

National Foundation for American Policy

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Contact: Stuart Anderson, 703-351-5042, press@nfap.com

New Research: International Students Remain a Key Source of Talent in America; Have Declined in Key Fields

At Many U.S. Universities, It Would be Difficult to Maintain Important Graduate Programs Without International Students

Arlington, Va. – International students are a significant source of talent for U.S. employers and allow U.S. universities to offer high-quality academic programs in science and engineering for American students, according to a [new analysis](#) by the National Foundation for American Policy (NFAP), a nonpartisan policy research organization. Without international students the number of students in America pursuing graduate degrees (master's and Ph.D.'s) in fields such as computer and information sciences and electrical engineering would be small relative to the size of the U.S. economy. In 2019, at U.S. universities, there were only 9,083 full-time U.S. graduate students in electrical engineering, compared to 26,343 full-time international students. Similarly, in computer and information sciences, in 2019, there were only 17,334 full-time U.S. graduate students compared to 44,786 international graduate students at U.S. universities.¹ This report updates an October 2017 [study](#).

The study, "International Students in Science and Engineering," can be found at <https://nfap.com/>.

Among the key findings of the research:

- The number of full-time international students enrolled in graduate-level electrical engineering at U.S. universities dropped 19.5% between 2015 and 2019. The number of full-time international students enrolled in graduate-level computer and information sciences at U.S. universities declined 9.5% between 2016 and 2019. This decline in international graduate students was before the new restrictions imposed on Chinese students and the impact of Covid-19. A continuation of this trend would present serious issues for U.S. employers and universities.
- At U.S. universities, foreign nationals account for 82% of the full-time graduate students in petroleum engineering, 74% in electrical engineering, 72% in computer and information sciences, 71% in industrial and manufacturing engineering, 70% in statistics, 67% in economics, 61% in civil engineering, 58% in mechanical engineering and agricultural economics, 56% in mathematics, 54% in chemical engineering, 53% in metallurgical and materials engineering, 52% in materials sciences and 50% in pharmaceutical sciences.
- At many U.S. universities, the data show it would be difficult to maintain important graduate programs without international students. In electrical engineering, the majority of full-time graduate students (master's and Ph.D.'s) are international students at 88% of the U.S. graduate school programs with at least 30 students, or 149 U.S. universities total. In computer and information sciences, the majority of full-time graduate students

¹ Note the designation computer and information sciences includes what in the past was referred to only as computer sciences or computer sciences.

are international students at 211 universities, representing 78% of the U.S. graduate school programs with at least 30 students.

- Over the past two decades, foreign-born scientists and engineers have played a critical role in filling the demand for high-level technical talent in the United States. Between 1998 and 2019, the annual number of full-time international graduate students in computer and information sciences *increased by 310%*, from 10,930 in 1998 to 44,786 in 2019. In comparison, over the same period, the annual number of full-time U.S. graduate students in computer and information sciences increased by 91%, from 9,042 in 1998 to 17,334 in 2019.
- A May 2020 Trump administration presidential proclamation (PP10043), continued by the Biden administration, contains overly broad criteria and is blocking visas for Chinese graduate students based on the universities they attended in China, not based on the individual risk of the students. After the resumption of consular activities in China, U.S. universities reported denials of J-1 visas for Chinese scholars and new and F-1 visas for graduate students in science and engineering. The implications of the denials have alarmed analysts and universities, given the significant role Chinese graduate students and scholars play in key technical fields in the United States.
- The policy is likely to block at least 3,000 to 5,000 Chinese graduate students a year. The policy is costly to the United States. Every 1,000 Ph.D. students blocked in a year from U.S. universities costs an estimated \$210 billion in the expected value of patents produced at universities over 10 years and nearly \$1 billion in lost tuition over a decade, according to an analysis from the National Foundation for American Policy. Other economic costs include the loss of highly productive scientists and engineers prevented from working in the U.S. economy or patents and innovations produced outside university settings.
- The annual number of full-time U.S. graduate students in electrical engineering increased by only 12% over the past 21 years, from 8,139 in 1998 to 9,083 in 2019. Over the same period, the annual number of full-time international graduate students in electrical engineering *increased by 130%*, from 11,469 in 1998 to 26,343 in 2019.
- The increase in both the size and number of graduate programs in science and engineering at U.S. universities indicates U.S. student enrollment has not been held down by the lack of available slots at U.S. graduate schools. Research by economist Kevin Shih found, "At the graduate level, international students do not crowd-out, but actually increase domestic enrollment."²
- In electrical engineering, international students account for 83% of the full-time graduate students at Auburn University, 81% at Duke University, 61% at the University of Kentucky, 88% at Texas A&M, 88% at SMU and 73% at the University of Texas at Austin.
- In computer and information sciences, international students account for 80% of the full-time graduate students at Rice University, 63% at Texas Tech, 67% at UCLA, 76% at North Carolina State, 70% at LSU, 77% at George Mason University, 61% at Vanderbilt, 56% at West Virginia University and 72% at Virginia Tech.
- A high level of international students allows U.S. universities to attract and retain faculty. "If we were not to place such a heavy emphasis on research, we wouldn't be able to get

² Kevin Shih, *Do International Students Crowd Out or Cross-Subsidize Americans in Higher Education?* September 25, 2017.

faculty that teach the wide range of things we do, with the appropriate expertise, so our educational mission would suffer,” said Professor Christopher Raphael, who heads the Music Informatics program in the School of Informatics, Computing, and Engineering at Indiana University.

- “To get tenure and perform research, professors require a significant number of graduate students and there are not enough domestic students alone in certain fields,” said Stuart Cooper, a professor of chemical and biomolecular engineering at Ohio State University.
- Postdocs assist in critical research at U.S. universities after completing their doctorate. Fifty-six percent of postdocs at U.S. universities are foreign nationals who work on temporary visas, including 73% in electrical engineering (954 postdocs in 2019), 72% in metallurgical and materials engineering, 69% in mechanical engineering, 68% in chemical engineering, 66% in oncology and cancer research (1,202 postdocs), 66% in physics (1,785 postdocs), 64% in computer and information sciences, 63% in chemistry, 53% in neurobiology and neuroscience (1,179 postdocs) and 49% (1,951 postdocs) in clinical medicine.

Maintaining a welcoming policy on international students is essential to preserving America's role as a center of technological innovation. Such a policy means reasonable visa policies for international students and making it easier for students to work after graduation, including preserving STEM OPT (Optional Practical Training) and improved policies on H-1B visas, per-country limits and employment-based green cards. Today, the global competition for international students and talented scientists and engineers is intense. Recent U.S. efforts to block many Chinese graduate students from U.S. universities might deal a significant blow to future innovation and scientific research in America.

About the National Foundation for American Policy

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2111 Wilson Blvd., Suite 700, Arlington, VA 22201
phone: (703) 351-5042 fax: (703) 351-9292 www.nfap.com