NATIONAL FOUNDATION FOR AMERICAN POLICY

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INTERNATIONAL STUDENTS IN SCIENCE AND ENGINEERING

EXECUTIVE SUMMARY

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. 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.

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

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

- 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]

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

- 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 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.

INTERNATIONAL STUDENTS: A KEY SOURCE OF TALENT AND INNOVATION

At U.S. universities, international students account for 82% of the full-time graduate students in petroleum engineering, 74% in electrical engineering and 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 and applied mathematics, 54% in chemical engineering, 53% in metallurgical and materials engineering, 52% in materials sciences and pharmaceutical sciences.[3] (Data for 2019.) The field computer and information sciences includes what a few years earlier encompassed computer sciences.

Table 1
Full-time Graduate Students and the Percent of International Students by Field (2019)

Field	Percent of International Students	Number of Full-time Graduate Students – International Students	Number of Full-time Graduate Students – U.S. Students
Petroleum Engineering	82%	803	181
Electrical Engineering	74%	26,343	9,083
Computer and Information Sciences	72%	44,786	17,334
Industrial and Manufact. Engineering	71%	6,554	2,632
Statistics	70%	5,497	2,406
Economics	67%	8,023	4,049
Civil Engineering	61%	8,775	5,527
Mechanical Engineering	58%	11,215	8,130
Agricultural Economics	58%	766	564
Mathematics and Applied Math	56%	9,902	7,876
Chemical Engineering	54%	4,590	3,975
Metallurgical/Materials Engineering	53%	2,981	2,671
Materials Sciences	52%	713	660
Pharmaceutical Sciences	50%	1,790	1,827

Source: National Science Foundation Survey of Graduate Students and Postdoctorates in Science and Engineering, Public Use Microdata files, National Foundation for American Policy. U.S. students include lawful permanent residents.

[3] National Science Foundation Survey of Graduate Students and Postdoctorates in Science and Engineering, Public Use Microdata files, National Foundation for American Policy. Data for 2019.

INCREASING IMPORTANCE OF INTERNATIONAL STUDENTS IN STEM FIELDS

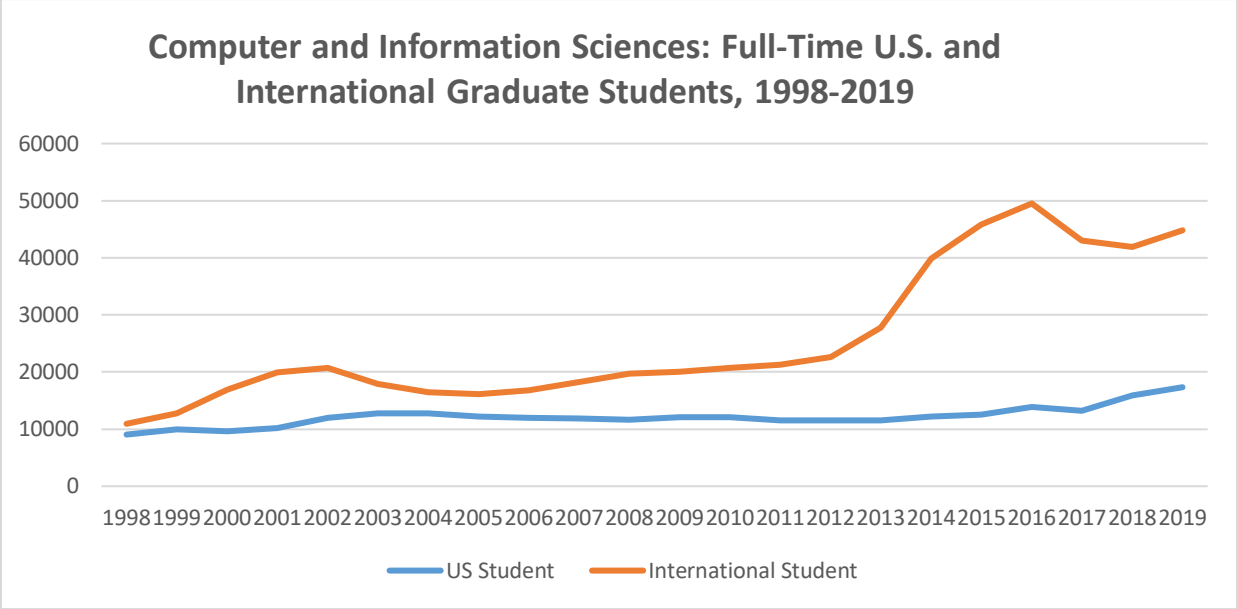
Over the past two decades, have helped fill the demand for high-level technical talent in the United States. Between 1998 and 2019, the annual number of full-time international graduate students in computer and information sciences *increased by 310%*, from 10,930 in 1998 to 44,786 in 2019. In comparison, 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.

