.

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⁷ "Motion initiates a community outreach program analysis for Los Angeles." Accessed May 17, 2016. University of Southern California.

<https://biotech.usc.edu/217/>

Current and Future Employment

To identify middle-skill jobs related to biotechnology, six occupations were identified using the Standard Occupation Classification (SOC) system. The majority of occupations included in the study are technician positions, such as biological technicians, chemical technicians and medical and clinical technicians. (The occupation of manufacturing production technicians falls under the SOC code for engineering technicians, except drafters, all others.) The occupational data presented below is representative of employment in the 24 industries most closely related to the biotechnology sector. Appendix A provides the industry codes used to obtain these projections.

Overall, middle-skill occupations are projected to grow from 7,473 to 8,092 jobs, a rate of 8%, in Los Angeles and Orange counties by 2020 (Table 1). This translates to 1,635 openings by 2020, with 619 of those jobs as new positions.

Data analysis revealed that in addition to technicians, inspectors and quality control analysts figure prominently in the middle-skills biotech workforce. (The occupation of quality control analysts is categorized under the SOC code for life, physical, and social science technicians, all other.)

Inspectors, testers, sorters, samplers, and weighers are expected to have the greatest number of openings in the region, 535 by 2020, representing a robust growth rate of 10%. This occupation currently employs 2,420 workers in the two-county area and pays a median hourly wage of \$17.84, or around \$37,000/year.

The occupations of medical & clinical laboratory technicians and chemical technicians are expected to experience the highest job growth of all the occupations—11% over the next five years. Medical & clinical laboratory technicians employ 1,807 workers in the region and will have 455 openings over the next five years. There are fewer chemical technicians in the region; as a result, this occupation will have only 205 openings.

Of all the middle-skill occupations identified for the region, the occupation of manufacturing production technicians pays the highest median wage, \$30.39/hour, or \$63,211/year. However, the occupation is only projected to experience 4% growth, with only 75 openings by 2020. Quality control analysts will experience constrained growth as well, again only 4%. This occupation, which pays \$21.85/hour, will have 115 openings.

Table 1 – Middle Skills Biotechnology Occupations (by 2015 jobs)

SOC	Description	2015 Jobs	2020 Jobs	5-Year Change	5-Year % Change	Median Hourly Earnings	5-Year Replacements	5-Year Openings
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	2,420	2,672	252	10%	\$17.84	285	535
29-2012	Medical & Clinical Laboratory Technicians	1,807	2,009	202	11%	\$19.83	255	455
19-4021	Biological Technicians	1,431	1,462	31	2%	\$21.87	220	250
19-4031	Chemical Technicians	869	965	96	11%	\$19.49	110	205
17-3029.09	Manufacturing Production Technicians**	484	503	19	4%	\$30.39	55	75
19-4099.01	Quality Control Analysts*	462	481	19	4%	\$21.85	95	115
Total / Average		7,473	8,092	619	8%	\$21.88	1,020	1,635

Source: EMSI Employment Data – 2016.1

*The data presented for this occupation is based on the broader 6 digit SOC code for Life, Physical, and Social Science Technicians, all other (19-4099)

**The data presented for this occupation is based on the broader 6 digit SOC code for Engineering Technicians, except Drafters, all others (17-3029)

Wages for the six middle-skill, biotech occupations were examined to determine median wages as well as how much an entry-level worker might earn compared to an experienced worker. Manufacturing production technicians lead all middle-skill, biotech-related occupations with the highest median hourly wage, \$30.39, and can expect to earn around \$38 as an experienced worker (Table 2).

Biological technicians and quality control analysts have the second highest median hourly earnings, \$21.87 and \$21.85 respectively. The occupation of inspectors, testers, sorters, samplers and weighers earns the lowest wages of the six occupations identified for all categories—median, entry level and experienced. Chemical technicians earn some of the lowest entry-level wages, but are paid some of the highest wages as experienced workers. The average hourly earnings for all middle-skill biotechnology occupations range from \$14.99 for entry-level workers to \$25.62 for experienced workers.

