

IEEE Life Sciences Study

Employment Trends by Occupations



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Overview

Over the past decade, the life sciences industry has evolved into new areas; bioengineering and health technology are growing at increasing rates and the role of engineering within those fields is becoming more pronounced. The life sciences industry presents abundant job opportunities for engineers, scientists, and other professionals. Even in a period marked by global recession, the life sciences industry has continued to grow jobs while other industries experienced significant decreases in employment.

The life sciences industry employs individuals across multiple disciplines and at all levels of education. There is a need for both entry level technicians as well as managers with advanced experience among industry employers. Lab technicians, chemists, biologists, clinical research coordinators, biochemists and biophysicists, and regulatory affairs specialists are among the top occupations listed in job postings within the United States.

In addition, employers seek “flexible knowledge-workers.” Employees are expected to possess a mix of “soft” and “hard” skills. The life sciences industry has opportunities for employees with varying educational backgrounds. This includes employees with bachelor’s degrees, high school graduates who can receive industry-specific training from employers, employees with advanced or highly specialized degrees, and employees with industry experience in regulatory and compliance issues.

Jobs and Occupations

An in-depth look into occupations within the industry provides valuable information into direction of the workforce. The following section outlines employment trends and projected growth across a number of occupations within the life sciences industry.

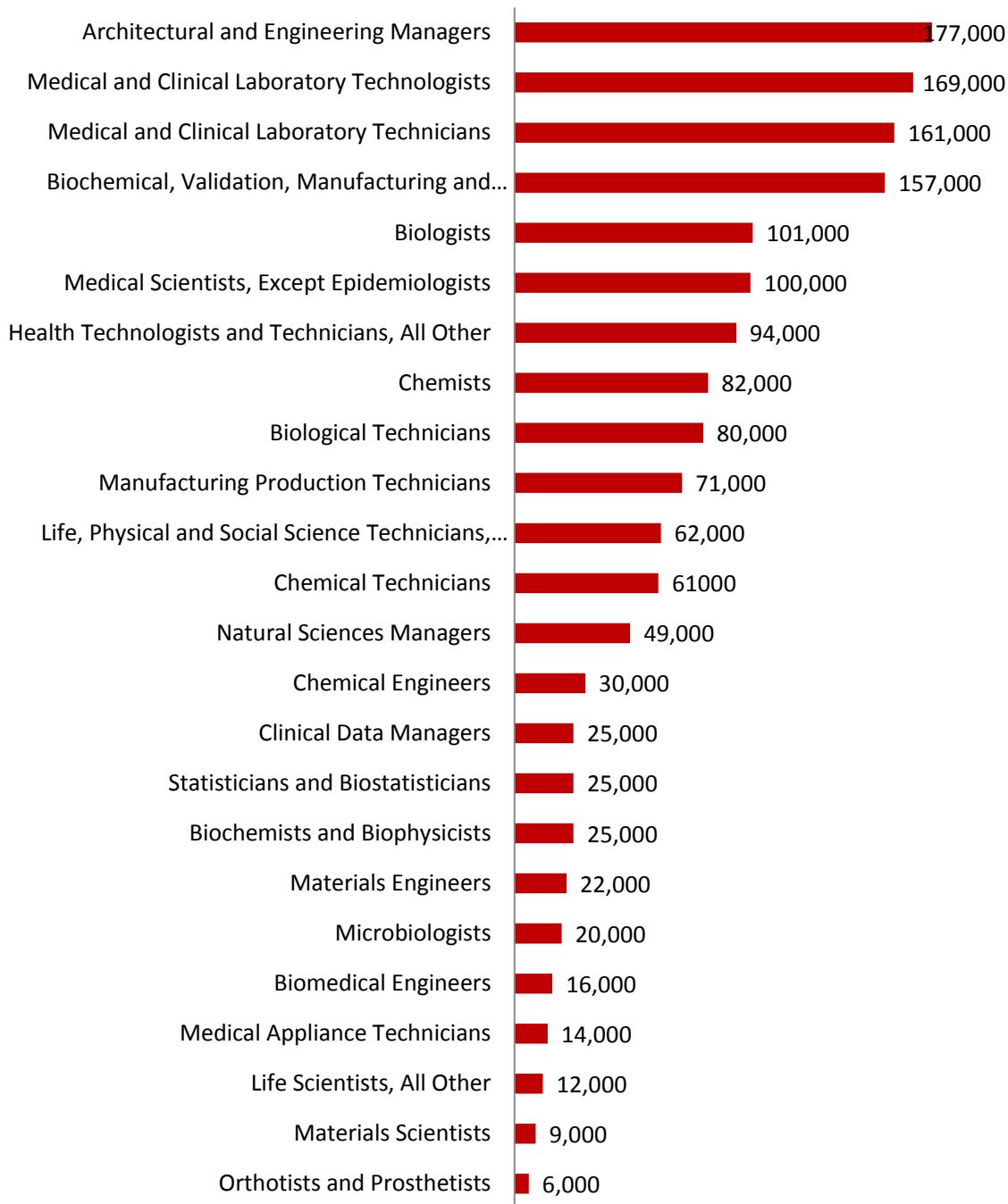
The life sciences industry is comprised of a wide range of occupations across diverse disciplines. For the purposes of this study, relevant occupations within architecture and engineering, healthcare, life, physical and social science, production, and management were identified and analyzed using The Bureau of Labor Statistics (BLS) Occupational Outlook Handbook. As the national source for standardized and occupation-specific descriptors, the BLS Occupational Outlook Handbook was used as the primary resource for the analysis of indicators across industry occupations.

