



A Guide to What You Should Know:

**Advancing Your  
Career in the  
Biotechnology  
Industry**

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Northeastern University



The biotechnology industry is diverse, growing, and filled with opportunity. Over the last few decades, the industry has produced innovative technologies that have transformed the lives of millions around the globe. Today, continued advances in areas like gene therapy, regenerative medicine, and DNA sequencing promise to result in more effective, individualized healthcare and preventive medicine for years to come.

Expected to reach \$727 billion by 2025, the industry's unparalleled growth has no end in sight. Jobs are abundant; in fact, many employers currently struggle to fill their roles with qualified candidates. The four biotechnology areas employers report the most difficulty in finding qualified candidates—research and development, regulatory affairs, quality, and clinical research—are also the top four functional areas in which biotech organizations plan to expand most in the coming years.

The growing biotech market means more career opportunities are available, in organizations ranging from large pharmaceutical operations to entrepreneurial start-ups. With the rapid pace of innovation, this also means aspiring professionals need to have a strong background and up-to-date skill sets in order to find success in the field.

For those looking to break into or advance in the field, your time is now. The biotechnology industry is in immediate need of innovative leaders—professionals who possess cross-functional expertise, combining the skills of scientist, business strategist, and public policy advocate.

Individuals with this combination of advanced scientific knowledge, soft skills, intellectual flexibility, and global vision can pursue a career path in an industry poised to answer today's most challenging healthcare problems, while saving lives along the way.

# What is Biotechnology?

According to Jared Auclair, director of [Northeastern University's MS in Biotechnology program](#), biotechnology is the manipulation of microorganisms to create new drug and biological products, many of which are used to help treat and prevent disease.

While bioengineering, biology, and biopharmaceutical industries all focus on related products and processes, the biotechnology industry addresses the whole lifecycle and all related workflows required to get from research and development to a commercialized biotechnology product.

According to Auclair, there are several areas of biotechnology that are shaping the future of science and medicine. He suggests that those looking to break into or advance their biotechnology careers should pay close attention to these industry trends that will continue to grow. As these and other new specialties emerge, there will be ample opportunity for success.

# Current Trends & Areas of Study in Biotechnology

## Molecular Biotechnology

Molecular biology is focused on studying the chemical structures, function, organization, and processes of molecules, the most basic unit of living things. The molecular biology applications in biotechnology today are revolutionizing the way we think of medicine, notably impacting scientists' abilities to identify and treat drug-resistant diseases.

This area of study is currently at the forefront of advancements in DNA fingerprinting, adaptive immunity, gene targeting, gene editing, gene therapy, gene silencing, RNA interference, and stem cell technology.

## Process Development

Process development focuses on the production of drugs and biopharmaceuticals, from cell culture process to the purification of biologic molecules. Pulling from theories



in engineering and life science, the professionals in this discipline focus on the scaling of drug compounds to mass production while remaining compliant with strict regulatory policies.

### **Biopharmaceutical Analytical Sciences**

This area of study focuses on structures and activities of biological molecules formed during the production of biopharmaceuticals, and the impact of these structural changes on the safety and efficacy of the drugs.

### **Pharmaceutical Technologies**

This discipline focuses on the conversion of purified proteins to biopharmaceutical drug products that are compatible for clinical use. This concentration addresses the design, development, and implementation of the drug product manufacturing processes.

### **Scientific Information Management**

Scientific information management focuses on the collection, management, analysis, and visualization of large amounts of scientific data. This concentration addresses the issues surrounding big data that face the industry today.



## **Regulatory Science**

This concentration addresses the issues surrounding current and innovative science practices that influence regulatory decisions. A key area of development in the field is biopharmaceutical product regulation and the industry's evolving compliance requirements both domestically and abroad.

## **Biotechnology Enterprise Management**

This area of the field integrates business and management skills with the science of biotechnology. Focusing on the fundamental concepts of leadership, entrepreneurship, innovation, financial decision making, and marketing—all within the context of developing biotechnology products—these professionals are the leaders and managers within the industry.

