Canada's Talent Advantage: PhD graduates in increasing demand from industry


LABS
Detector Card
THORLABS

U of T: a hub of highly skilled talent

The University of Toronto is Canada's primary engine of advanced talent creation.

With approximately 1,000 PhD graduates every year, U of T trains one in seven of the country's doctoral degree holders. These graduates power the country's research and teaching enterprise. A growing share of the university's PhD alumni are working in the private sector, in industries such as life sciences, artificial intelligence, fintech and computing, according to a new analysis of their career outcomes completed by the university's School of Graduate Studies. The highly qualified personnel (HQP) graduating from U of T play an important role in solving the country's economic challenges.

This report identifies the industries in which U of T's PhD graduates are working, and summarizes the career outcomes of 16,014 PhD students who graduated between 2000 and 2021. The analysis finds that graduates' skills are in high demand in knowledge-intensive economic sectors. **It adds to evidence that Canadian companies are increasingly leveraging the advanced skills and competencies of PhD grads to drive economic success.**[1] Investment in talent with specialized knowledge is a critical element in raising productivity, as noted in Canada's 2017 Fundamental Science Review. Indeed, with almost 43 per cent of all science and technology graduates now working in the private sector, the career outcomes of PhD grads in Canada are comparable to those of **peers in the United States, where 47 per cent work in industry**.

The Career Outcomes study demonstrates that investments in training young researchers—as recently announced in the 2024 federal budget—will yield economic gains. Currently, only 1.1 per cent of Canadians have a PhD degree. With continued and sustained support, this number can rise to meet the need for workers from the most dynamic sectors of the economy.

In addition, targeted support for programs that commercialize research, and train talent for field-specific workplaces, will assist new employees to be successful faster. Indeed, one of the goals of the University of Toronto's Career Outcomes study is to share PhDs' employment trends with the university community, and **inform national and international strategies that prepare them for work in academic and non-academic settings**.

1 The definition of advanced skills includes the qualities, skills and competencies PhD graduates have learned during their degrees. These include knowledge, research, analytical and scholarship skills that are transferable and interdisciplinary. For a review of the skills classification scholarship, see https://www.frontiersin.org/articles/10.3389/feduc.2022.1009106/full. For a review of the Council of Graduate Schools' research on defining and identifying skills and competencies, see https://legacy.cgsnet.org/publication-pdf/4923/rticulatingLearningOutcomesinDoctoralEducationWeb.pdf.

Skills in demand: Who is working in the private sector?

4000
U of T PhD grads

27%
of U of T PhD grads who graduated from 2016 to 2021

43%
of U of T PhD grads in engineering, statistics, aerospace, computer science and other physical sciences disciplines

Facing page: *Founded by former University of Toronto postdoctoral physics researcher Christian Weedbrook, Xanadu is one of Canada's fastest growing companies with a valuation of $1B U.S. It is working on building the world's first photonic-based, fault-tolerant quantum computer. Photo Matt Volpe*

Career Outcomes Snapshot

Recent PhD graduates are building careers in Canada's most dynamic industries.

Total PhD graduates from 2000–2021[2]

U of T PhD graduates work across all sectors and industries. While the post-secondary sector is the top employment sector for all PhD alumni, reflecting U of T's leading role in producing teaching and research talent for Canada's academic institutions, the rate of industry employment is rising rapidly. Comparing the cohorts of 2000 to 2015 and 2016 to 2021, nearly 10 per cent more PhDs were employed in the private sector (19 per cent versus 27 per cent in the latter cohort). Life sciences, engineering, trades and transportation, health and information technology are the primary industries employing PhD graduates.

Total Physical Sciences = 4,472 graduates

Physical sciences graduates are the most likely to work in the private sector. These fields include engineering, statistics, aerospace and biomedical engineering. As of 2022, 42.8 per cent of all PhD alumni work in the private sector, with Google, Intel, Royal Bank of Canada, Johnson & Johnson Innovative Medicine, Sanofi, Apple and Microsoft among the largest employers. For the 2016–2021 graduates, 10 per cent more are working in the private sector than earlier cohorts. Alumni include some of the university's most well-known entrepreneurs who have started companies drawing investment capital in artificial intelligence (Cohere), drug discovery (BenchSci), drug development (Phenomic AI), and agriculture (Vive Crop Protection).