EMPLOYMENT TRENDS

Employment varied significantly across different occupations related to the life sciences industry in 2010; employment ranged from 6,000 to 177,000 among 24 relevant occupations included in the analysis.

Architectural and engineering managers, medical and clinical laboratory technologists, and medical and clinical laboratory technicians were among the largest occupations in the industry in 2010, employing over 160,000 individuals each. Meanwhile, more specialized occupations like materials scientists, and orthotists and prosthetists had the lowest employment numbers in 2010.

2010 Employment by Occupation



*Source: McKinley analysis of Bureau of Labor Statistics Occupational Handbook, O*Net Online.*

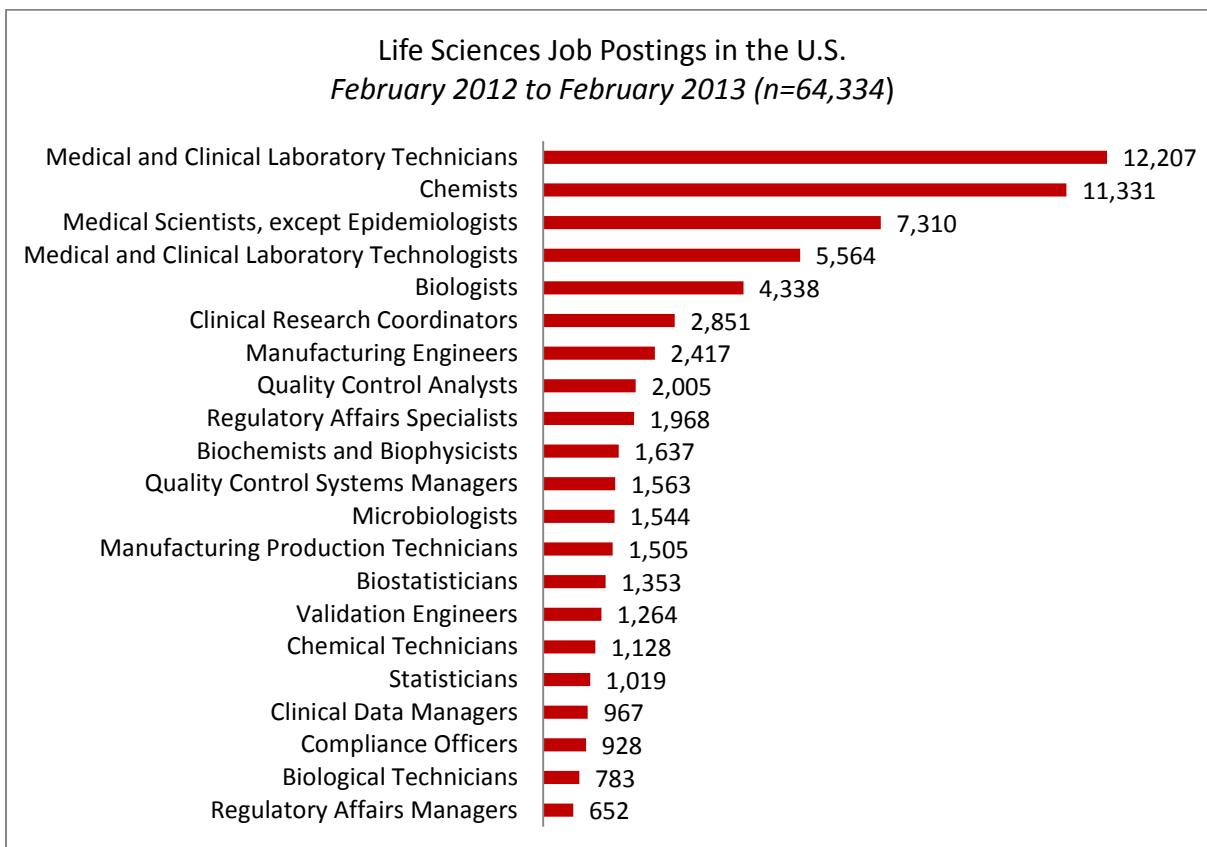
CURRENT JOB OPENINGS

To provide greater insight into the growing demand for talent with interdisciplinary knowledge and skills within the life sciences industry, the Coalition of State Bioscience Institutes (CBSI), in collaboration with

Booz & Company, published findings from a quantitative analysis of Burning Glass, a proprietary platform that aggregates, extracts, codes and normalizes job data from more than 23,000 job boards and other websites across the United States.¹ Through its analysis, CBSI and Booz & Company identified the most frequently cited occupations in over 64,000 job postings in the life sciences industry between February 2012 and March 2013:

"Trends analysis across jobs-related websites shows that the life sciences industry continues to be an engine for job creation at all levels of education and across multiple disciplines, with particular need for entry level technicians and managers with advanced experience, especially in regulatory and compliance functions."²

Many jobs, such as lab technicians and chemists, had a broader focus; however, specialized positions also appeared in the top 21 positions posted. Over 1,300 job postings, for example, called for biostatisticians and another 1,200 postings listed a need for validation engineers.³ The chart below depicts the top 21 occupations listed in the job postings.