As biotechnology companies strive for rapid and continued innovation in each of these areas, demand is growing for qualified professionals in the field.

# Biotechnology Market Outlook

The biotechnology industry is a major economic driver, generating approximately \$140 billion in revenue. The bioscience industry has also shown impressive strength and resilience, with employment growth of nearly 10 percent since 2001. What's more, the economic impact is well distributed across the country: Since 2012, 35 states have experienced net job growth in the biosciences.

U.S. biotechnology firms currently employ over 1.66 million people, but with the need for continued research and rapid innovation, the demand for skilled professionals will continue to rise. According to the U.S. Bureau of Labor Statistics, biotechnology jobs are expected to grow an additional 10 percent by 2026—faster than the national average across all other occupations.



Biotechnology firms also continue to create and sustain high-wage jobs, with the average annual wage for a U.S. bioscience worker reaching \$94,543 in 2014—nearly 85 percent more than the private sector average of \$51,148.



Biotechnology jobs opportunities are expected to grow 10% by 2026.

(Bureau of Labor Statistics, 2018)

# Careers in Biotechnology

Many pursuing a degree in biotechnology aspire to the title of “scientist.” In most cases, a PhD is required; however, with a professional master’s degree, this career path is made possible. With this degree, individuals looking to work in the lab are able to progress from research associate to scientist, and eventually, to director level and beyond.

Auclair stresses, however, that working in drug development for a pharmaceutical or medical device company is not the only path a biotech professional can take. For those looking to move “beyond the bench,” there are many opportunities to make an impact in the industry. Biotechnology professionals work in many functional areas, including:

- » Research & Development
- » Clinical Science
- » Operations and Manufacturing

- » Quality Assurance & Regulatory Affairs
- » Government and Policymaking
- » Business & Global Leadership
- » Product Marketing
- » Technology
- » Sales and Support
- » Strategy & Innovation

### **Where Can You Work?**

Because biotechnology innovations have application across many industries, professionals have many options when choosing where to work. Whether you want to work in a small company that gives you great responsibility with room to learn and grow, or a large corporation with well-established processes and procedures, the jobs are plentiful.

Large hubs of biotechnology research and innovation are found in the U.S. around:

- » Seattle
- » San Diego
- » North Carolina's Research Triangle Park
- » Philadelphia

The majority of biotechnology work, though, is done in **Boston** and **San Francisco**.

San Francisco currently has the highest concentration of public biotech companies in the U.S., along with the highest biotech revenues, while Boston is the second largest biotechnology hub in the U.S.

In fact, the life sciences industry in Massachusetts has grown at approximately double the rate of the U.S. economy, and the region's biotechnology employment is expected to grow by 22 percent over the next four years. With over 250 companies in Boston, Cambridge, and surrounding suburbs, nearly every pharmaceutical company has a stake in Boston's biotech network.

Auclair says graduates of Northeastern's program work at a variety of organizations across the globe, in academia, small start-ups, global pharmaceutical corporations, private organizations, and government agencies. Whether you earn your Northeastern master's degree in Boston, Silicon Valley, or online, you'll have the chance to join alumni working at organizations such as Biogen, Pfizer, Amgen, Takeda, GenTech, Novartis, and Sanofi-Genzyme.

# Common Job Titles and Salaries

Here are some of the most in-demand biotechnology careers in today's market:

## Biomedical Engineer

Biomedical engineers combine engineering and biological expertise to design solutions to problems in biology and medicine. With the goal to improve the quality and effectiveness of patient healthcare, they design biomedical equipment, devices, and medical software, such as artificial organs, prostheses, and diagnostic machines.

Median Pay: **\$88,040**

Projected Growth  
by 2026: **7%**

## Biochemist

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Biochemists study the chemical properties of living things and biological processes, such as cell development, cell growth, heredity, and disease. They conduct complex research projects and frequently isolate, analyze, and synthesize proteins, lipids (fats), DNA, carbohydrates (sugars), and other molecules. They also research the effects of drugs, hormones, and nutrients on tissues and biological processes to develop products and processes that may improve human health.

