

**YOUR GUIDE TO
ADVANCING
YOUR CAREER IN
BIOTECHNOLOGY**

Northeastern
University





3 Industry Outlook →

5 What is Biotechnology? →

6 Biotechnology
Career Paths →

11 Trends in Biotechnology →

16 Essential
Biotechnology Skills →

18 The Benefits of an
Advanced Degree →

23 Advancing Your
Biotechnology Career →

27 An Insider's Perspective →

28 Biotechnology at
Northeastern: Fast Facts →

Table of Contents

Medical advances in gene therapy, regenerative medicine, and DNA sequencing

have all come about thanks to biotechnology. This industry is at the forefront of creating effective personalized medications and treatments for illnesses that have historically been difficult to manage, improving the quality of life for millions of people worldwide.

Industry Outlook

With such limitless potential to positively impact healthcare, it's no surprise that the biotech industry is growing quickly. A 2020 report from [Industry ARC](#) predicts that the biotech market size will reach more than \$610 billion in revenue by 2025, due in large part to advances in artificial intelligence and agricultural applications.

This growing market opens the door to increased career opportunities at pharmaceutical companies, biotech startups, research labs, and more. Professionals who can combine their interdisciplinary knowledge of biology, chemistry, chemical engineering, and pharmaceutical science with high-value business skills will be in high demand for these roles.

“Biotechnology is a thriving global industry,” says Jared Auclair, associate dean of [biotechnology programs](#) in Northeastern University’s College of Science. “You must take a holistic approach to prepare yourself for working in such a competitive, cross-cultural discipline.”

If you’re ready to become a leader in the biotechnology industry, this guide will help you advance your career and reach your goals.

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– Jared Auclair, associate dean of biotechnology programs
in Northeastern University’s College of Science

What is Biotechnology?



Biotechnology involves the creation of new drugs and biological products through the manipulation of microorganisms. In other words, biotechnologists use living organisms, such as bacteria, to create new medical treatments. The discipline encompasses everything from research and development to commercialization, spanning all phases of a product's lifecycle. The industry's broad scope differentiates it from the bioengineering, biology, and biopharmaceutical industries, which typically focus on only one area of product development.

While many people entering the biotech field hope to become scientists, dozens of career paths and specialties are available in this rapidly growing industry. Keep reading to help determine the best path for you based on your interests, skills, and industry trends.



Biotechnology Career Paths

Careers in biotechnology are expected to continue growing in the coming years, particularly in San Francisco and Boston, the two largest biotech industries in the U.S. More than **1,000 biotech companies** call the Boston area home, and venture capital investment in the region reached **\$5.2 billion in 2018**. In Massachusetts alone, jobs within the biotech industry have grown **94 percent** in the last 15 years, and the industry as a whole is projected to grow **8.3 percent more** within the next five years.

The median salary for biotech professionals is **\$94,490 per year**, with salaries varying based on the specific role you play at your company or lab. Many people pursuing an advanced degree in biotechnology plan for careers as scientists; however, roles in the operations, manufacturing, sales, marketing, and strategy departments of biotech companies and labs are available as well. In addition to these options, some professionals choose to pursue a career in academia rather than in biotech labs or companies.

[Learn More](#) | [Working in Industry vs. Academia: Which Is Right for You?](#)

Here are some of the **most in-demand roles** in biotech today.

1,000

**biotech companies call the
Boston area home.**

(Northeastern University College of Science, 2020)

Biomedical Engineer

Median Salary: \$91,410 (BLS)

Biomedical engineers design biomedical equipment, devices, and software used to advance medicine. Projects can include working on artificial organs, prostheses, and diagnostic machines, among other tools. Many engineers work in manufacturing settings, but careers are also available in universities, hospitals, and research facilities.