Table 2 – Wages for Middle-skill Biotechnology Occupations

Occupation	Median Hourly Earnings	25 Percentile Hourly Earnings	75 Percentile Hourly Earnings
Manufacturing Production Technicians**	\$30.39	\$22.62	\$38.11
Biological Technicians	\$21.87	\$16.51	\$28.36
Quality Control Analysts*	\$21.85	\$17.34	\$29.04
Medical and Clinical Laboratory Technicians	\$19.83	\$15.98	\$25.12
Chemical Technicians	\$19.49	\$14.76	\$28.39
Inspectors, Testers, Sorters, Samplers, and Weighers	\$17.84	\$13.33	\$23.34
Average	\$19.67	\$14.99	\$25.62

Source: EMSI Employment Data – 2016.1

*The data presented for this occupation is based on the broader 6 digit SOC code for Life, Physical, and Social Science Technicians, all other (19-4099)

**The data presented for this occupation is based on the broader 6 digit SOC code for Engineering Technicians, except Drafters, all others (17-3029)

Employer Demand

Job postings for the Los Angeles/Orange County region were analyzed to determine a broader picture of employer hiring activity.

Overall, there were nearly 9,000 job postings for the six occupations associated with the middle-skill biotechnology workforce.

Nearly 40% of middle-skill biotechnology job postings in 2015 were for inspectors, testers, sorters, samplers and weighers (Table 3). There were 3,339 postings for this occupation.

In fact, the top two occupations—inspectors, testers, sorters, samplers, and weighers and medical and clinical laboratory technicians—accounted for two-thirds of all 2015 job postings. There were nearly 3,000 job postings for medical and clinical laboratory technicians.

Quality control analysts were the third most common job posting, with 1,608 ads in 2015. Chemical technicians, 150 job postings, and biological technicians, 89 job postings, had the fewest ads.

Table 3 – Number of Job Postings by Occupation, Full Year 2015

O*NET Code	Occupation	Job Postings, Full Year 2015
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	3,339
29-2012	Medical and Clinical Laboratory Technicians	2,843
19-4099.01	Quality Control Analysts	1,608
17-3029.09	Manufacturing Production Technicians	789
19-4031	Chemical Technicians	150
19-4021	Biological Technicians	89
Total		8,818

Source: Burning Glass

The 8,818 job postings identified for the study were further examined to determine common middle-skill, biotechnology job titles.

In 2015, the top job titles for the 8,818 job postings were: laboratory technician (924 postings), laboratory assistant (516) and quality control inspector (432).

Other common titles included telemetry nurse, quality inspector, quality assurance specialist, quality assurance technician and test engineer. Table 4 lists the top 22 job titles identified by the study.

Table 4 – Top Job Titles (n=8,818)

Job Title	Number of Job Postings, Full Year 2015
Laboratory Technician	924
Laboratory Assistant	516
Quality Control Inspector	432
Telemetry Nurse	426
Quality Inspector	420
Quality Assurance Specialist	354
Quality Assurance Technician	252
Test Engineer	239
Patient Care Technician	222
Quality Control Technician	206
Quality Specialist	181
Manufacturing Technician	158
Quality Technician	149
Quality Assurance Inspector	129
Mechanical Inspector	126
Quality Coordinator	126
Production Technician	123
Quality Control Analyst	123
Quality Control Specialist	70
Quality Control Supervisor	66
Research Technician	53
Chemist	52

Source: Burning Glass

Top Employers

An analysis of job posting data revealed which biotechnology firms are conducting the greatest amount of hiring in the Los Angeles/Orange County region.

The top employer in the region was DaVita Incorporated, a health care services company, which had 185 postings. The University of Southern California had 105 postings, and Providence Health & Services, a non-profit health care system, had 71. Quest Diagnostics, a diagnostics testing information and services company, had 69 postings in the region. Only half of all the job postings identified for the study included the name of an employer.

Table 5 – Top Employers for Middle Skills Biotechnology Occupations (n=8,818)

Employer	Job Postings, Full Year 2015
DaVita Incorporated	185
University of Southern California	105
Providence Health & Services	71
Quest Diagnostics Incorporated	69
Medtekcorp	63
Cedars-Sinai	58
Spacex	52
Kaiser Permanente	49
Accountable	46
Baxter International Incorporated	46
Johnson & Johnson	44
Laboratory Corporation of America	38
University of California, Irvine	38
Dignity Health	36
Medtronic	34

Source: Burning Glass

In-demand Skills & Certificates

Specific requirements included in job postings signaled certain hiring trends in the region. To get a clearer picture of which skills and credentials employers most desire in middle-skill biotechnology job applicants, the study looked at technical/specialized skills and fundamental/baseline skills.