Median Pay: **\$91,190**

Projected Growth  
by 2026: **11%**

## Medical Scientist

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Medical scientists conduct clinical research to improve patient health by investigating diseases and prevention methods. They may also develop and test medical devices. They frequently prepare and analyze medical samples to investigate the causes and treatments of toxicity, pathogens, and chronic diseases. These scientists also help standardize drug potency, doses, and methods for the mass manufacturing and distribution of drugs and medicinal compounds.

Median Pay: **\$82,090**

Projected Growth  
by 2026: **13%**

# Process Development Scientist

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Process development scientists oversee the manufacturing process

Median Pay: **\$94,739**

in an organization's lab, looking for ways to increase quality and efficiency. Once a new product has been developed and approved for manufacturing, these scientists develop methods to scale production while adhering to standardized protocols.

# Biomanufacturing Specialists

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Biomanufacturing specialists use tools and methods to guarantee

Median Pay: **\$80,629**

products meet stringent requirements of purity, safety, potency and quality throughout the manufacturing process. Biomanufacturing often involves the large-scale production of proteins used to treat or cure human diseases, which requires that these specialists possess a thorough knowledge of federal, state, and industry regulatory standards.

# Biological/Clinical Technician

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Also known as medical laboratory scientists, biological technicians collect samples, perform tests, and analyze results of body fluids, tissue, bacteria cultures, and other substances. These technicians use lab instruments, advanced robotics, specialized computer software, and automated equipment to collect, analyze, and model experimental data.

Median Pay: **\$51,770**

Projected Growth  
by 2026: **13%**

# Microbiologist

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Microbiologists study viruses, bacteria and the immune system to produce biomedical and industrial products. These professionals conduct complex research projects and lab experiments to aid in the diagnosis and treatment of infectious illnesses.

Median Pay: **\$69,960**

Projected Growth  
by 2026: **8%**

## Business Development Manager

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Business development managers provide detailed market analysis and competitive intelligence to help biotechnology companies formulate and execute growth and investment strategies. They assist in assessing and pursuing expansion, acquisition, and collaborative research and partnering opportunities with other biotechnology institutions to achieve business growth in line with corporate strategic goals.

Median Pay:  
**\$113,769**

## Director of Strategy and Commercialization

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Biotechnology professionals in these [business-related roles](#) are responsible for the development and execution of the commercialization strategy for new biotechnology products including launch, market development, marketing, sales, and logistics, driving growth and profitability while ensuring compliance with regulatory and quality requirements.

Median Pay:  
**\$124,726**

# Why Pursue a Master's in Biotechnology?

Not only will a master's degree prepare you to collaborate and lead in a variety of biotech specialties, but you'll also gain the scientific knowledge, technical skill, and strategic business competencies required to take your career in any direction. Here are some reasons to start pursuing your degree today:

## Meet Employer Demand

There has been a dramatic increase in the total number of [STEM jobs requiring a master's degree](#) since 2014. According to recent research by Burning Glass Labor Insight, over 50 percent of biotechnology job postings require (or strongly prefer) graduate-level degrees—a much higher percentage than the average 22 percent across other job postings. Earning an MS can help you meet the demands of your next employer.

## Stay Competitive with Your Peers

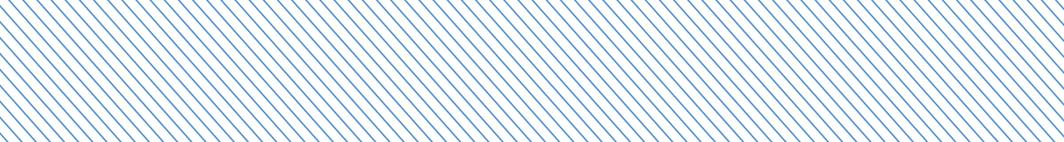
Master's degree holders in the biotech industry have doubled since 2010, so although the demand for skilled workers with advanced degrees has increased, so has the competition. A master's degree from Northeastern will arm you with experiential learning opportunities, specialized training, and soft skill training to help get your foot in the door.