Total Life Sciences = 5,508 graduates

The Greater Toronto Area is a global hub for the life sciences industry, employing more than 80,000 professionals and leading research and industry collaborations. Talent graduating from the University of Toronto powers this ecosystem.

As with graduates of physical sciences, an increasing number of life sciences grads are choosing the private sector. As of 2022, more than 25 per cent of graduates are working in the private sector after graduation. Top employers include global sector leaders such as Johnson & Johnson Innovative Medicine, Roche, Sanofi and AstraZeneca, as well as some of the most innovative life sciences startups in the country, including Notch Therapeutics, and BlueRock Therapeutics. Nine per cent more graduates from the 2016–2021 cohort are working in the private sector compared to graduates prior to 2016.

Life sciences alumni are also supporting Canadians' health. The Hospital for Sick Children, University Hospital Network and the Centre for Addiction and Mental Health are among the top employers of U of T life science PhDs.

Total Social Sciences = 3,802 graduates

Among social sciences graduates, the percentage working in the post-secondary sector has remained stable. This group drives research and teaching across the country, with just over half in tenure-track roles. A fifth are in teaching-focused jobs in universities and colleges. As the number of teaching-stream faculty has grown, recent cohorts have been deploying innovative teaching methods such as experiential, community-engaged learning and work-integrated learning.

Still, a small number of the most recent graduates are moving to the private and charitable sector (~2 per cent increase for 2016–2021 grads versus earlier cohorts). A third of this group work in health-related fields, while one in 10 are in management and administration and banking, finance and investment.

Total Humanities = 2,232 graduates

In 2016, just over five per cent of humanities graduates worked in the private sector. In 2022, the proportion rose to approximately nine per cent. As with social sciences graduates, U of T humanities PhDs are teaching at universities in Canada and throughout the world.

At the same time, humanities PhD grads are increasingly working in creative fields outside academic research. Of the 9 per cent working in the private sector, a variety of sectors are represented, including media and publishing (15 per cent), arts and culture (35 per cent), education (10 per cent) and banking and finance (7 per cent).

2 The School of Graduate Studies has four divisions, each of which contain academic units. Humanities includes languages, literature, music, classics, cinema studies, history. Social Sciences includes economics, political science, psychology and sociology. Physical Sciences includes engineering, computer science, statistics and aerospace. Life Sciences includes public health, biochemistry, immunology and medical science. The full list of academic units for each division is available at https://www.sgs.utoronto.ca/about/explore-our-data/career-outcomes/

