

CTE: THE KEY TO ECONOMIC DEVELOPMENT

Biosciences:



Improve human, animal and plant life

Have a more than **\$2 trillion** impact on the U.S. economy¹

Pay more than **\$107,000** annually, on average²

What is the pathway to these fulfilling and essential careers?

Career and Technical Education!



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Biosciences

Advancing innovation, the biosciences sector:

- includes drugs and pharmaceuticals; medical devices and equipment; research, testing and medical laboratories; agricultural feedstock and industrial biosciences; and bioscience-related distribution
- is a high-growth industry in many states
- relies on highly skilled employees

What jobs are available in biosciences?

Advances in the biosciences improve lives through safer pesticides, cleaner energy and groundbreaking gene therapies, among other accomplishments. In 2020 and 2021, this field has been absolutely critical to combating COVID-19, and a continued demand for research and development of treatments and vaccines for infectious diseases will drive a projected rise in employment. The sector employed 1.87 million Americans across every state in 2018 and the biosciences workforce was growing at twice the rate of overall private sector employment even before COVID-19.³ The sector continued to expand its workforce in 2020⁴ and opportunities for lab technicians are expected to grow by at least 9% through 2029 as the pandemic and other health challenges continue to impact our lives.⁵ In addition, the pharmaceutical and medicine manufacturing sub-sector is projected to grow its workforce by about 19% through 2029 owing to production of vaccines and other pharmaceuticals.⁶ Demand has also been strong in the past several years, and is likely to grow, for IT professionals and sales representatives in this sector.⁷

Employees in the biosciences industry earn almost twice the private sector national average.⁸ Individuals who work in the distribution of bioscience products earn almost \$106,000 per year, on average. Those employed in the medical devices and equipment sub-sector earn approximately \$90,500 and those in the agricultural feedstock and industrial biosciences sub-sector – which includes agricultural processing, organic chemical and fertilizer manufacturing, and biofuels – make about \$83,000.⁹

More than 30% of jobs in the biosciences require education beyond high school but less than a bachelor's degree, including scientific technicians; manufacturing workers; and individuals in transportation, distribution and logistics jobs, while almost half of the biosciences workforce needs a bachelor's degree or higher.¹⁰ These workers can also benefit from industry certifications and licenses. Occupations in this sector require academic, technical and employability skills, not only for research, development and biomanufacturing but also in quality control, sales, marketing and IT. In addition, bioscience professionals are increasingly required to navigate digital and automated work environments. Below is a small sampling of biosciences occupations:

- pharmaceutical sales representatives
- agricultural and food science technicians
- biomedical engineers
- forensic science technicians
- market research analysts
- medical equipment wholesalers
- first-line supervisors for medical instrument manufacturing
- lab technicians



Endnotes

1. TEconomy Partners, LLC & Biotechnology Innovation Organization. (2020). *The bioscience economy: Propelling life-saving treatments, supporting state & local communities*. Retrieved from <https://www.bio.org/sites/default/files/2020-06/BIO2020-report.pdf>
2. Ibid.
3. Ibid.
4. Coalition of State Bioscience Institutes & TEconomy Partners, LLC. (2021, June). *2021 life sciences workforce trends report: Taking stock of industry talent dynamics following a disruptive year*. Retrieved from https://8fda1a63-0c57-4c37-8416-71cb16e70702.filesusr.com/ugd/dd6885_748b39d8cdb14de490a1380fa342f777.pdf
5. Ice, L., Rieley, M. J., & Rinde, S. (2021, February). Employment projections in a pandemic environment. *Monthly Labor Review*. Retrieved from <https://www.bls.gov/opub/mlr/2021/article/employment-projections-in-a-pandemic-environment.htm>
6. Ibid.
7. Coalition of State Bioscience Institutes & TEconomy Partners, LLC. (2021, June). *2021 life sciences workforce trends report: Taking stock of industry talent dynamics following a disruptive year*. Retrieved from https://8fda1a63-0c57-4c37-8416-71cb16e70702.filesusr.com/ugd/dd6885_748b39d8cdb14de490a1380fa342f777.pdf
8. TEconomy Partners, LLC & Biotechnology Innovation Organization. (2020). *The bioscience economy: Propelling life-saving treatments, supporting state & local communities*. Retrieved from <https://www.bio.org/sites/default/files/2020-06/BIO2020-report.pdf>
9. Ibid.
10. Coalition of State Bioscience Institutes & TEconomy Partners, LLC. (2021, June). *2021 life sciences workforce trends report: Taking stock of industry talent dynamics following a disruptive year*. Retrieved from https://8fda1a63-0c57-4c37-8416-71cb16e70702.filesusr.com/ugd/dd6885_748b39d8cdb14de490a1380fa342f777.pdf
11. North Carolina Biotechnology Center. (N.d.). *KBI, Durham Tech launch workforce training apprenticeship program*. Retrieved from <https://www.ncbiotech.org/news/kbi-durham-tech-launch-workforce-training-apprenticeship-program>
12. St. Louis Community College. (N.d.). *Life science lab assistant*. Retrieved from <https://stlcc.edu/programs-academics/pathways/science-and-science-tech/life-science-lab-assistant.aspx>
13. Coalition of State Bioscience Institutes & TEconomy Partners, LLC. (2021, June). *2021 life sciences workforce trends report: Taking stock of industry talent dynamics following a disruptive year*. Retrieved from https://8fda1a63-0c57-4c37-8416-71cb16e70702.filesusr.com/ugd/dd6885_748b39d8cdb14de490a1380fa342f777.pdf
14. Governor's Office of Economic Development & Tourism. (2020). *Texas biotechnology and life sciences*. Retrieved from <https://www.thbi.com/gov-2020-biotech-report.pdf>
15. Carlmont High School Biotechnology Institute. (N.d.). *Curriculum*. Retrieved from <https://www.carlmontbti.org/Curriculum/index.html>
16. Cambridge CM. (N.d.). *SUHSD Carlmont Biotechnology Building*. Retrieved from <https://www.cambridge-cm.com/projects/suhd-carlmont-biotechnology-building>