## Increase Your Salary

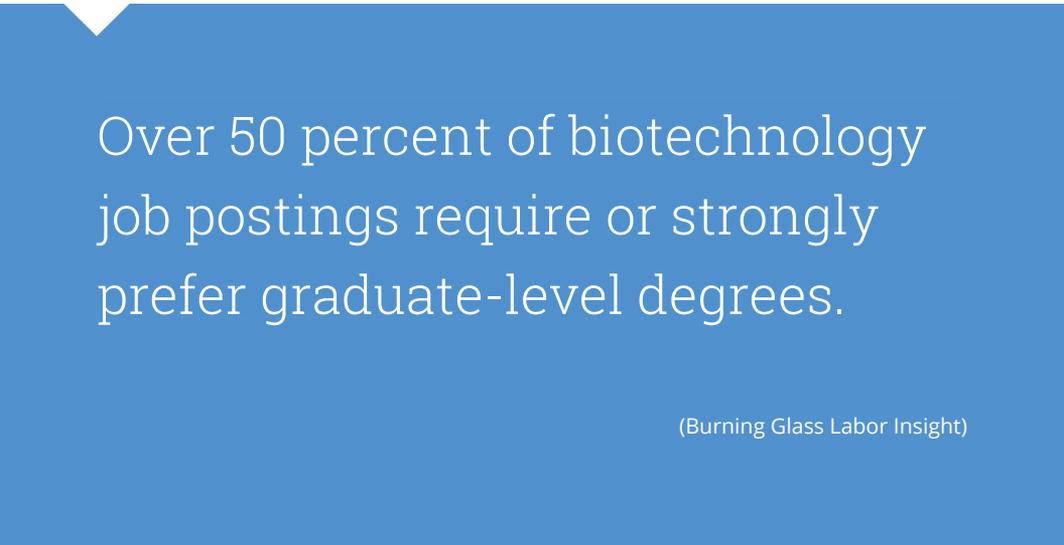
Over the course of your lifetime, you'll earn significantly more money having earned your master's degree in biotechnology. In the biotech industry, masters-level professionals earn an average 20 percent more annually than their bachelor's degree-holding peers.

## Increase Your Marketability

Upon earning your master's degree, you'll be immediately able to innovate, lead teams and impact global change, making you increasingly attractive to employers. And by learning to effectively market your degree to employers, you can demonstrate that you have the knowledge and experience to enter the field or advance your career.



With an MS from Northeastern, you'll have already gained hands-on experience allowing you to connect theory and practice, leaving you poised to solve the most pressing global challenges for your prospective employer's organization.



Over 50 percent of biotechnology job postings require or strongly prefer graduate-level degrees.

(Burning Glass Labor Insight)

## Who Should Pursue an MS in Biotechnology?

An MS in biotechnology may be right for you if:

**You're newly out of school and want to propel your career.** Enrolling in an advanced biotechnology program will provide you with the science, math, technology, and business skills to advance and impact change. Some programs also provide hands-on research or training opportunities to help you connect the theories you learn in the classroom to practice in the real-world—a quality that is highly valued by employers.

Plus, with a professional science master's degree, you'll be prepared to make an impact immediately within the industry and you can climb the chain of command without having to get a PhD. For those recent graduates who don't want to invest five to eight years doing research, and instead would prefer to focus on hands-on experience—this degree is for you.



**You want to change direction within the field.** Whether you'd like to shift from manufacturing to product management, or from clinical work into a business role, an MS in Biotechnology can help you achieve your goals. A degree program, Auclair says, will get you off the bench and allow you to explore other roles available to you in the industry. You'll learn new skills that will help you change careers and gain access to industry connections that can open doors for you in the new sector you aspire to work in.