The most sought after technical/specialized skill in the region is inspection (Table 6). Nearly 30% of job postings listed inspection as a specialized skill. Other skills in high demand include filing, chemistry, mathematics and patient care.

Table 6 – Top Technical/Specialized Skills (n=8,818)

Technical/Specialized Skill	Number of Job Postings
Inspection	2,385
Filing	888
Chemistry	741
Mathematics	672
Patient Care	621
Repair	591
Micrometers	585
Phlebotomy	574
Scheduling	572
Good Manufacturing Practices (GMP)	560
Calipers	551
Calibration	546
Data Entry	532
Labeling	499
Test Equipment	469
Cleaning	453
Telemetry	446
Packaging	428
Validation	409
Microbiology	394

Source: Burning Glass

Regarding fundamental/baseline skills, nearly 40% of postings listed quality assurance and control as a required skill (Table 7). Other fundamental skills that are in high demand include communication skills (2,284 job postings), writing (1,515) and Microsoft Excel (1,434).

Table 7 – Top Fundamental/Baseline Skills (n=8,818)

Fundamental/Baseline Skill	Number of Job Postings
Quality Assurance and Control	3,176
Communication Skills	2,284
Writing	1,515
Microsoft Excel	1,434
Detail-Oriented	1,177
Computer Skills	1,164
Organizational Skills	1,151
Microsoft Office	1,035
English	1,014
Physical Demand	964
Problem Solving	813
Microsoft Word	801
Troubleshooting	732
Research	681
Mathematics	672
Team Work/ Collaboration	527
Planning	523
Microsoft PowerPoint	476
Multi-Tasking	447
Supervisory Skills	350

Source: Burning Glass

Job posting data also showed which industry certifications are the most important for middle-skill, biotechnology job seekers. Out of the nearly 9,000 job postings identified, only 18% noted specific certifications for middle-skill, biotechnology occupations.

The certification in highest demand was phlebotomy, which was mentioned in 443 postings (Table 8). Other certifications listed in job ads included First Aid CPR, Emergency Medical Technician (EMT) and Certified Medical Assistant credentials.

Table 8 – Top Certifications (n=8,818)

Certification	Number of Job Postings
Phlebotomy Certification	443
First Aid CPR AED	253
Emergency Medical Technician (EMT)	230
Certified Medical Assistant	212
Certified Ambulatory Perianesthesia Nurse	163
Nurse Practitioner	100
Certified Medical Laboratory Technician	74
Advanced Cardiac Life Support (ACLS) Certification	59
Basic Cardiac Life Support Certification	55
American Society for Quality (ASQ) Certification	50

Source: Burning Glass

Educational Programs

Currently, there are 15 community colleges in Los Angeles and Orange counties that prepare students for middle-skill biotechnology occupations. In the last three years, 724 awards have been conferred in the region. Moreover, the number of conferred awards has been increasing substantially each year. During the 2012-2013 academic year, 136 awards were issued compared to 356 in 2014-2015.

Table 9 displays the breakdown of award type for biotech-related community college programs. There are 17 programs at nine community colleges in Los Angeles County, and 10 programs at six community colleges in Orange County.

Table 9 – Student Awards (by Program)

TOP Code	Program	College Name	Annual Awards 2012-2013	Annual Awards 2013-2014	Annual Awards 2014-2015	3-Year Average
093460	Biomedical Instrumentation	LA Valley	13	15	18	15
043000	Biotechnology and Biomedical Technology	Fullerton	6	3	2	4
		Pasadena	13	3	51	22
092400	Engineering Technology, General	Cerritos	0	34	27	31
		East LA	0	0	2	2
		LA Harbor	1			1
		Pasadena	2	70	91	54
093420	Industrial Electronics	El Camino	0	0	1	1
095680	Industrial Quality Control	Santiago Canyon	0	0	4	4
095500	Laboratory Science Technology	Fullerton	0	2	1	2
		LA Trade-Tech	19	9	13	14
093480	Laser and Optical Technology	Irvine	0	0	1	1
		Cerritos	0	0	21	7
		El Camino	6	1	2	3
		Fullerton	3	3	4	3
		Irvine	0	1	8	5
		LA Valley	1	6	9	5
		Long Beach	1	0	0	1
		Mt San Antonio	2	23	18	14
		Saddleback	0	1	6	2
		Santa Ana	1	3	6	3
120500	Medical Laboratory Technology	El Camino	0	1	0	1
		Mt San Antonio	29	15	25	23
		Saddleback	11	19	16	15
099900	Other Engineering and Related Industrial Technologies	Coastline	14	10	15	13
		LA Trade-Tech	9	8	12	10
095420	Plastics and Composites	Cerritos	5	5	3	4
Total/Average			136	232	356	261

Source: www.datamart.cccco.edu

Colleges with the highest average number of awards in the region include: Pasadena City (76), Mt. San Antonio (37), LA Trade-Tech (24) and LA Valley (20).