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How does CTE prepare the biosciences workforce?

Career and technical education prepares high school, postsecondary and adult students for careers in the biosciences through:

- the national Career Clusters Framework—including Career Clusters® and pathways in STEM; health science; agriculture, food and natural resources; and manufacturing—which outlines course progressions that help students explore career options and prepare for college and career success
- CTE courses in medical lab technology, biotechnology, biomedical innovation, agricultural biotechnology and biotechnical engineering, integrated with rigorous academics and supported by third-party resources such as Bio-Rad's Explorer Program, the Curriculum for Agricultural Science Education (CASE) and Project Lead the Way's biomedical science curriculum
- work-based learning experiences, such as the three-year pharmaceutical manufacturing apprenticeship launched by KBI Biopharma and Durham Technical Community College in North Carolina that results in an Associate of Science degree from the college and a Registered Apprenticeship credential from the U.S. Department of Labor¹¹
- career and technical student organization experiences, such as industry-based competitive events in biomedical and biotechnology topics offered by HOSA–Future Health Professionals and the Technology Student Association
- opportunities to earn industry certifications and stackable postsecondary certificates and degrees, such as St. Louis Community College's two-semester Life Science Lab Assistant certificate program, which articulates to the Associate in Applied Science program in Biotechnology¹²

What are promising programs in biosciences?

Launched in 2019, **InnovATEBIO** is a National Science Foundation-funded initiative that is developing the biotechnology technician workforce. It assists 119 community college programs in 38 states with curriculum, professional development and other supports.¹³ In addition, InnovATEBIO builds bridges across the biotechnology workforce pipeline through relationships with industry leaders, four-year colleges and K-12 schools. The initiative's National Center for Biotechnology Education is located at **Austin Community College (ACC)** in Texas, a state that is home to more than 5,400 life science research, development and manufacturing firms.¹⁴ ACC prepares high school and college students for skilled technical positions in biomanufacturing, quality assurance, instrumentation and more through various certificate and degree programs. Each course is organized as a regulated laboratory environment, where students work on real-world industry projects, culminating in a capstone internship. Industry partners include organizations that are part of the ACC Bioscience Incubator, which offers shared workspace and collaboration to help companies, particularly start-ups, accelerate product development.

Carlmont High School in Belmont, California, is home to the **Biotechnology Institute**, a three-year, cross-curricular small learning community. The curriculum incorporates biotechnology courses as well as science-themed core courses such as English classes that focus on scientific writing. The biotechnology coursework culminates in a college-level biomanufacturing course in which students follow the path of a drug from inception to a final, marketed product. Students earn dual credit for this course and for the earlier courses in the biotechnology strand, resulting in nine college credits by graduation.¹⁵ In addition, learners interact with biotechnology professionals through guest speakers, industry tours and mentorships with Gilead Sciences, Roche Molecular Solutions, Genentech and other partners. Students in the 11th grade are matched with an employer mentor who they connect with weekly and shadow on the job. The program is housed in a 2,400-square-foot building with laboratory lecture classrooms, a plant growth room and chemical storage rooms.¹⁶