**You're trying to break back into the field after taking some time off.** "Even two years off can be a long time in this field," Auclair says. "When entering back into the workforce, it's important you possess the most relevant skills and up-to-date techniques."

Technologies used in the field, such as mass spectrometry and instrument technology, have evolved immensely, he says. While you may be able to learn to operate new machinery, if you don't receive the theory and background education, you will not be able to



troubleshoot and optimize processes proactively. Going back to school can help you keep current with these relevant skills, techniques, and advancements, allowing you to anticipate trends and lead the charge instead of following.

**You've hit a plateau in your career.** You can have a successful career in biotechnology with a bachelor's degree; however, if you want to advance to director levels, you'll need to pursue an advanced degree, such as a master's or PhD. Many people, though, are not willing to commit to earning a PhD, which requires an enormous investment of time, money, and energy. Many master's degree programs, however, are designed to flex to your schedule, offering [online classroom options](#) that enable you to learn while continuing to work in the industry.

**You're looking to take on a leadership role.** If you're looking to climb the career ladder, Auclair says, earning an advanced degree is one way to help you get there.



“Earning a master’s degree in biotechnology sets up students to be leaders in the field. 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.”

The best biotechnology programs allow students to pursue advanced training and excel in science while simultaneously developing highly valued business skills without also having to acquire a PhD or MBA. By giving you the scientific and interpersonal skills necessary to grow and thrive in a constantly evolving industry, an MS in Biotechnology can help you advance in or break into an exciting and impactful career.

And no matter your motivation, enrolling in an advanced biotechnology program gives you access to a network of key industry players in government, industry, and academia that can open the door to career advancement. In fact, Northeastern’s MS in Biotechnology program has had a 95 percent employment rate after graduation in industry or research since 2015.

## Skills for Success

Although the market outlook is extremely positive and jobs are abundant, it's critical that professionals keep their skills sharp and knowledge up-to-date. The key to continued success in this industry, Auclair says, is a combination of specialized scientific knowledge, technical skills, interpersonal soft skills, and business acumen.

"Biotechnology is a thriving global industry," Auclair says. "You must take a holistic approach to prepare yourself for working in such a competitive, cross-cultural discipline. Companies are now focused on hiring well-rounded workers as opposed to merely looking for scientific rigor and expertise."

According to a report by [MassBioEd](#), life science companies are becoming increasingly concerned with finding individuals who possess not only the technical knowledge, but the business skills to help implement strategies, develop industry partnerships, and lead a product and/or organization to success.

Here are Auclair's strategies for success in the industry:

## **Sharpen Your Scientific Knowledge & Technical Expertise**

Biotechnological advances happen rapidly. It's critical for those who want to remain competitive to have profound scientific knowledge and meticulous technical skill. Some of the critical areas of scientific knowledge for those looking to work in biotechnology include:

- » Molecular Biology
- » Cellular Culture and Biology
- » Chemical Analysis
- » Purification
- » Research Methodology
- » Drug Development
- » Clinical Research
- » Lab Research
- » Genetics
- » Data Management/Data Analytics
- » Regulation and Compliance

## **Develop Soft Skills & Business Acumen**

Auclair also stresses the importance of cultivating exceptional people skills if you want to grow and advance in the industry. As important as it is to understand cell culture, it's also important to understand how to fit into



the company culture at a biotech organization, he says. Managing projects and personnel in a technology-based organization can be difficult, as you're often working with groups of highly educated, and often very experienced, people.

Understanding how to navigate these interpersonal environments becomes key to managing your projects and your career. According to Burning Glass Labor Insight, these non-science specific competencies are considered the most in-demand soft skills by biotechnology employers:

- » Communication
- » Research
- » Organizational Skills
- » Detail-Oriented
- » Problem Solving/  
Troubleshooting
- » Time Management
- » Business Strategy
- » Project Management
- » People Management
- » Budget Management

While the biotechnology industry is strongly dependent on the concept that knowledge is shared and ownership is collective, scientists, Auclair says, can be quirky.



