

New York City's STEM Ecosystem: Growth, Diversity, and Competitive Advantage

January 2024

Following the 2008 financial crisis and the Great Recession, New York City has diversified its traditional economic base, shifting toward an economy driven by innovations in science and technology. This diversification not only provides new employment opportunities in future-focused sectors, it makes our city more resilient to economic shocks. Though new challenges from the COVID-19 pandemic have emerged, evidence of New York City's evolution over the past decade can be found across the economy. From labor force and talent development to new startups and venture capital, New York City's STEM (Science, Technology, Engineering, and Mathematics) ecosystem continues to flourish.

Report Highlights

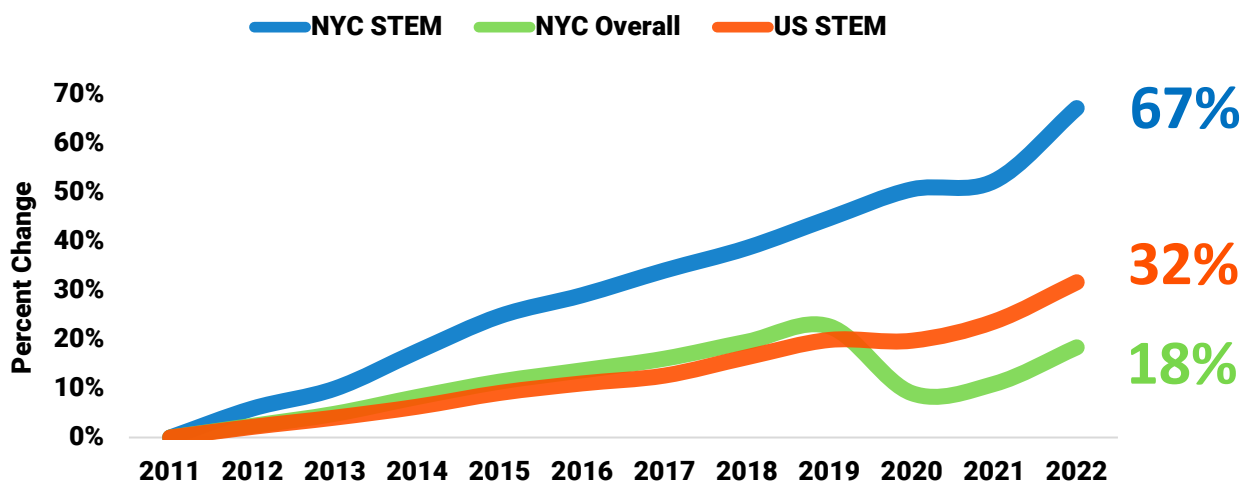
- New York City STEM employment grew by about 130,000 jobs over the past decade, a growth rate of 67%, higher than the overall private-sector growth rate (14%) and the growth rate for STEM employment nationally (32%).
- Nearly all (93%) of the STEM sector job growth in the New York Metro over the past decade occurred within the city limits, and most (84%) occurred in Manhattan, reversing a decades-long trend of suburbanization.
- STEM startups have higher growth potential in jobs and wages, suggesting greater capacity for economic impact. STEM's share of the city's economic output increased from 8% in 2011 to 16% in 2022.
- New York City's talent pipeline is increasingly pursuing STEM education. Growth in STEM degrees has almost entirely driven the overall growth in annual degrees awarded by NYC universities. From 2011-2021, the annual number of STEM degrees awarded in NYC increased by 61%, outpacing the national growth rate of 19%.
- STEM entrepreneurs in New York City are increasingly diverse, with 40% identifying as BIPOC (Black, Indigenous, People of Color). This growth presents an opportunity to diversify the STEM sector more broadly.