Programs with the high average number of awards include Engineering Technology, General (88), Manufacturing and Industrial Technology (43), Medical Laboratory Technology (39) and Other Engineering and Related Industrial Technologies (23).

It should be noted that Biomedical Instrumentation only conferred on average 15 awards per year, and Biotechnology and Biomedical Technology only conferred 28. These two programs are often directly linked with supplying students for the biotechnology workforce.

Conclusion & Recommendations

The Los Angeles/Orange County region is the third largest biotechnology hub in the state. The region is home to Amgen, the largest biotech company in the world, as well as Catalyst Pharmaceutical Research, Allergan and Ista Pharmaceuticals.⁸ The region also is an incubator for more than 100 biotech startups, according to the Southern California Biomedical Association.

However, there appears to be a looming shortage of middle-skill workers to enter the biotechnology workforce.

Middle-skill biotechnology occupations are projected to undergo growth at a rate of 8%, resulting in a workforce that will expand from 7,473 to 8,092 jobs by 2020. More than 1,600 job openings, around 360 per year, are expected during this time period. In addition, there were nearly 9,000 job postings for middle-skill biotechnology workers in 2015. Across all occupations, the average median hourly wage is \$19.67, the equivalent of a salary around \$41,000/year.

Yet, community colleges in the region are conferring only a small number of degrees and certificates related to biotechnology. On average, only 261 awards are conferred each year for the entire region. The low number of awards in the region suggests a supply gap may exist and that in the future, there may not be enough middle-skill workers to fill middle-skill jobs in the biotechnology industry. An encouraging finding, however, is that over the last three years, the number of awards conferred has steadily increased.

Several of the occupations identified by the study pay solid wages and are expected to expand, such as jobs for technicians and inspectors. Community colleges may choose to focus on developing pathways for these occupations.

Recommendations:

- Workforce projections and job posting data show strong demand for technicians of various kinds, including biological, chemical and medical. For example, there were nearly 3,000 job postings for medical and clinical laboratory technicians in 2015. Moreover, laboratory skills appear to be highly desired. There were 924 postings for laboratory technicians and 516 for laboratory assistants.
- The high frequency of job postings for quality inspectors, quality assurance specialists, quality assurance technicians and test engineers (who develop processes for quality assurance) reflects the important role of quality control within the biotech sector. In addition, the top baseline/fundamental skill in demand by employers is quality assurance and control. Community colleges could give attention toward connecting students with these career pathways and incorporate quality control into curriculum.
- Since the most sought after technical/specialized skill in the region is inspection, community colleges may want to work with industry to develop a certificate in this area or incorporate inspection into

⁸ <http://www.biospace.com/content2.aspx?ContentEntityID=1220>

existing programs. It is also important to connect students with internships or other hands-on training so they can gain experience in this area.

- Community colleges may want to center attention on preparing students for the top four following middle-skill biotech occupations: biological technicians, chemical technicians, medical clinical and laboratory technicians and inspectors, testers, sorters, samplers, and weighers. These occupations are projected to have the greatest number of openings, nearly 1,500, in the two-county region over the next five years.

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Appendix A – Biotechnology Sector in NAICS

NAICS Code	Description
311221	Wet Corn Milling
311224	Soybean and Other Oilseed Processing
325193	Ethyl Alcohol Manufacturing
325311	Nitrogenous Fertilizer Manufacturing
325312	Phosphatic Fertilizer Manufacturing
325314	Fertilizer (Mixing Only) Manufacturing
325320	Pesticide and Other Agricultural Chemical Manufacturing
325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339114	Dental Equipment and Supplies Manufacturing
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
424210	Drugs and Druggists' Sundries Merchant Wholesalers
424910	Farm Supplies Merchant Wholesalers
541380	Testing Laboratories
541711	Research and Development in Biotechnology
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)
621511	Medical Laboratories