Table 2
Computer and Information Sciences: Full-time Graduate Students: 1998 to 2019

Year	U.S. Students	International Students	Percent International Students
1998	9,042	10,930	54.7%
1999	9,939	12,748	56.2%
2000	9,630	16,928	63.7%
2001	10,164	19,923	66.2%
2002	11,919	20,660	63.4%
2003	12,744	17,964	58.5%
2004	12,719	16,443	56.4%
2005	12,226	16,091	56.8%
2006	11,959	16,801	58.4%
2007	11,814	18,268	60.7%
2008	11,684	19,654	62.7%
2009	12,113	20,085	62.4%
2010	12,072	20,710	63.2%
2011	11,579	21,282	64.8%
2012	11,534	22,574	66.2%
2013	11,481	27,787	70.8%
2014	12,232	39,837	76.5%
2015	12,539	45,790	78.5%
2016	13,854	49,507	78.1%
2017	13,224	42,982	76.5%
2018	15,904	41,885	72.5%
2019	17,334	44,786	72.1%

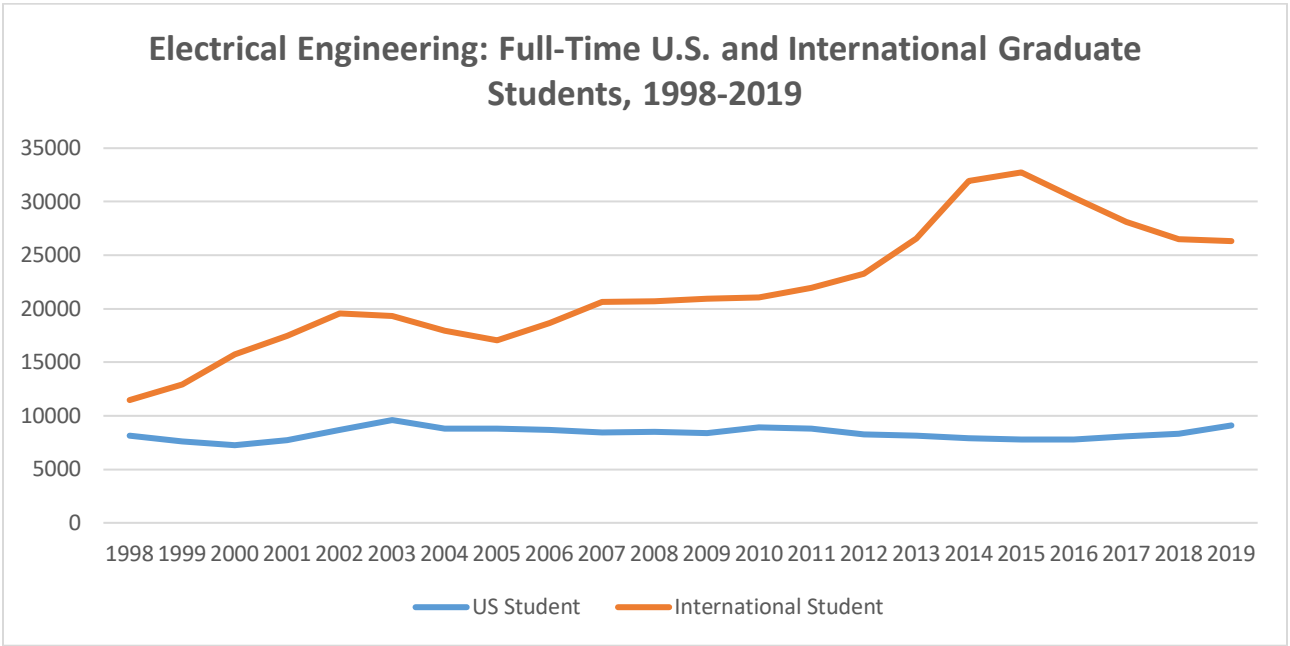
Source: National Science Foundation, Survey of Graduate Students and Postdoctorates,
National Foundation for American Policy calculations. U.S. students include lawful permanent residents.

Figure 1



Source: National Science Foundation, Survey of Graduate Students and Postdoctorates, National Foundation for American Policy calculations. U.S. students include lawful permanent residents.

Figure 2



Source: National Science Foundation, Survey of Graduate Students and Postdoctorates, National Foundation for American Policy calculations. U.S. students include lawful permanent residents.