Biochemist

Median Salary: \$94,490 (BLS)

As a biochemist, you'll study the chemical properties and biological processes of living things, such as cell development and growth, heredity, and how disease interacts with each. Biochemistry involves complex research with proteins, lipids, DNA, carbohydrates, and other molecules. Professionals in this hands-on field also research the effects of drugs, hormones, and nutrients on the human body, using this information to improve health outcomes.

\$94,490

**the median annual
salary for biotechnology
professionals.**

(BLS, 2020)

Medical Scientist

Median Salary: \$88,790 (BLS)

Medical scientists are in charge of conducting clinical trials and managing all the research therein, so the majority of their work takes place in labs. Duties can also include preparing and analyzing medical samples, standardizing drug potency and doses, and contributing to mass manufacturing and distribution methods.

Process Development Scientist

Median Salary: \$90,000 ([LinkedIn](#))

Process development scientists oversee manufacturing processes within labs, paying careful attention to improving product quality and efficiency at all stages. These scientists also develop methods to scale a drug or medical device's production without sacrificing their company's standards to ensure a safe product.

Learn More | [How to Become a Process Development Scientist](#)

Biomanufacturing Specialists

Median Salary: \$83,017 ([ZipRecruiter](#))

Biomanufacturing specialists are responsible for ensuring that products meet purity, safety, potency, and quality requirements before they can be sold. This role requires strong knowledge of federal, state, and industry regulatory standards and often involves familiarity with large-scale production.

Lab Manager

Median Salary: \$129,100 ([BLS](#))

Lab managers oversee the operations, training, safety plans, and maintenance of labs. Their work includes many tasks, from ordering supplies and ensuring the lab is clean to managing lab projects and acting as a liaison between staff and key stakeholders. Professionals in this role should have strong communication skills and a thorough understanding of the industry, as each lab will have its own management needs depending on its focus.

Learn More | [What Are the Requirements to Become a Lab Manager?](#)

Business Development Manager

Median Salary: \$119,314 ([Salary.com](#))

On the business side of biotech, business development managers conduct detailed market analysis and research to help companies build investment and growth strategies. They help assess and pursue opportunities in expansion, acquisition, and collaborative research to meet organizational goals.

Director of Strategy and Commercialization

Median Salary: \$167,349 ([Glassdoor](#))

These biotech professionals develop and execute the launch, market development, marketing, sales, and logistics strategies for new products. Successful directors drive growth and profitability for their companies while meeting strict quality and regulatory standards in the industry.

Trends in Biotechnology



Understanding **emerging trends in biotechnology** can help you determine your career path and keep up with advances that may impact your current role. Here are some key trends that are impacting the industry today.

Monoclonal Antibodies and Biosimilars

Monoclonal antibodies are lab-grown antibodies designed to support the immune system by restoring, enhancing, or mimicking system responses. They can identify cancer cells and deliver radiation to specific areas, making them a vital tool in eliminating disease. Combining these antibodies with drugs in new ways can make it easier to manage conditions that currently lack effective treatments or require expensive medication.

IN THIS CHAPTER

- Monoclonal Antibodies and Biosimilars
- Cell and Gene Therapies
- Vaccine Development
- Next-Generation Computing Technology
- Increased Stakeholder Collaboration
- Improved Clinical Trials
- Advances in Personalized Treatment
- Agricultural Applications

Meanwhile, biosimilars are modified to deliver the same effects as an existing drug, using slightly different compositions. Biosimilars make immunotherapy and targeted drug therapies more accessible in the same way that generic drugs do for synthetic-based medications.

Cell and Gene Therapies

Customized medications in the form of **cell and gene therapies** are booming, according to Auclair. The FDA approved the first-ever gene therapy, called **Kymriah**, in 2017. The drug uses a patient's own white blood cells to treat acute lymphoblastic leukemia. Since then, the gene and cell therapy market has **doubled in growth**, and experts predict that the FDA will continue approving new therapies at a fast rate.