Source: Coalition of State Bioscience Institutes and Booze & Company, Demand for Talent: Current & Projected Workforce Trends in the Life Science Industry (2013).

PROJECTED GROWTH TRENDS

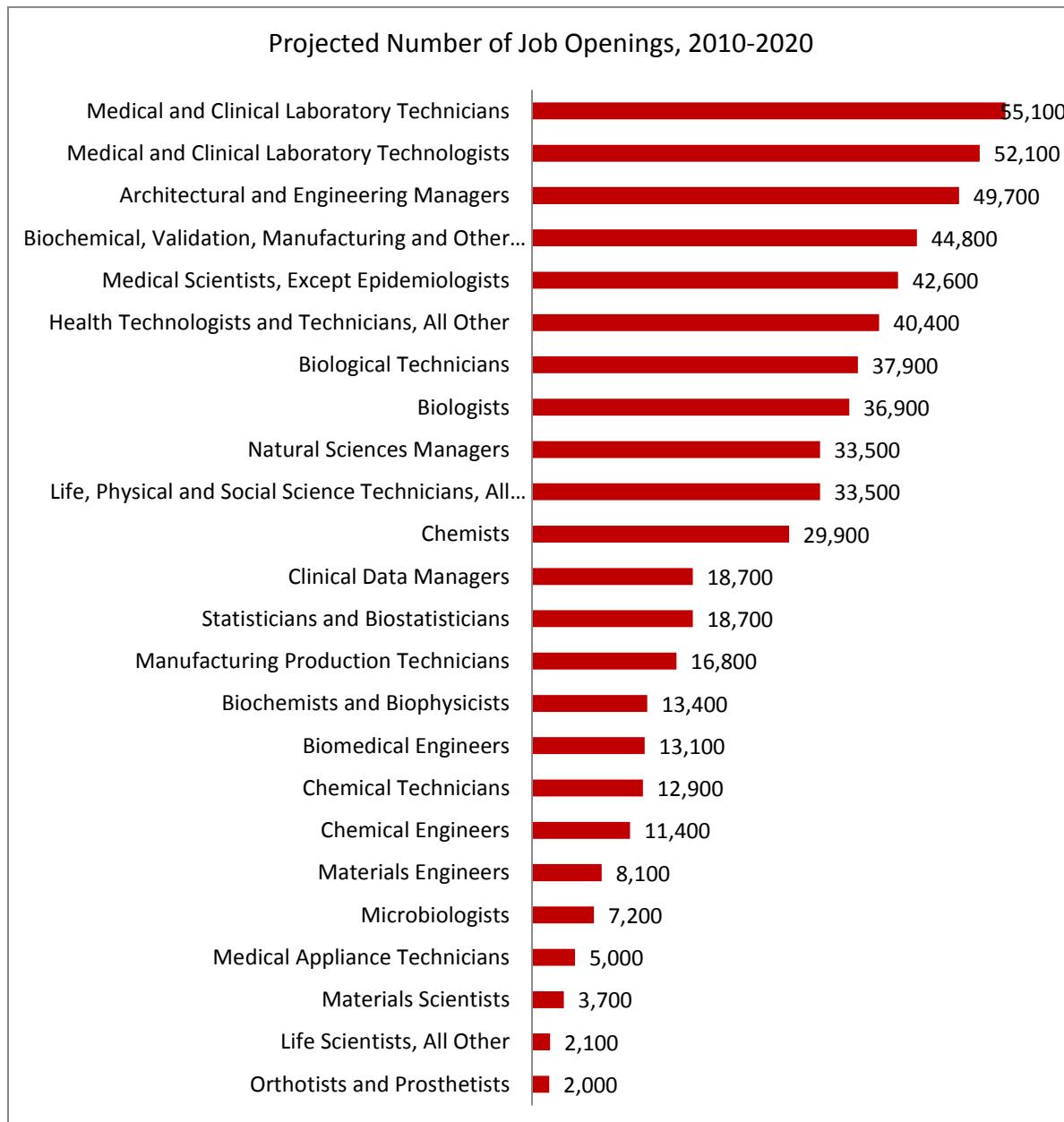
In addition to current employment statistics, The Bureau of Labor Statistics (BLS) also projects future employment growth to determine the outlook for occupations within the United States. Total employment in the U.S. is expected to grow by 14.3% between 2010 and 2020; however, a much faster employment growth rate is projected for several key occupations related to the life sciences industry.⁴ With a projected growth rate of 29% or higher, employment for biomedical engineers, biochemists and biophysicists, and medical scientists (except for epidemiologists) is expected to grow at a rate that is “much faster than average” (29% or more) between 2010 and 2020. Health technologists and technicians are also expected to experience “faster than average” employment growth rate, with employment expected to increase between 20% and 28% over the next decade.