Figure 1: Career Outcomes for all PhDs in the private sector

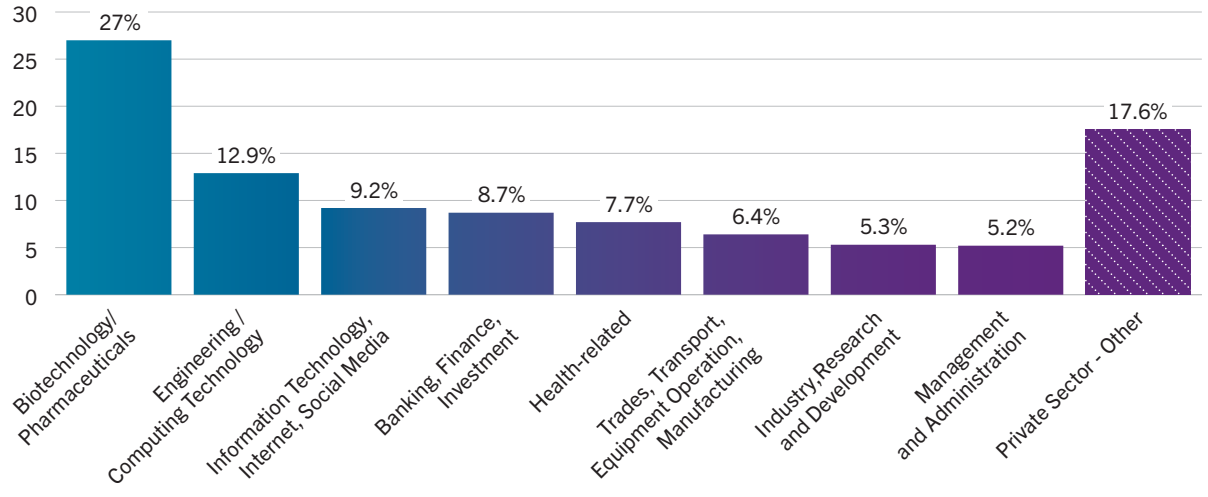


Figure 2: Employment outcomes for graduates in physical sciences from 2000–2015, as of 2016

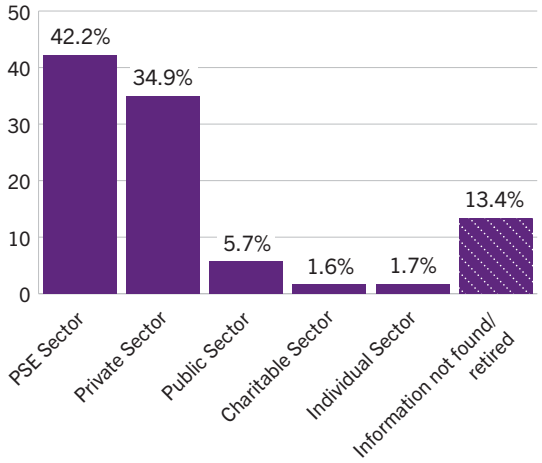


Figure 3: Employment outcomes for graduates in physical sciences from 2016–2021, as of 2022

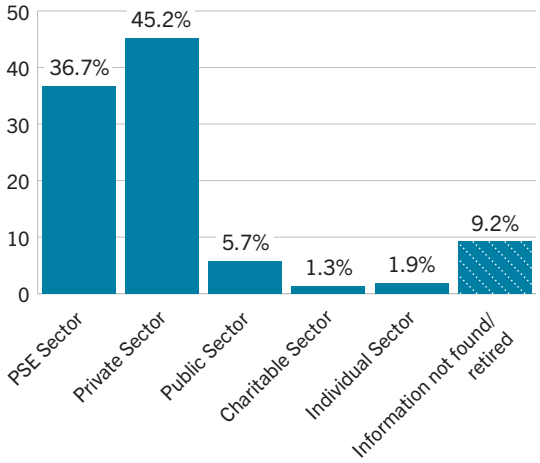


Figure 4: Employment outcomes for graduates in life sciences from 2000–2015, as of 2016

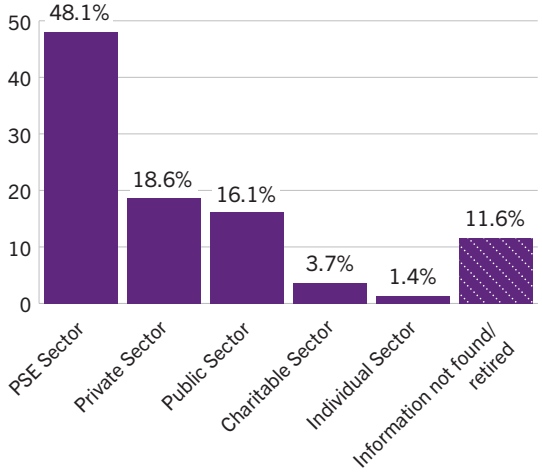
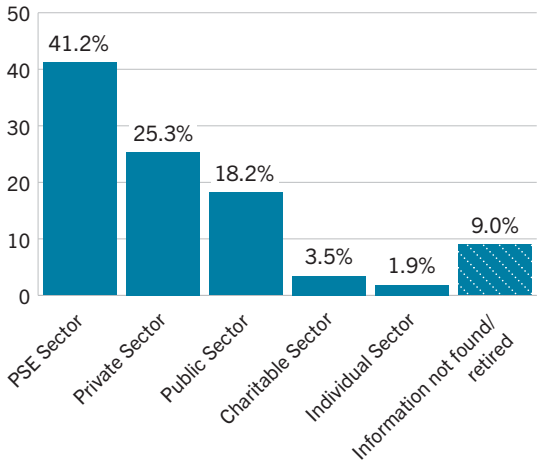