Vaccine Development

The COVID-19 pandemic has spurred the scientific community to consider new ways of approaching vaccine development. For example, Moderna **developed a candidate** that uses mRNA from the novel coronavirus, rather than a weaker version of the virus itself, to create an immune response. This has helped make the vaccine safer and fast-track its development, allowing the company to move to Phase 3 of development on an unprecedented schedule.

Next-Generation Computing Technology

Machine learning, artificial intelligence, and other advanced computing methods have allowed companies to broaden their reach. Now, research and manufacturing efficiency are at higher levels than ever. For example, the ability to quickly analyze large sets of data has allowed drug makers to **identify cancer mechanisms** that can make it easier to determine the best treatment based on the disease's causes.

Cloud computing has also impacted biotech. Early-stage startups can now rely on borrowed storage space in the cloud, rather than investing in their own hardware, freeing up their limited capital for research and development opportunities instead.

Increased Stakeholder Collaboration

Biotechnological research requires constant collaboration with a range of stakeholders, from lab associates to international partners. To facilitate effective collaboration, more companies are turning to advanced software tools that support data sharing, quick communication, and virtual meetings. These technologies allow teams to work together no matter their geographic location, expanding a company's ability to develop breakthrough medical products.

Improved Clinical Trials

Once a largely manual process, clinical trials have been heavily digitized. Companies can now use widely available technology, such as the [Apple Watch and genetic testing](#), to study disease. Widespread digitization makes trials more accessible to a larger, more geographically diverse group of people. Researchers can also use machine learning to more easily exclude patients who do not meet trial criteria, analyze the efficacy of treatments, and determine new findings from previous studies.

[Learn More](#) | [Working in Clinical Trial Design](#)

Advances in Personalized Treatment

Biotechnology and gene-based therapies have gone hand-in-hand for decades. Now, scientists have made significant strides thanks to improved technology. The [cost of genetic sequencing](#) has dropped dramatically, from \$2.7 billion for the Human Genome Project in 1990 to less than \$300 today, paving the way for more in-depth patient analysis and targeted interventions. Personalized cancer treatments like [CAR T-cell therapy](#) have already been made possible due to faster, more affordable sequencing.

[Learn More](#) | [The Future of Personalized Medicine](#)

Agricultural Applications

The U.N. estimates that the global population will reach **9.7 billion by 2050**, necessitating more sustainable food sources and efficient land use. Gene editing could lead to crops that thrive in harsher conditions or produce higher yields in smaller areas while providing the same nutritional value. Developing biologically based pesticides may also help protect these crops without relying on harsh chemicals that damage the environment.

Keeping track of trends like these can help you become a stronger biotech professional. You'll be able to make connections between your existing training and new developments in the industry, positioning you to become a leader within your field. Depending on your role, these trends can also impact the way you work, your organization's goals, and the techniques you'll need to learn to reach them.



Essential Biotechnology Skills

“Companies are now focused on hiring well-rounded workers as opposed to merely looking for scientific rigor and expertise,” Auclair says. Here are the skills he recommends cultivating in order to advance in the field.

Scientific and Technical Skills

A strong foundation in scientific and technical skills can help you keep up with rapid advances in biotechnology. Critical areas of knowledge include:

- > Molecular biology
- > Cellular culture and biology
- > Chemical analysis
- > Purification
- > Research methodology
- > Drug development
- > Clinical research
- > Lab research
- > Genetics
- > Data management and analytics
- > Regulation and compliance

Soft Skills and Business Acumen

Professionals who can collaborate with teammates, communicate clearly, and learn throughout their careers will be among the most successful in biotechnology. As you advance, developing and executing strategy—which requires strong people skills—will become just as important as your technical knowledge. Begin practicing these skills early in your career to help navigate your day-to-day work more effectively.

- > **Communication**
- > Research
- > Organization
- > Attention to detail
- > Problem solving
- > Time management
- > Business strategy
- > **Project and budget management**

[Learn More](#) | [How to Become a Biotechnologist: Build Your Soft Skills](#)



The Benefits of an Advanced Degree



One of the most reliable ways to contribute to biotech’s global impact is by earning an advanced degree, which can give you the skills you need to create meaningful change in this industry.