Defining STEM

In this analysis, we identify STEM (Science, Technology, Engineering, and Math) sectors using a methodology [originally developed by the US Bureau of Labor Statistics](#). If an industry sector has a high share of STEM occupations—engineers, scientists, and tech workers—we identify it as STEM. These sectors include advanced manufacturing, software development and information technology, engineering, and scientific research and development.ⁱ

STEM Job Growth in New York City Exploded During the Last Decade

Figure One: Relative Change in Total Number of Jobs, 2011 to 2022



Source: NYCEDC analysis of data from QCEW and Lightcast

Jobs and Economic Growth

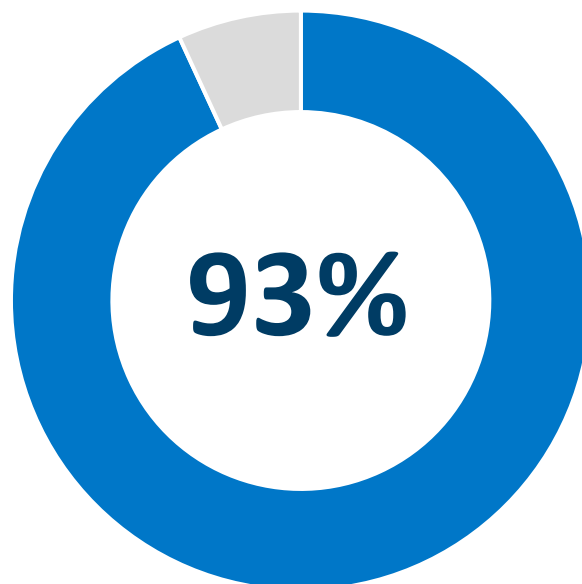
Centered around innovation and technology, the STEM sector has become critical to the growth and health of our local economy. Over the past decade, New York City has experienced rapid growth in not only STEM businesses and employment but also in education, workforce, and talent. More people are earning STEM degrees, working in STEM-related fields, and starting STEM-intensive businesses.

From 2011 to 2022, New York City's STEM employment increased by roughly 130,000 jobs, a growth rate of 67%, much faster than the 18% increase we see in the private sector overall in NYC and faster than the national STEM-sector growth rate of 32% (see Figure One).

Meanwhile, both entrepreneurship and the expansion of existing firms have increased the total number of STEM businesses in the city by about 7,000, or 52%. Much of this growth can be attributed to traditional tech sectors: computer systems design, software publishing,

Regional STEM Job Growth Has Concentrated in NYC

Figure Two: Share of STEM Job Growth in the New York Metro Located in NYC, 2011 to 2022



Source: NYCEDC analysis of data from QCEW and Lightcast

and data processing have added a combined net total of 63,000 jobs and 4,500 businesses in the city since 2011.ⁱⁱ

In the New York Metro, STEM employment grew at a rate of just 26%, lower than the national rate and the rates for many other metro areas across the country.ⁱⁱⁱ However, nearly all (93%) of the regional jobs added over the past decade were within the city limits, and most (84%) were in Manhattan (see Figure Two). STEM sector firms have increasingly chosen to locate in the city over the surrounding counties, a reversal of decades-long suburbanization and a testament to the strong ecosystem of entrepreneurship in New York City.

In the pre-pandemic period from 2017 to 2019, annual formation rates for STEM-sector firms averaged about 7 percentage points higher than overall formation rates in New York City,

showing just how strong startup growth in this sector has been. By the end of 2019, nearly 20% (or one in five) of all STEM-sector firms in the city had started that same year. And, despite a slowdown following the pandemic and into 2021, STEM startups regained momentum in 2022 with at least 1,600 new STEM businesses formed.^{iv}

STEM entrepreneurship is increasingly important to the local economy. Not only do new businesses create new jobs, STEM businesses in particular have higher growth potential and higher economic impacts. The average newly-formed STEM startup in New York City has 6 employees, while all STEM businesses have an average size of 20 employees (a 337% increase). This is higher than the 294% average growth in the private sector between new businesses and all businesses. That suggests that newly formed STEM businesses have the potential for greater employment growth. The average wage for STEM sector businesses also tends to be higher – about \$193,000 in 2022, 65% higher than the private sector overall.^v Both the employment growth potential and higher wages indicate STEM's potential for higher economic impacts beyond the sector's employment and business shares.