Figure 5: Employment outcomes for graduates in life sciences from 2016–2021, as of 2022



Industry-ready training

Integrating partnerships with industry and communities in academic programs.

Whether it is a career in academia or industry, U of T provides graduate students with unparalleled opportunities to kickstart their future through multiple career training programs and industry partnerships. The School of Graduate Studies' GradHub offers a wide range of resources to support every phase of a graduate student's journey and enrich the experience. In addition, multiple programs are helping doctoral students and graduates translate their academic studies into diverse career possibilities.

University of Toronto Early-Stage Technology (UTEST) program

For advanced researchers and graduate students interested in starting a business, the University of Toronto Early-Stage Technology (UTEST) program provides an intensive entrepreneurial education, access to mentors and investors, and potential funding. The Intellectual Property Education Program offers foundational knowledge needed to grow discoveries into companies. The program, coupled with U of T's 12+ Accelerators and robust entrepreneurship supports, has helped firms like Ardra Inc., BenchSci, HDAX Therapeutics, Vive Crop Protection, Phenomic AI, and Xanadu.

Leveraging industry partnerships for training

The Faculty of Applied Science & Engineering's OPTIONS Program facilitates graduate students and postdoctoral fellows to explore career options, prepare for the world of work, and build their network. UTSC's Work Project Practicum enables select PhD students to participate in a research project in partnership with industry.

Connaught PhDs for Public Impact Fellowship Program

The Connaught PhDs for Public Impact Fellowship Program is creating new pathways for PhD students to communicate their research to the public and policymakers. The program helps participants partner with a school, community organization, or cultural institution to exchange and build knowledge and action.

> "This study shows the important role that U of T plays in Canada's economic and social landscape, by producing graduates who are in high demand from the world's leading companies."
>
> **Joshua Barker, Vice-Provost, Graduate Research and Education, and Dean, School of Graduate Studies**

> "It is crucial that we equip PhD students with the necessary skills, knowledge, and expertise to thrive in long-term careers within the industry. In my research group, this involves engaging them in partnerships with industry leaders and offering opportunities for internships in the private sector."
>
> **Christine Allen, professor, Leslie Dan Faculty of Pharmacy, co-founder and CEO Intrepid Labs**

Investing in emerging top talent

PhD grads are shaping the future economy.

The career trajectories of U of T's PhD graduates demonstrate that their skills are in demand across economic sectors and contribute to gains in growth and productivity.

Investments made in Budget 2024 will further advance education for jobs in the knowledge-based economy. Responding to strong advocacy from graduate students, universities, and research organizations, the budget includes increases to the funding level and number of competitive federally-funded PhD scholarships, the first such increases in two decades. Starting in 2024–25, doctoral student scholarships, awarded through the Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council (NSERC), and Social Sciences and Humanities Research Council (SSHRC), will increase to $40,000. Postdoctoral fellowships will also increase to $70,000. Within five years, funding for the three granting councils will increase by 30 per cent, with $750-million in ongoing support.

This investment was highlighted by Deputy Prime Minister and Minister of Finance Chrystia Freeland: "Our government is securing the future of top-tier research and innovation in Canada by investing in younger generations today. This is about fostering homegrown research talent and encouraging Canadian brainpower to scale-up their innovative ideas in Canada . . . ."