Conversely, several occupations within the engineering, chemistry and manufacturing disciplines are expected to experience “slower than average” (3-9%) employment growth rates. A full list of occupations by project growth rates is outlined in the table below.

Projected Employment Growth Rate by Occupation, 2010-2020			
Much faster than average (29% or higher)	Faster than average (20% to 28%)	Average (10% to 19%)	Slower than average (3% to 9%)
<ul style="list-style-type: none"> • Biomedical Engineers • Biochemists & Biophysicists • Medical Scientists, Except Epidemiologists 	<ul style="list-style-type: none"> • Health Technologists and Technicians, All Other 	<ul style="list-style-type: none"> • Medical & Clinical Lab Technologists • Medical & Clinical Lab Technicians • Orthotists & Prosthetists • Biological Technicians • Materials Scientists • Biologists • Statisticians and Biostatisticians • Microbiologists • Clinical Data Managers • Life Scientists, All Other • Life, Physical and Social Sciences Technicians, All Other 	<ul style="list-style-type: none"> • Biochemical, Validation, Manufacturing and Other Engineers • Chemical Engineers • Materials Engineers • Chemical Technicians • Chemists • Medical Appliance Technicians • Manufacturing Production Technicians • Architectural & Engineering Managers • Natural Sciences Managers • Bioinformatics Scientists

Furthermore, the BLS Occupational Handbooks lists the number of job openings projected for each occupation between 2010 and 2020. While projected growth rates help to identify the general direction of

an occupation, the projected number of job openings provides insight into the future size of occupations. Employment for medical and clinical lab technologists and technicians, for example, is only expected to grow at an average rate over the next decade; however, these occupations are also expected to have the greatest number of job openings in the next several years because the occupation is already large in terms of employment. The BLS predicts that there will be over 57,000 job openings for these two occupations between 2010 and 2020. This is followed by architectural and engineering managers, which is projected to have 49,700 job openings between 2010 and 2020. The chart below depicts the projected number of job openings by occupation.



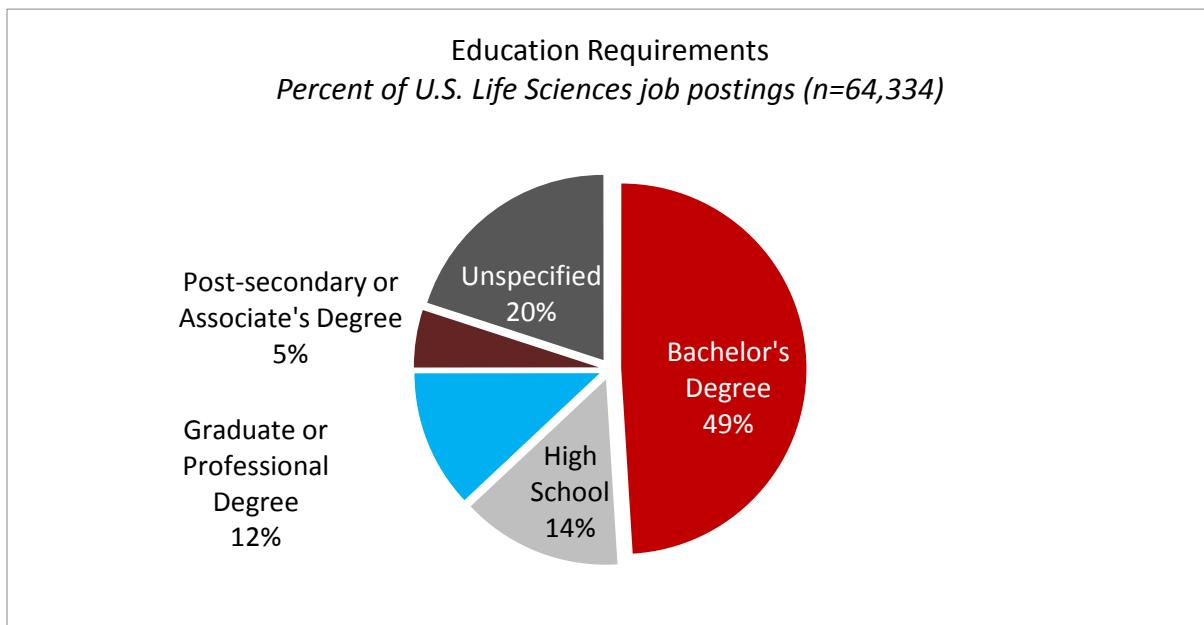
Source: McKinley analysis of Bureau of Labor Statistics Occupational Handbook, O*Net Online.