We see further evidence of this higher economic impact when looking at gross city product (GCP)—a measure of the city's total economic output. In 2013, output from STEM sectors represented just 8% of GCP. By 2022, that share had increased to 16%, doubling in just 10 years. While the city's economy has annually grown at an average rate of about 2.4% since 2013, roughly in line with the national average, STEM sector growth has averaged 11.0%, nearly tripling in total size.^{vi}

20%

Share of STEM Businesses Started in Past Year, 2019

1,600

New STEM Businesses Started in 2022

STEM Jobs Exist Across Industry Sectors

In this research, we have chosen to focus on sectors rather than occupations to better showcase the STEM economy in New York City. As we noted above, these sectors are defined as industries that have a high share of very technical workers. However, STEM jobs can and do exist across industry sectors. From Finance, to Education, to Entertainment, we have seen an increase in demand for technical skills and technology-driven occupations.

Two clear examples are Software Developers and Computer Programmers, occupations that require a strong understanding of technology but that can exist across industry sectors. **In 2022, more than one-third of Software Developers and Computer Programmer jobs in NYC were in non-STEM sectors, including Finance, Publishing, Government, and Education.**

Source: NYCEDC analysis of data from Lightcast

This impressive growth speaks to just how important these sectors are to New York City: while general job and business growth are critical to a healthy economy, the even stronger growth in total output shows that STEM sectors have outsized importance, especially as we build a resilient, future-focused economy.

Finally, startups headquartered in New York City have raised over \$200 billion in venture capital since 2011, roughly equal to the amounts raised in London, Singapore, and Hong Kong combined.^{vii} Since 2018, investments in New York have concentrated in SaaS (Software as a Service), FinTech (Financial Technology), TMT (Technology, Media, and Telecom), and Artificial Intelligence. Compared to the rest of the United States, New York has shown a competitive advantage in some legacy sectors (Fashion, Finance, Real Estate, Marketing, and Advertising) as startups in these industries push toward innovation. Even in sectors that are not traditionally considered part of STEM, innovation and technology are shaping the growth and investment.

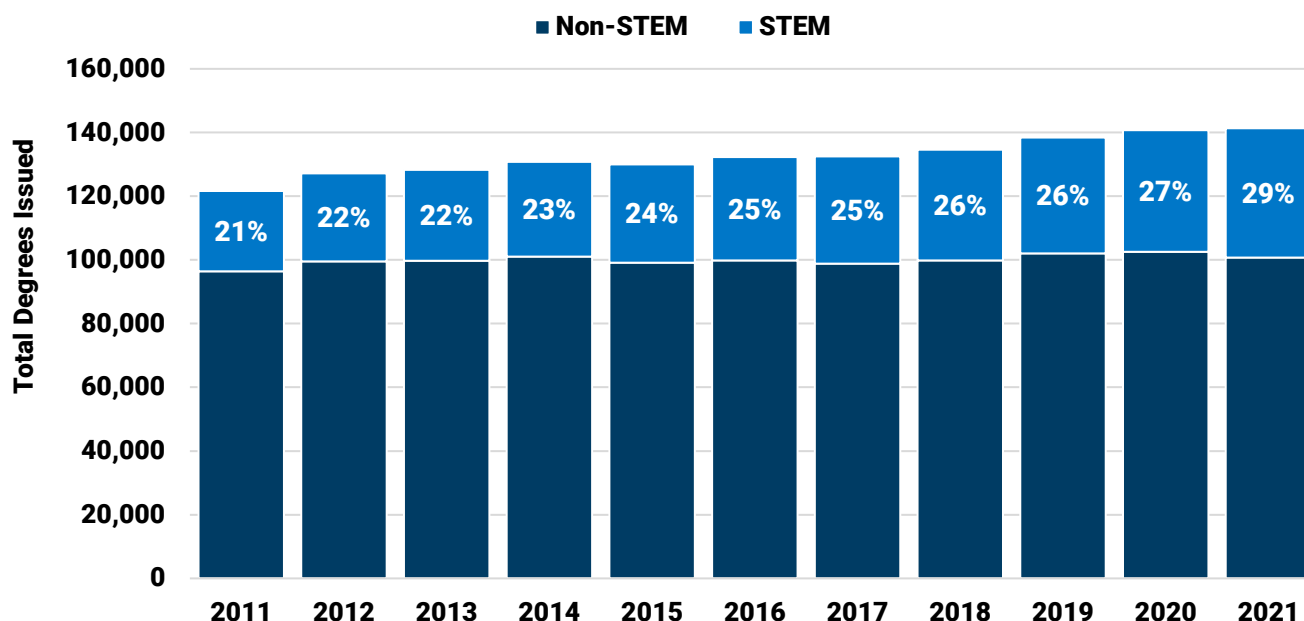
Combined, these trends of growth tell a story about the city's economy, about its transition toward sectors that rely on innovation and technology. And while this transition is occurring throughout the global economy, it is particularly evident in New York, where the shift toward STEM sector employment is occurring at a faster pace than we see nationally and where venture capital investments outpace many other international cities.

