

QIR

Quantum
Index Report
2025

MIT INITIATIVE ON THE DIGITAL ECONOMY

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▶ Interactive website and public data

The Quantum Index Report 2025 is accompanied with interactive tools available on our website (qir.mit.edu) and we share our raw data with the community available to download from our website (qir.mit.edu/data).

In memory of Shawneric Hachey, whose unique talent and dedication shaped the way this project is presented today.



Center for Quantum Networks
A National Science Foundation Engineering Research Center



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7 | Education

The creation of a mature quantum ecosystem depends not only on scientific breakthroughs and unlocking commercial use cases but also on the cultivation of a multidisciplinary workforce equipped to build, navigate, and govern this emergent space. However, the inherently complex nature of quantum phenomena and the reliance on advanced mathematics and physics concepts can pose a perceived barrier to education and training. Despite this there are an increasing range of global initiatives focused on providing training at all levels, from K-12, to postgraduate and professional development.

In the US, the National Q-12 Education Partnership¹ was launched in 2020 as part of the national quantum strategy and aims to increase the capabilities and number of students who are ready to engage in the quantum workforce by developing K-12 level educational materials and providing classroom tools for hands-on experiences.

There are similar examples of quantum education programs targeted at this level in China², and in the EU, through its Quantum Flagship's dedicated initiative to implement quantum topics in high school curricula.³ Industry also showed an interest in filling the formal curricula lag in quantum for high school students. The Coding School, a non-profit, launched an introductory course in quantum technologies targeted at high school students in collaboration with IBM, MIT, and UC Berkeley in 2020.⁴ The Coding School reports that their Introduction to Quantum Computing course was attended by over 18,000 high school students so far, and it continues to be offered in collaboration with Google Quantum AI for its September 2025 iteration.⁵

Many universities internationally offer specialized degrees in quantum technologies, at both undergraduate and graduate levels. These programs often involve interdisciplinary approaches, combining physics, computer science, and engineering to prepare students for careers in quantum research and development.

In this chapter, we present global data on master's degree programs dedicated to quantum technologies. Given the very limited number of offerings of bachelor's degree programs dedicated to quantum technologies, we present enrollment data for bachelor's degrees in the physics, computer science, and engineering fields within the US.

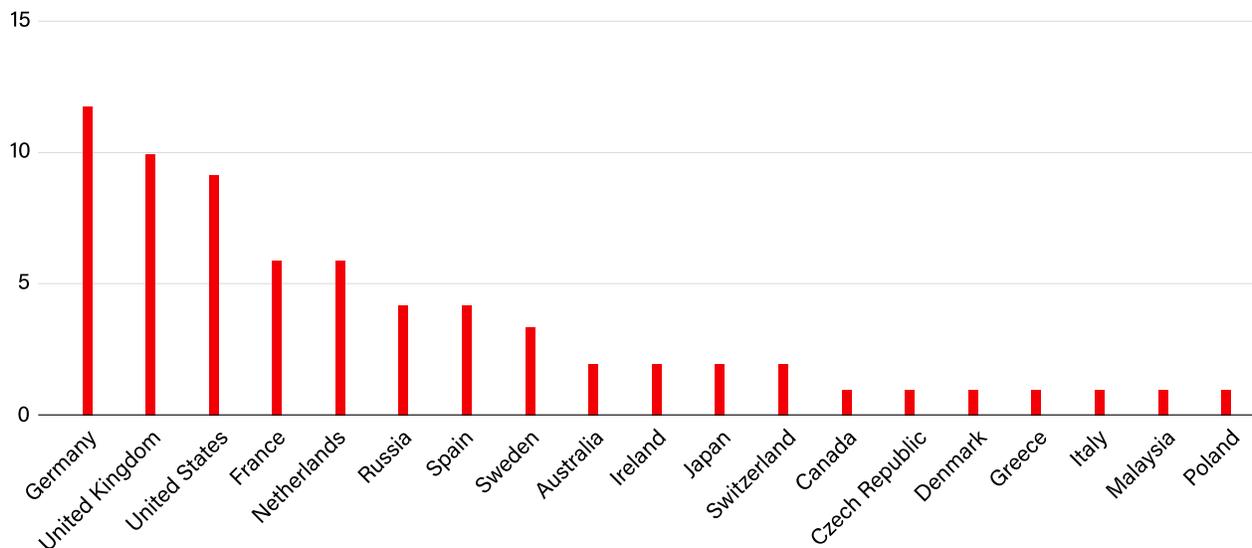
7.1 | Postgraduate education

As the quantum technology industry continues to grow, there may be increasing demand for specialized master's degrees tailored to different sectors. Some institutions have already begun to offer dedicated streams within their programs. This trend towards more specialized training reflects the growing diversity of roles in the quantum sector and the need for education to keep pace with industry demands.