Industry Demands

EDUCATIONAL REQUIREMENTS

As it continues to grow and evolve, the life sciences industry requires a range of expertise from traditional biological sciences as well as quantitative sciences, including cell and molecular biology, physics, chemistry, computer science, mathematics and more.⁵ In addition to a need for an interdisciplinary workforce, the *Demand for Talent: Current and Projected Workforce Trends in the Life Sciences Industry* report also revealed a demand for individuals across a variety of educational levels.

According to the report, almost half of 64,334 jobs in the life sciences posted between February 2012 and March 2013 required a bachelor's degree, while 17% sought individuals with graduate or professional degrees (12%) or post-secondary degrees (5%). A notable percentage of postings (14%) also sought individuals with a high school diploma or equivalent.⁶



Source: Coalition of State Bioscience Institutes and Booz & Company, Demand for Talent: Current & Projected Workforce Trends in the Life Science Industry (2013).

Additionally, the study also summarized findings from 26 qualitative interviews with industry leaders, including CEOs, heads of Research & Development, Commercial Development, Human Resources and Manufacturing. Findings from the qualitative research identified the need for “flexible knowledge workers” and supported the fact that there are opportunities for a variety of educational and experience levels within the life sciences industry:

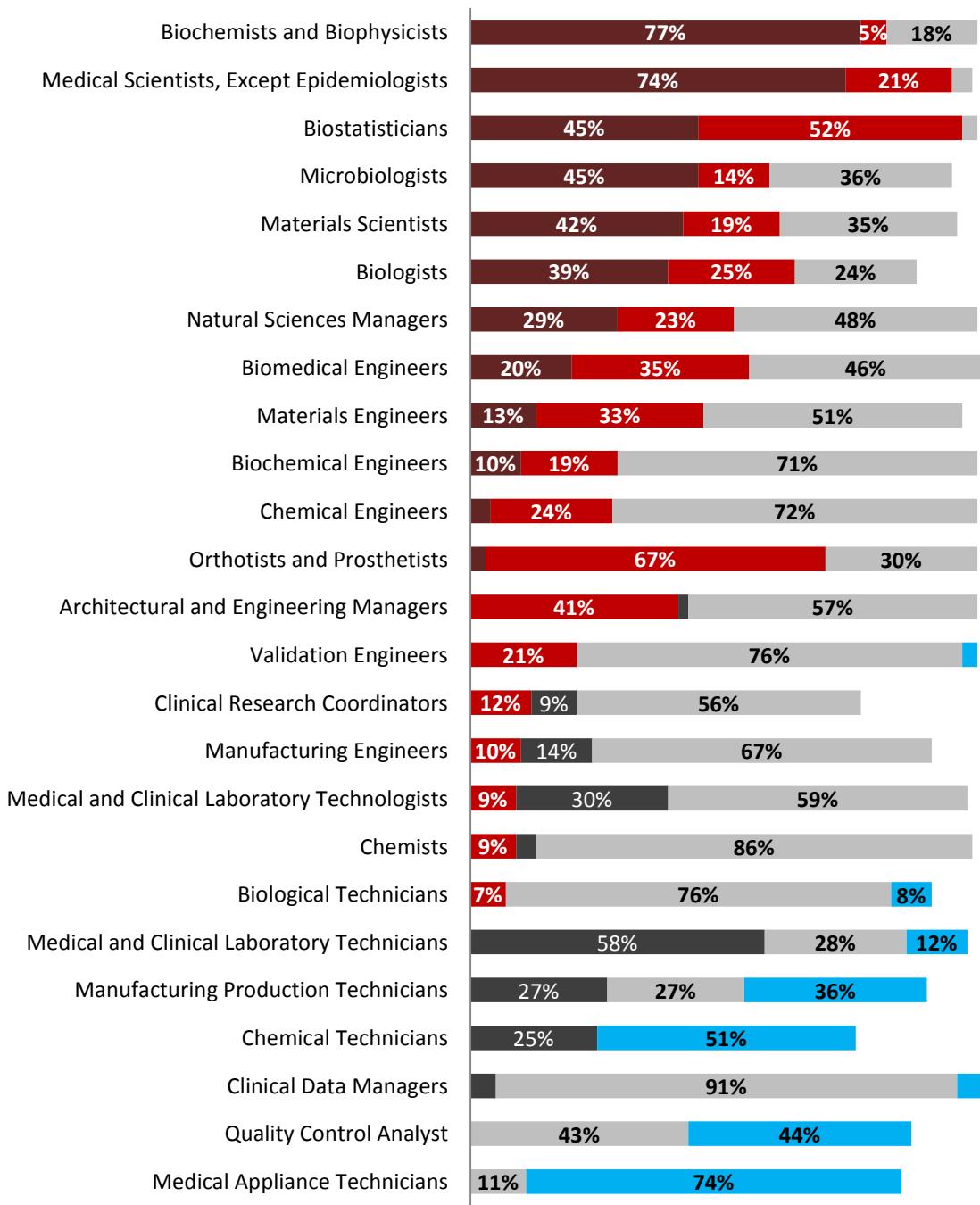
“The need for knowledge workers shows up in four distinct ways: (i) substantial need for employees with baccalaureate and advanced degrees; (ii) need for high school-only graduates when graduates can receive industry-specific training from their employers; (iii) advanced/ specialization degrees,

such as bioinformatics, biostatistics and computational biology, as well as engineers with the ability to manage complex biological process scale-up, are in exceptional demand; and (iv) industry and experience-specific job skills in disciplines such as Regulatory and Quality Systems continue to be in short supply.”⁷