NYC's STEM Workforce

As New York City's jobs, businesses, and economic output have increasingly turned toward STEM, so too has the city's workforce and talent pipeline. Overall, there are approximately 467,000 residents over the age of 25 that have a bachelor's degree or higher in a STEM field.^{viii} That number has increased from 359,000 since 2014 (27% increase) and currently represents about 8% of the 25 and older population and 19% of the 25 and older population with a bachelor's degree or higher.

STEM Degree Propel Growth in Total Degrees Issued since 2011

Figure Three: Total Degrees Issued by NYC Institutions, STEM and Non-STEM, 2011 to 2021



Source: NYCEDC analysis of data from NCES and Lightcast
 Degree refers to undergraduate and graduate degree programs. STEM is defined as degrees in Computer and Information Science (11), Engineering (14 and 15), Biological and Biomedical Sciences (26), Mathematics and Statistics (27), Physical Sciences (40), Science Technologies (41), and Health Professions (51).

Nationally, we see very similar estimates: STEM degree holders make up 8% of the 25 and older population and 24% of all bachelor's degree holders over 25. The total number of STEM degree holders who are 25 or above has grown by 28% since 2014.

In turn, nearly all growth in New York City's degree production over the past decade has been in STEM (see Figure Three). From 2011-2021, the annual number of STEM degrees awarded in NYC increased by 61%, outpacing the national growth rate of 19%. While New York City had a slightly lower share of STEM degrees than the national rate in 2021 (29% vs. 33%), the share of STEM degrees has increased more quickly in NYC than nationally (+8% vs. +2%) since 2011.^{ix}

Across all fields of study, computer and information sciences has been the fastest growing degree in NYC, increasing by 6,300 (217%) from 2011 to 2021 – faster than the national rate during that same period (90%). This growth in computer science and technology degrees aligns with the growth in tech jobs New York City has experienced over the past decade. Building a workforce with the skills needed to meet the demands of this increasingly important sector helps to ensure its continued growth.

Demographically, STEM-degree holders in New York City tend to be whiter, be more highly educated, and earn higher wages than their non-STEM counterparts. They are also much more likely to live and work in Manhattan and identify as male. Just 35% identified as women

in 2021. Additionally, about half of STEM educated NYC residents (age 25 and older) are foreign-born, slightly higher than the 47% of 25+ residents overall.

While NYCEDC is charged with fostering growth in the STEM sector overall, much of our emerging sector work is focused on ensuring that employment opportunities are available for all New Yorkers. Our ongoing work continues to ensure that women and BIPOC workers have access to and are encouraged to pursue STEM education and workforce programming.

One avenue to increase representation in STEM is through BIPOC entrepreneurship. As STEM entrepreneurship overall has increased over the past decade in New York City, it has also grown more diverse. The overall share of entrepreneurs that identify as BIPOC jumped from 39% in 2011 to 46% in 2021, while the share for STEM entrepreneurs increased from 26% to 40% over the same period, nearly double the national share of 21% (see Figure

Four). Regionally, about 31% of the STEM entrepreneurs in the New York Metro identify as BIPOC, higher than Seattle (22%) and Boston (15%) and lower than Miami (43%), Los Angeles (38%), and San Francisco (35%).^x