- ▶ Germany is the leading nation in terms of master's degrees in quantum technologies, with 12 programs on offer. The UK follows closely with 10 programs, whereas the United States offers 9. France and the Netherlands are also in the top 5 countries offering master's degrees specifically referring to "quantum" in the degree title.

This distribution suggests that quantum technology is becoming increasingly important globally, with major research hubs like Germany, the United Kingdom, and the United States leading the way. The number of programs also reflects the interdisciplinary nature of quantum technology, which often involves physics, engineering, computer science, and mathematics. This diversity of possible departmental homes within universities is likely contributing to the growth of these programs. As expectations for commercial application breakthroughs in quantum computing continue to rise, we expect to see further expansion in the number of master's programs dedicated to this field globally.

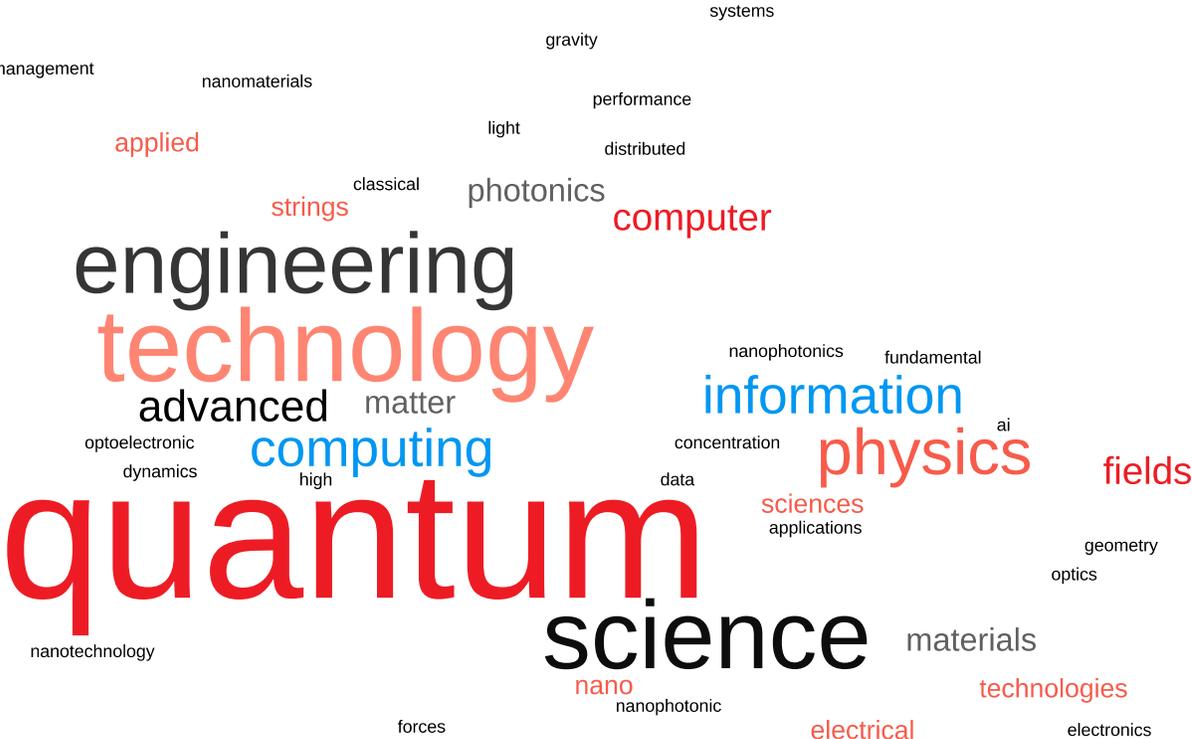
Master degrees with a specific reference to 'quantum' in the degree name



Based on Studyportals data, there are 69 master's degrees distributed across 19 countries with a specific reference to "quantum" in the degree name. Germany stands out as the leader, offering 12 quantum-related master's programs, which accounts for 17.4% of the global total. The United Kingdom follows closely behind with 10 programs (14.5%), while the United States offers 9 programs (13.0%). France and the Netherlands each contribute 6 programs (8.7% each), completing the top five countries.