The Careers Outcomes Study also confirms recent data showing that companies are increasingly integrating advanced researchers in the workforce. **Canada's rate of researchers per 1,000 jobs is now higher than the OECD average**, behind only France and Germany among G7 countries. Programs that provide connections between industry and PhD students can further prepare this workforce and drive productivity gains. The University of Toronto has developed multiple programs to enhance students' readiness for jobs outside university research positions, some showcased in this report. Nationally, programs such as the Mitacs Accelerate Fellowship, for example, have been instrumental in showing companies the value PhD graduates bring to the workplace.

The successful integration of advanced researchers into the workforce highlighted by the Careers Outcomes Study underscores that talent creation is one of Canada's strategic advantages. With sustained investment and collaboration among governments, universities and industry, it can continue to be a driver of economic prosperity and security.

Career Outcomes Study: Methodology

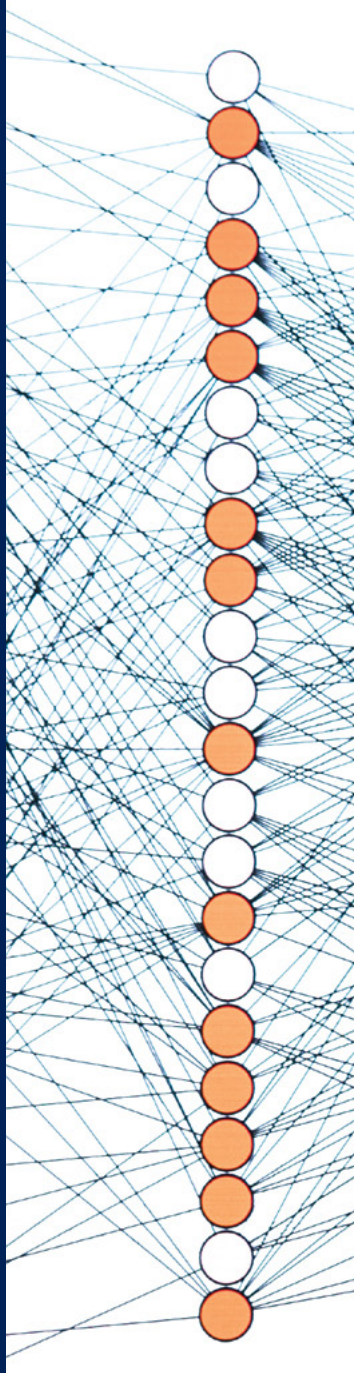
The 2022 Career Outcomes Study, a project led by the School of Graduate Studies, provides a snapshot of employment outcomes for PhD graduates at U of T between 2000–2021, and Postdoctoral Fellows who worked at U of T between 2008–2021. The study used publicly available data from open access sources (e.g., LinkedIn, company websites) to determine employment status. This follows the same methodology as the 10,000 PhDs Project published in 2018. The latest study successfully located 90.1% of PhD graduates in this time period. The study also supports the University of Toronto's commitment as a member of the Coalition for Next Generation Life Science to bring transparency to PhD and postdoctoral training and collect and publish data.

For more information, see the Career Outcomes Dashboard https://uoft.me/arz

Cover Photo: *Professor Deepa Kundur and her research students discuss data analytics research results at the Visualization Facility, a state-of-the-art space at the Myhal Centre for Engineering Innovation & Entrepreneurship. Photo by Matt Volpe*

"The University of Toronto's PhD graduates are contributing to prosperity and productivity as innovators and talented employees. With the excellent training U of T provides, our PhDs are ready for jobs: advancing research, teaching and Canada's future economy."

Leah Cowen
Vice-President, Research and Innovation,
and Strategic Initiatives



For more information, contact:

University of Toronto
Government Relations Office
Simcoe Hall
27 King's College Circle, Room 5
Toronto, Ontario M5S 1A1

t. (416) 946-3067
gro.utoronto.ca

UNIVERSITY OF TORONTO

DEFY GRAVITY