A master’s degree typically takes between two and three years to complete and provides students with a holistic view of the field. Hands-on learning opportunities prepare you to meet evolving industry needs, making it the ideal degree for those who want to work in a lab or biotech organization.

Not only will your education teach you the scientific, technical, and business skills you'll need, you'll also learn leadership and collaboration techniques that make you a more valuable employee.

"Earning a master's degree in biotechnology sets up students to be leaders in the field," Auclair says. "You'll gain the experience of executing high-end experiments, but the coursework will also ready you to take on leadership roles that influence scientific strategy and development."

[Learn More | Is a Master's in Biotechnology Worth It?](#)

Those interested in teaching and conducting research in an academic setting may choose to pursue a PhD, which will better prepare them for these roles, rather than a master of science. A PhD takes up to eight years to complete and is designed for those who would prefer to work in research or academia. It teaches a more specialized view of biotechnology and focuses primarily on research skills, literature within the industry, and other academic competencies. Students will still gain exposure to lab equipment and other technical skills, though the focus will be primarily on preparing to enter academia.

[Learn More | Should You Get a Master's or a PhD in Biotechnology?](#)

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– Jared Auclair, associate dean
of biotechnology programs
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Master's vs PhD in BIOTECHNOLOGY

5 ASPECTS TO CONSIDER

Master's

PhD

PROGRAM LENGTH

2-3 years to complete



5-8 years to complete

CURRICULUM

Provides a holistic
view of the field



Provides a specialized
view of the field

EXPERIENTIAL LEARNING

Hands-on learning opportunities
within the industry



Research project with
program faculty

INDUSTRY DEMAND

Students prepare to meet
evolving industry needs



Students gain exposure to
real-world lab equipment

CAREER GOALS

Best fit for those planning
to work in the industry



Best fit for those planning
to work in academia



Here's what continuing your education can do for your career.

Meet Employer Requirements

As the biotech workforce becomes more competitive, a growing number of employers will require a master's degree as a basic job qualification. The Bureau of Labor Statistics predicts a 14 percent increase in graduate-level biotech job postings by 2022.

Expand Your Network

Establishing a strong **professional network** can have long-term benefits for your career. Building meaningful connections with others in your industry helps you stay up to date on the latest developments, gain valuable insights on your research from colleagues, and open the door to new career opportunities. Much of this networking can happen in a master's degree program, but you can also join professional organizations and attend industry events to make connections.

[Learn More](#) | [5 Networking Tips for Scientists](#)



Earn More

According to a 2019 study by the National Association of Colleges and Employers, professionals with a master's degree can earn salaries **significantly higher** than those with bachelor's degrees alone by as much as \$27,000 per year. Investing in your education now can not only position you for more advanced roles, but also for the higher salaries that often accompany them.

Gain Real-World Experience

One of the best ways to develop your skills in biotech is through real-world experience. While internships can be a helpful way of gaining that experience, students with a more extensive resumé will stand out.

Learn More | [How to Write a Strong Biotechnology Resumé](#)

Northeastern students, for example, can participate in co-ops that place them in temporary jobs within the biotech industry, allowing them to become part of a real business team and help solve challenges on a daily basis. They can also work in one of the university's countless labs and research centers alongside professors with decades of industry experience.



Advancing Your Biotechnology Career



Northeastern offers its master’s degree in biotechnology **online** or on ground at its **Boston** and **Portland, Maine** campuses. This innovative, nonthesis degree program is **PSM certified** and prepares students to respond to regional and national needs for a stronger scientific workforce by integrating technical, scientific skills with business education.

“PSM programs, such as our master’s in biotechnology, are very practical and continuously evolve to develop multidisciplinary skills aligning with the changing industry demands,” says Kevin Broadbelt, interim director of

Northeastern's biotechnology programs. "We continue to develop rigorous, practical coursework, which we feel allows our graduates to attain a distinctive credential designed to maximize career potential."