To understand how these educational needs and requirements translate across various occupations within the life sciences industry, educational requirements listed on the Occupational Information Network (O*NET), a database that contains standardized information and indicators on specific occupations,⁸ were reviewed. The analysis reinforced the fact that the life sciences industry demands employees with diverse educational levels and backgrounds. While more specialized scientist positions, such as biochemists and biophysicists, medical scientists, biostatisticians, microbiologists and materials scientists may require talent with doctoral or professional degrees, broader, entry-level positions such as lab technicians are more likely to require high school level education or an associate’s degree.

Required Education Level by Occupation

- █ Doctoral or Professional Degree █ Master's Degree
- █ Post-secondary or Associate's Degree █ Bachelor's Degree
- █ Some College or High School Diploma

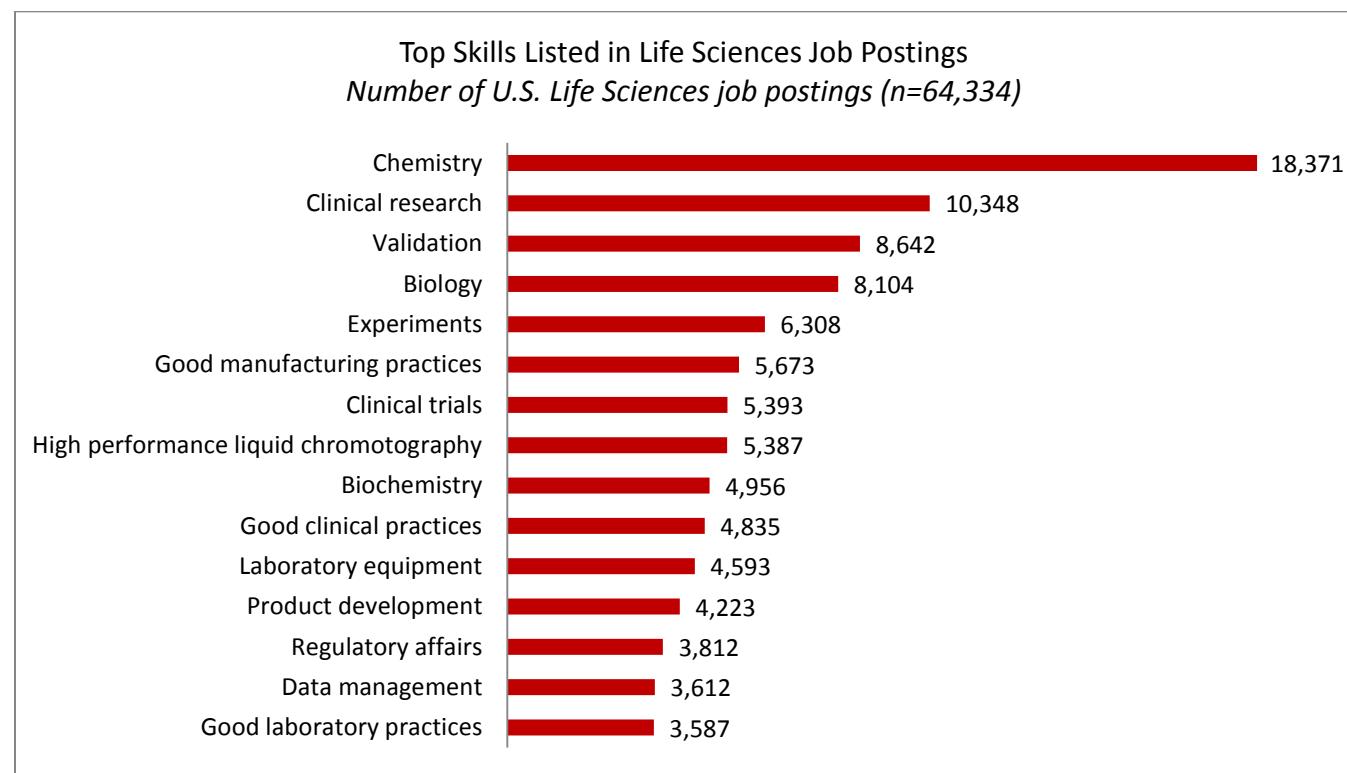


Source: McKinley analysis of Bureau of Labor Statistics Occupational Handbook, O*Net Online.