And, as you advance in your career and up the chain of command, he says, work becomes less and less about lab work, and more about developing and executing strategy. In this way, business skills and interpersonal effectiveness become critical.

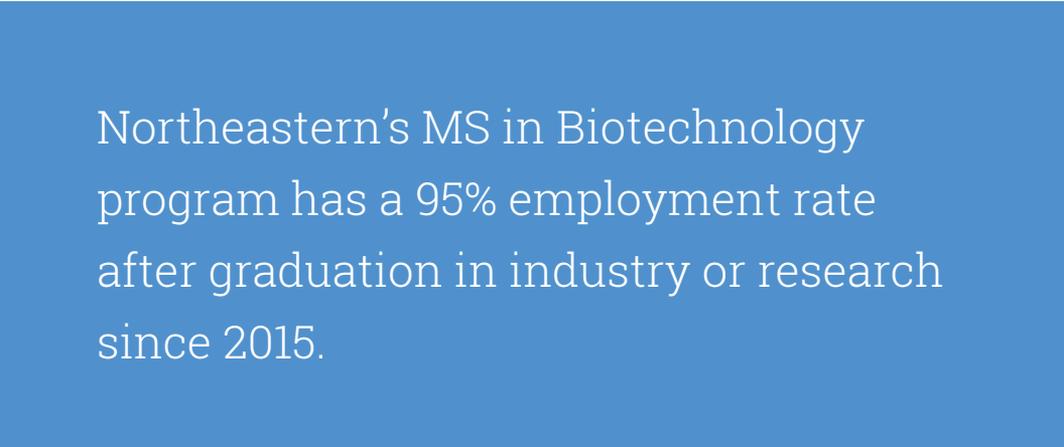
### **Build Your Professional Network**

Auclair says that another key strategy for success in the biotechnology industry is establishing a robust professional network. Although it may seem difficult to find the time, he says, make it a priority to build meaningful connections with those around you, including colleagues, supervisors, advisors, professors, and other industry professionals.

Auclair suggests joining professional organizations and attending local industry events to develop your network, which can also help keep you abreast of the latest trends and developments in the field. Having a strong set of professional contacts can open doors to new opportunities, help you overcome a project roadblock, or help you transition into a new role, whether in industry or academia.



Noting this shift toward well-rounded, networked scientists, programs like [Northeastern's Master of Science in Biotechnology](#) have evolved to provide students with the tools to meet both the scientific and business demands employers are seeking. Northeastern's program combines advanced interdisciplinary training in biology, chemistry, technology, engineering, and pharmaceutical science with professional business skills critical to success in today's dynamic workplace. Incorporating real-world, hands-on training into their coursework, students also gain access to key industry leaders to set them up for career success.



Northeastern's MS in Biotechnology program has a 95% employment rate after graduation in industry or research since 2015.

# An Insider Perspective

Here's advice from industry insiders about how an MS in biotechnology can help advance your career:

“ Stacy Simon, MS Biotechnology '18

Having professors that are working technology professionals is a huge advantage—I gained skills immediately relevant to my job in the biotechnology sector. And the flexible schedule of the MS in Biotechnology program enabled me to gain industry-applicable skills while still working full-time.

“ Dr. Stephen Hatfield, Associate Professor of Biotechnology and Principal Research Scientist at the New England Inflammation and Tissue Protection Institute

Northeastern has established an excellent research community with faculty members that are happy to lend advice, share expertise, and train students to become successful researchers in the lab. Taking advantage of these resources and opportunities is a great way to expand your research interests, expertise, and scientific network.



# Are You Ready to Advance Your Career in the Biotechnology Industry?

To learn more about the Northeastern experience, including the [Master in Biotechnology program](#), visit [northeastern.edu/graduate](https://northeastern.edu/graduate) or [connect with our team](#) to receive personalized advice.

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