The distribution pattern reveals strong concentration in European countries and the United States, with Germany, the UK, and the US together accounting for 45% of all quantum master's programs. There is a notable gap between the leading group and the majority of countries, with most offering just a single program. In this list, the Asia-Pacific region shows relatively limited representation: only Japan, Malaysia, and Australia offer programs, each contributing a single quantum-related master's degree to the total count.

The QED-C State of the Global Quantum Industry Report⁶ presented a word cloud of their quantum postgraduate degrees database. The word cloud representing the data used in our report resulted in the following:



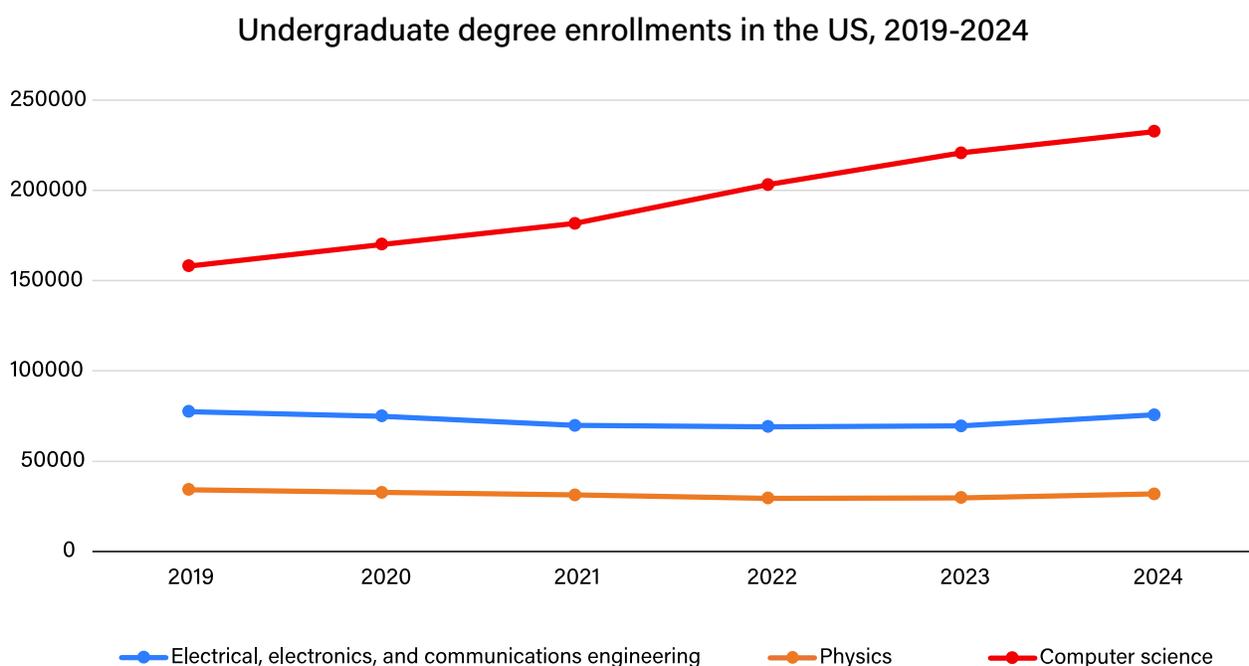
7.2 | Enrollment numbers

The 2021 US Report⁷ “The Role of International Talent in Quantum Information Science” focuses on the future workforce needs of Quantum Information Science and Technology (QIST). The report concludes that the quantum science and technology sector faces a critical talent shortage across all major sectors, including industry, academia, and government. While the National Quantum Initiative aims to develop new workforce talent, there's an immediate need for skilled professionals and uncertainty remains about whether existing programs will sufficiently meet future demands. According to the report, international talent plays a crucial role, with foreign students comprising approximately half of US graduates in quantum-related fields.