SKILLS AND EXPERTISE

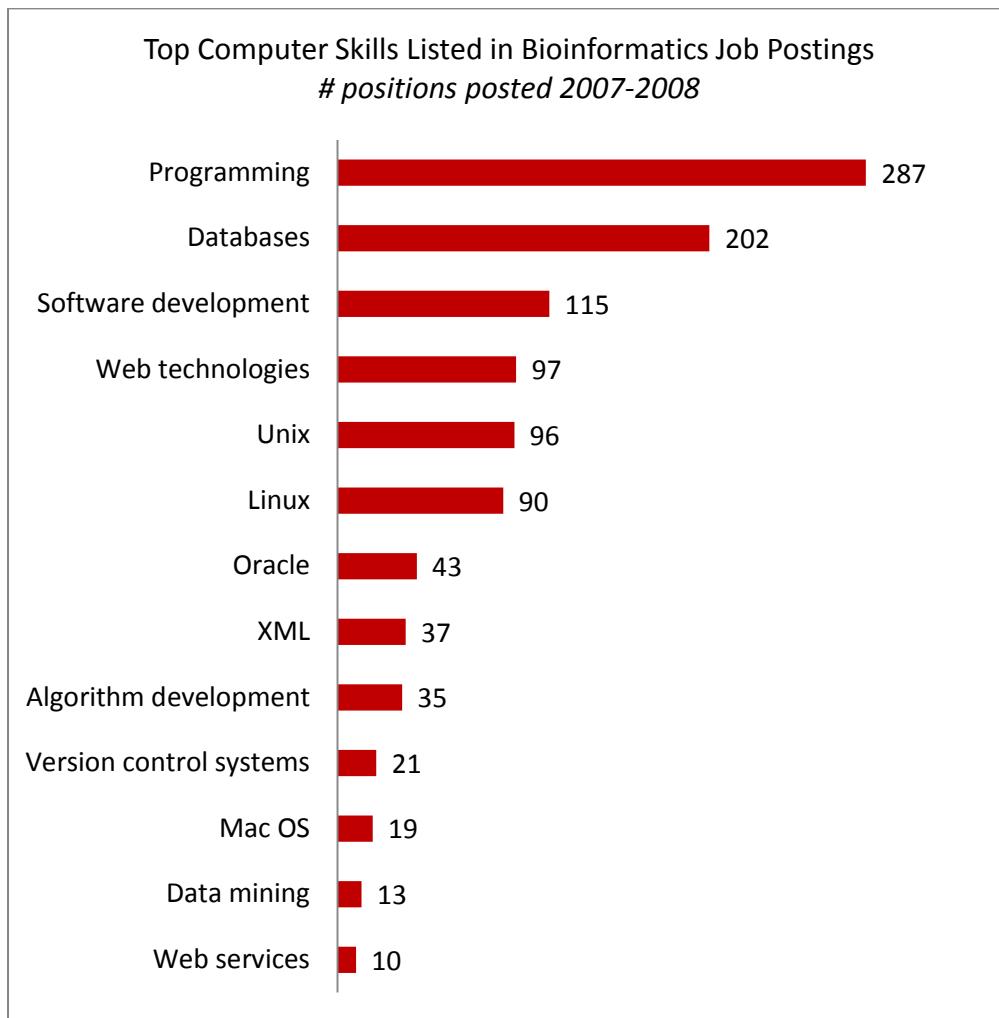
The *Demand for Talent: Current and Projected Workforce Trends in the Life sciences Industry* report also analyzed online job postings to identify the most in-demand skills within the life sciences sector today. The chart below depicts the top skills and expertise cited across 64,334 job postings aggregated through the Burning Glass platform.⁹ While the majority of job postings listed chemistry as a required skill, others ranged from clinical research, manufacturing practices, and even regulatory affairs. “Our association is trying to take a leadership role in advancing the field of regulatory sciences,” explained one executive interviewed. “It is not recognized as a true science, but it is in fact a true science.”

These findings demonstrate the need for scientists, engineers, clinicians and management teams who also possess strong communications skills, a commercial market-based mindset versus an academic mindset, the ability to propel scientific developments into commercial production.¹⁰ One industry executive interviewed explained that recent downsizes in pharmaceutical companies may have propelled the increased demand for soft skills related to communications and business acumen. “Big pharmaceutical companies are eliminating key research areas in drug development and outsourcing it. Employees who have been let go have formed their own consulting organizations to fill the gap for pharmaceutical companies in the drug development process, and they have to have a more diverse skill set to know how to market themselves and run a business, as opposed to doing their one step in the drug development process,” explained the executive.



Source: Coalition of State Bioscience Institutes and Boozé & Company, Demand for Talent: Current & Projected Workforce Trends in the Life Science Industry (2013).