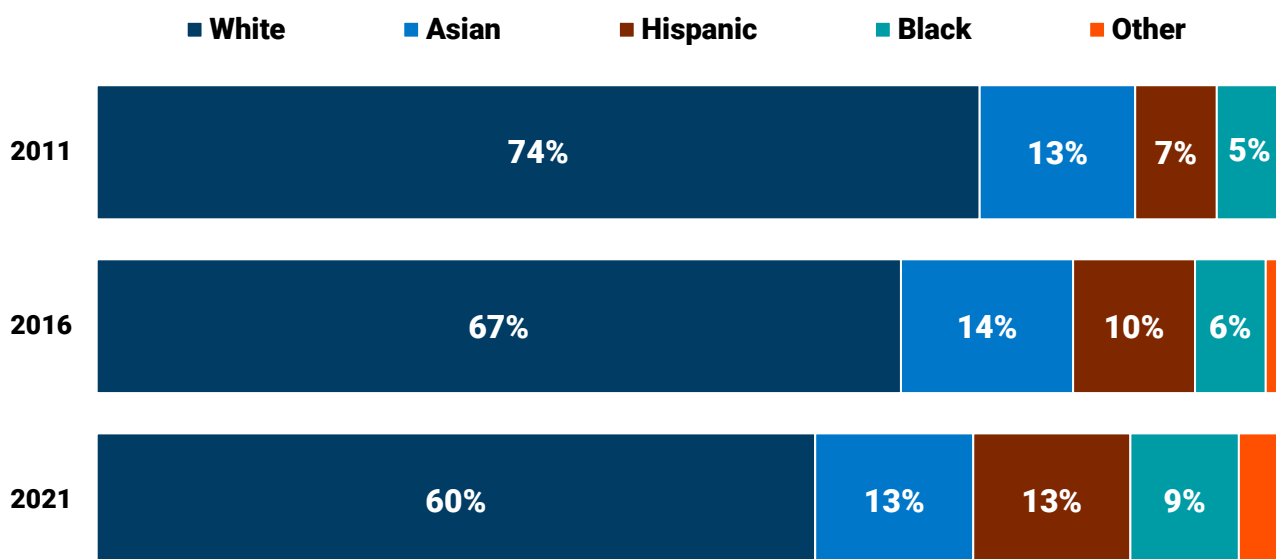
Conclusion

This brief analysis has shown that STEM is increasingly important to New York City. By strategically growing these sectors, both in terms of jobs and a talent pipeline, we are diversifying our city's economy and making it more resilient against future economic shocks.

Growth in these sectors has the potential to create high quality jobs, but there is still work to be done to make sure that career opportunities in STEM are accessible to all New York City residents. **To learn more about how NYCEDC is working to grow a stronger and more inclusive economy, visit us at edc.nyc.**

STEM Entrepreneurship in NYC Has Diversified Rapidly Over the Past Decade

Figure Four: NYC STEM Entrepreneurs by Race and Ethnicity



Source: NYCEDC analysis of data from ACS microdata

About NYCEDC

New York City Economic Development Corporation is a mission-driven, nonprofit organization that works for a vibrant, inclusive, and globally competitive economy for all New Yorkers. We take a comprehensive approach, through four main strategies: strengthen confidence in NYC as a great place to do business; grow innovative sectors, with a focus on equity; build neighborhoods as places to live, learn, work, and play; and deliver sustainable infrastructure for communities and the city's future economy.

For more economic data, insights, and analysis from NYCEDC's Economic Research & Policy group, and to receive economic reports via email, visit edc.nyc/insights.

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ⁱ We excluded NAICS 55 Management of Companies and Enterprises from the BLS definition because our analysis with QCEW data shows that most of the management companies in NYC are in fashion, finance, entertainment, and social services.

ⁱⁱ Total employment and business figures are from analysis of data from QCEW and Lightcast.

ⁱⁱⁱ Based on analysis of data from QCEW and Lightcast. Metro areas with higher growth rates include Boston (+35%), San Francisco (+83%), San Jose (+48%), and Seattle (+39%).

^{iv} New business formation analysis is from analysis of QCEW microdata provided by NYSDOL.

^v Wage and average employment figures are based on analysis of QCEW microdata from NYSDOL.

^{vi} GCP figures are from analysis of data from Moody's.

^{vii} Based on investment data from Pitchbook.

^{viii} Characteristics of the STEM-educated population in New York City and nationally are based on analysis of ACS microdata.

^{ix} Figures about degrees awarded are based on analysis from the National Center for Education Statistics and Lightcast.

^x Demographic characteristics of STEM entrepreneurs is based on analysis of ACS microdata.