The United States has historically benefited from retaining these international scholars, with about 70% of foreign STEM PhD graduates choosing to stay in the country as of 2017. However, developing new quantum expertise is a lengthy process requiring roughly a decade of post-secondary education and training. To address the growing workforce demands, the United States will need to pursue a dual strategy: expanding its domestic talent pipeline while maintaining its ability to attract and retain international expertise.

The report states that “the most QIST-relevant degree fields are physics, electrical engineering, and computer science” and explains that these domains were selected based on two criteria: preliminary search of keywords for online job postings and analysis of doctoral thesis titles, abstracts, and keywords.

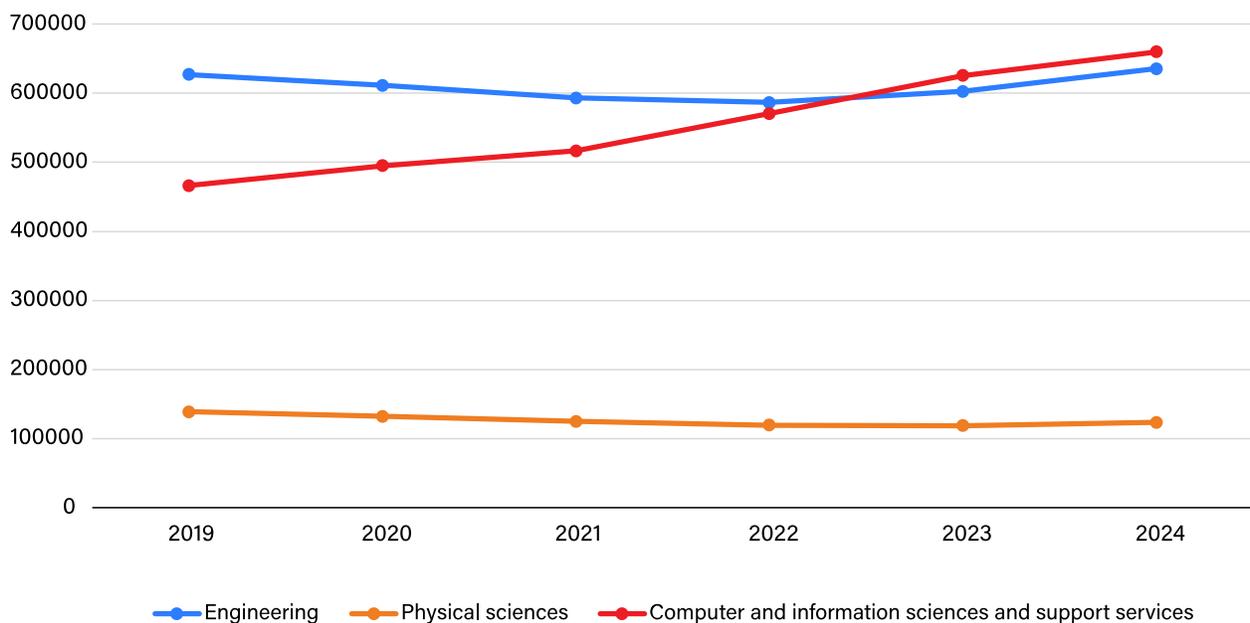
To better understand emerging enrollment trends for physics, electrical engineering, and computer science courses, we analyzed data from the NSC Research Center (January 2025 update).



Based on the enrollment data from 2019 to 2024, computer science exhibits the highest student numbers and substantial growth over the period. The electrical, electronics, and communications engineering program maintains moderate enrollment levels, whereas physics enrollments show the smallest but most consistent enrollment pattern, with a narrower range of 4,811 students between its lowest and highest enrollment figures.

The data categorization involved challenges as the major field groups at times had interconnected degrees such as “Computer and Information Science, general” and “Astronomy and Astrophysics,” which are not included in the subject-level enrollment data. In order to provide a fuller picture, the report also presents the enrollment numbers for the three major field families engineering, physical sciences, and computer and information sciences and support services.

Undergraduate major field family enrollments in the US, 2019-2024



7.3 | Future research

The quantum education landscape is rapidly evolving, but it remains fragmented and under-documented. While anecdotal evidence points to rising interest and enrollment in quantum-related programs, there is a critical need for data on student demographics, institutional investment levels, and career outcomes. Such data is essential for identifying best practices, highlighting gaps in access and equity, and supporting evidence-based policymaking.