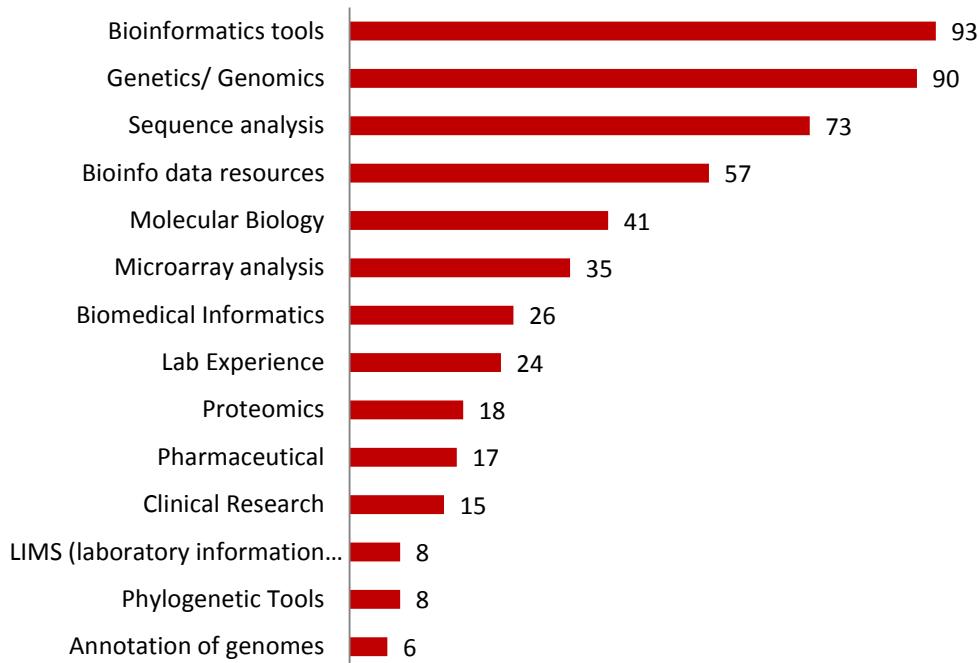
In addition to skills demanded within the overall life sciences industry, another report published by the University of Illinois at Urbana-Champaign's Graduate School of Library and Information Science assessed current trends specifically within the bioinformatics job market using a sample of 1,996 online employment advertisements posted between January 2003 and December 2008. The most frequently requested skills were analyzed among 404 jobs that were posted between 2007 and 2008. After programming skills, the ability to create and maintain relational databases was the next most frequently demanded computer science skill.¹¹



Source: University of Illinois at Urbana-Champaign, Characteristics of bioinformatics employment advertisements (2009).

In addition to computer science skills, the report also identified the most common biology and bioinformatics skills cited by employers that posted jobs between 2007 and 2008. Experience with bioinformatics tools (i.e., sequence analysis tools such as BLAST and CLUSTAL) was cited by 93 positions, followed by genetics and genomics.¹²

Top Biology and Bioinformatics Skills
positions posted 2007-2008



Source: University of Illinois at Urbana-Champaign, Characteristics of bioinformatics employment advertisements (2009).

Endnotes

¹ Nugent, K.L., & Kulkarni, A. (2013). An interdisciplinary shift in demand for talent within the biotech industry. *Nature Biotechnology*, 31. Retrieved from <http://www.nature.com/nbt/journal/v31/n9/full/nbt.2694.html>.

² Coalition of State Bioscience Institutes and Booze & Company. (2013). *Demand for Talent: Current & Projected Workforce Trends in the Life Science Industry*. Retrieved from http://www.csbinstitutes.org/download/files/reports/CSBI_WorkforceReportvFR.pdf.

³ Nugent, K.L., & Kulkarni, A. (2013). An interdisciplinary shift in demand for talent within the biotech industry. *Nature Biotechnology*, 31. Retrieved from <http://www.nature.com/nbt/journal/v31/n9/full/nbt.2694.html>.

⁴ U.S. Department of Labor and National Center for O*NET Development. O*NET Online. Retrieved from <http://www.onetonline.org>.

⁵ Tachibana, Chris. (2010). Systems Biology and Bioinformatics: Something for Everyone. *Science Careers*. Retrieved from http://sciencecareers.sciencemag.org/print/career_magazine/previous_issues/articles/2010_04_09/science.opms.r1_000087

⁶ Battelle and Biotechnology Industry Organization. (2012). *State Bioscience Industry Development 2012*. Retrieved from http://www.bio.org/sites/default/files/v3battelle-bio_2012_industry_development.pdf.

⁷ Coalition of State Bioscience Institutes and Booze & Company. (2013). *Demand for Talent: Current & Projected Workforce Trends in the Life Science Industry*. Retrieved from http://www.csbinstitutes.org/download/files/reports/CSBI_WorkforceReportvFR.pdf.

⁸ U.S. Department of Labor and National Center for O*NET Development. O*NET Online. Retrieved from <http://www.onetonline.org>.

⁹ Coalition of State Bioscience Institutes and Booze & Company. (2013). *Demand for Talent: Current & Projected Workforce Trends in the Life Science Industry*. Retrieved from http://www.csbinstitutes.org/download/files/reports/CSBI_WorkforceReportvFR.pdf.

¹⁰ Nugent, K.L., & Kulkarni, A. (2013). An interdisciplinary shift in demand for talent within the biotech industry. *Nature Biotechnology*, 31. Retrieved from <http://www.nature.com/nbt/journal/v31/n9/full/nbt.2694.html>.

¹¹ Hill, J., MacMullen, W.J., Palmer, C.L. (2009). Characteristics of bioinformatics employment advertisements. Retrieved from <https://www.asis.org/Conferences/AM09/open-proceedings/papers/67.xml>.

¹² Ibid.