Throughout your education, you'll learn in-demand skills from faculty with deep industry experience, ensuring that you receive the most up-to-date training as you earn your degree. Our network of more than 265,000 alumni in 179 countries can also assist with mentorship, research, and networking opportunities as you prepare to enter the workforce.

Students have the opportunity to undertake co-ops with more than 3,350 corporate partners and conduct lab research with faculty during their program. Our Boston campus is located within one of the country's busiest biotech centers with more than **1,000 biotech companies in the area**, allowing you to work with well-established companies in the industry. Northeastern's close partnerships with companies in the Boston biotech ecosystem have helped students secure co-ops and full-time roles at businesses ranging from startup firms to powerhouse companies like Genzyme, Biogen, Pfizer, Takeda, Amgen, and Novartis.

In Portland, you can be an early leader of the city's growing biotech space. A **2019 report** discovered that the life sciences industry as a whole was growing faster than any other in the state, with more than 7,000 jobs available and a job growth rate of 14 percent in the previous five years.

Online students can experience these industries by participating in a two-week residency at Northeastern's Boston campus. During the residency, you'll hone your lab skills using the same curriculum and faculty support as students studying on campus full time. This flexible program option allows you to meet faculty and fellow students while continuing to work at your current employer. Many online students are able to complete co-ops at their workplaces and begin implementing their studies right away.

After graduation, **about 95 percent** of master's in biotechnology graduates find an industry-related job thanks to the resources Northeastern provides.

You can choose to deepen your studies by undertaking one of the following concentrations:

- > Agricultural Biotechnology
- > Biodefense
- > Molecular Biotechnology
- > Process Sciences
- > Manufacturing and Quality Operations
- > Biopharmaceutical Analytical Sciences
- > Pharmaceutical Technologies
- > Scientific Information Management
- > Regulatory Science
- > Biotechnology Enterprise

Northeastern also offers a **graduate certificate in biotechnology**, available online or on ground in Boston or Portland. The program provides individuals without a biotech background with a strong foundation in the field's basic concepts, and credits from the certificate can be applied toward a master's degree should you choose to continue your education.

Each program is informed by an industry advisory board composed of representatives from Biogen Idec, Novartis Institutes for Biomedical Research, and Takeda Pharmaceuticals International.

94%

of Northeastern master's in
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(Northeastern University, College of Science)

An Insider's Perspective

Northeastern's master's in biotechnology program offers access to state-of-the-art labs, co-ops with industry leaders, and more. Here's what recent graduates had to say about their experience.

Gaining industry exposure is always very important as an international student. Northeastern University's interdisciplinary biotechnology program helps by combining a tailored course with a wide array of electives to choose from, with a co-op helping to directly get your foot into the door. Being in Boston, Northeastern also helps in networking and connecting with highly accomplished individuals from the biotech and biopharma industry.

Tanay Bhagwat, MS'21

The skills that we learn here are skills I've seen being applied in a lab setting. When I go into an academic lab and perform an experiment, I realize what the professor was talking about in class. Because of these experiences, I feel prepared for co-ops and full time jobs.

Gaurav Saawant, MS'21

Biotechnology at Northeastern: Fast Facts

Master's Program Locations

- Boston
- Portland, ME
- Online

Available Concentrations:

- > Agricultural Biotechnology
- > Biodefense
- > Biopharmaceutical Analytical Sciences
- > Agricultural Biotechnology
- > Manufacturing and Quality Operations

Commitment

- > Full Time
- > Part Time

Certificate Locations

- Boston
- Portland, ME
- Online

- > Molecular Biotechnology
- > Pharmaceutical Technologies
- > Process Sciences
- > Regulatory Science
- > Scientific Information Management

Duration

- > 1-3 Years



LEARN MORE →

Are you ready to take the next step in your biotechnology career?

Northeastern can help you get ahead.
Visit northeastern.edu/graduate to learn how.

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