We invite contributions from the quantum education community to future editions of this report. The objective is to deepen and expand the insights provided.

Researchers and educators interested in sharing enrollment data, curriculum insights, or information about new programs are encouraged to contact us. We hope that our community-led approach will facilitate a comprehensive global overview of quantum education initiatives and facilitate the development of more effective educational strategies for the field.

You can reach us at contact@qir.mit.edu.

► Footnotes

¹ National Quantum Initiative, 'Enabling People' (National Quantum Initiative) <<https://www.quantum.gov/workforce/>> accessed 24 March 2025.

² SpinQ Press Release, 'Shenzhen Middle School: Building a Quantum Computing Elective Program from the Ground Up' (28 June 2024) <<https://www.spinquanta.com/news-detail/shenzhen-middle-school-building-a-quantum-computing-elective-program-from20250121075716>> accessed 24 March 2025.

³ 'QTEdu- Coordination and Support Action for Quantum Technology Education' (Quantum Flagship) <<https://qt.eu/projects/archive/csa-projects/qtedu>> accessed 24 March 2025.

⁴ 'IBM and Qubit by Qubit Offer Quantum Course | IBM Quantum Computing Blog' <<https://www.ibm.com/quantum/blog/year-three-quantum-coding-school>> accessed 28 March 2025.

⁵ 'QubitxQubit | Course Info' <<https://www.qubitbyqubit.org/course-info>> accessed 28 March 2025.

⁶ QED-C, 'State of the Global Quantum Industry Report' (2025) <<https://quantumconsortium.org/stateofthequantumindustry2025/>> accessed 24 March 2025.

⁷ Subcommittee on Economic and Security Implications of Quantum Science Committee on Homeland and National Security of the National Science & Technology Council, 'The Role of International Talent in Quantum Information Science.'

11 | Appendix

Chapter 6 | Workforce

This data was gathered by Accenture and sourced from Lightcast. Lightcast integrates economic, labor market, demographic, education, profile, and job posting data from dozens of government and private-sector sources, creating a comprehensive and current dataset that includes both published data and detailed estimates with full United States coverage. Further information on Lightcast data sources available [here](#).

The following keywords were used in our Lightcast database searches:

Quantum skills keywords: Quantum Gates, Heteronuclear Single Quantum Coherence Spectroscopy, Heteronuclear Multiple Quantum Coherence, Quantum Link, Quantum Mechanics/Molecular Mechanics (QM/MM), Quantum Point Contact, Quantum Phase Transition, Quantum Dynamics, Quantum Imaging, Quantum Technology, Superconducting Quantum Interference Device (SQUID), Amazon Quantum Ledger Database (QLDB), Quantum Cryptography, Quantum GIS (QGIS), Quantum Scalar Servers, Quantum Chemistry, Quantum Mechanics, Quantum Physics, Quantum Information Sciences, Quantum Computing, Quantum Dots, Quantum Information, Quantum ESPRESSO.

Quantum mentions keywords: quantum computer quantum computing quantum supremacy quantum entanglement quantum superposition quantum bit qubit topological qubit silicon spin qubit quantum advantage quantum simulation quantum machine learning quantum optimization quantum chemistry optical quantum computing gate model quantum computing photonic quantum computer quantum dots superconducting quantum computer trapped ion quantum computer quantum annealing quantum as a service quantum cloud post-quantum cryptography PQC quantum algorithm Shor's algorithm Grover's algorithm quantum encryption quantum research quantum use case

Chapter 7 | Education

The education data represented in the “Postgraduate Education” section was collected from the StudyPortals resource and presents the master’s degree programs that make a specific reference to “quantum” in the degree name found in the named resource.

Education enrollment data was collected from the publicly available data set “Current Term Enrollment Estimates” with the January 2025 updates of the NSC Research Center. The NSC states in their methodology for compiling the relevant dataset that the data is based on administrative data directly derived from college and university registrars. NSC declares that since the fall of 2021, “institutions actively submitting enrollment data to the Clearinghouse account for 97 percent of all enrollments at Title IV, degree-granting institutions in the US.”

The 2021 US Report “The Role of International Talent in Quantum Information Science” states that “the most QIST-relevant degree fields are physics, electrical engineering, and computer science” and explains that these domains were selected based on two criteria:



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