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.

Table 3
Electrical Engineering: Full-time Graduate Students: 1998 to 2019

Year	U.S. Students	International Students	Percent International Students
1998	8,139	11,469	58.5%
1999	7,595	12,926	63.0%
2000	7,253	15,709	68.4%
2001	7,750	17,490	69.3%
2002	8,654	19,586	69.4%
2003	9,601	19,328	66.8%
2004	8,792	17,940	67.1%
2005	8,790	17,059	66.0%
2006	8,696	18,683	68.2%
2007	8,448	20,628	70.9%
2008	8,486	20,726	71.0%
2009	8,362	20,920	71.4%
2010	8,904	21,073	70.3%
2011	8,802	21,933	71.4%
2012	8,278	23,248	73.7%
2013	8,130	26,530	76.5%
2014	7,925	31,943	80.1%
2015	7,783	32,736	80.8%
2016	7,758	30,400	79.7%
2017	8,108	28,096	77.6%
2018	8,338	26,476	76.0%
2019	9,083	26,343	74.4%

Source: National Science Foundation, Survey of Graduate Students and Postdoctorates, National Foundation for American Policy calculations. U.S. students include lawful permanent residents. This includes full-time graduate students in electrical, electronic and communications engineering.

INTERNATIONAL STUDENTS KEEP TECH STUDIES AVAILABLE FOR U.S. STUDENTS AND HELP RETAIN TOP FACULTY

At many U.S. universities, 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 are international students at 211 universities, representing 78% of the U.S. graduate school programs with at least 30 students.[4] The story is similar in other fields. In mechanical engineering, the majority of full-time graduate students are international students at 101 universities, representing 67% of the U.S. graduate school programs with at least 30 students.[5] The story is similar in other fields.

Table 4
U.S. University Graduate Programs with a Majority of International Students (2019)

Field	Number of U.S. Universities with More Than 50 Percent International Students in Graduate School Program (2019)	Percentage of U.S. Universities with a Majority of International Students in Graduate School Program (2019)
Electrical (and Electronics and Commercial) Engineering	149	88%
Industrial/Manufact. Engineering	65	86%
Economics	86	80%
Statistics	60	79%
Computer and Information Sciences	211	78%
Civil Engineering	93	76%
Mechanical Engineering	101	67%
Metallurgical and Materials Eng.	36	63%
Pharmaceutical Sciences	29	63%
Chemical Engineering	55	61%
Mathematics/Applied Math.	83	54%

Source: National Science Foundation, Survey of Graduate Students and Postdoctorates, National Foundation for American Policy calculations. U.S. students include lawful permanent residents. Note: analysis limited to programs with at least 30 full-time students.

The high level of international students plays a role in universities being able to attract and retain faculty, which benefits U.S. students. "If we were not to place such a heavy emphasis on research, we wouldn't be able to get

[4] Ibid.
[5] Ibid.

faculty that teach the wide range of things we do, with the appropriate expertise, so our educational mission would suffer," said Professor Christopher Raphael, chair of the computer science department at Indiana University. "Really the most important part of the educational experience is to work closely with high quality faculty, as one does directly at the Ph.D. stage. So the research and the education are of a piece." [6]

"We are a research university, and in computer science that means that much of the research is done by teams led by professors with experiments carried out by graduate students," explains Professor Christopher Raphael, who heads the Music Informatics program in the School of Informatics, Computing, and Engineering at Indiana University. "This model only works if we can get high-quality Ph.D. students and we would be hard pressed to get the number we need solely from the United States."[7]

A look at well-known universities in different parts of the country illustrates how critical international students are to maintaining graduate-level programs in computer science, electrical engineering and other fields. At Indiana University, approximately 329 of the 450 full-time graduate students in computer and information sciences, or 73%, are international students. One can see a similar pattern at other schools in the Midwest. The proportion of international students in computer and information sciences graduate programs is 73% at Purdue, 61% at Michigan State and 73% at Iowa State. At Carnegie Mellon University in Pittsburgh, 78%, or 1,444 of the approximately 1,850 full-time graduate students in computer and information sciences are international students, while 79% of the full-time graduate students at Carnegie Mellon in electrical engineering are international students.[8]

Stuart Cooper, a professor of chemical and biomolecular engineering at Ohio State University, also points to the connection between research and teaching at U.S. colleges. "There is a synergy. 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 Professor Cooper. "The advances made by professors and graduate students, including international students and post-docs, provide new knowledge and benefits society."[9]

Without the ability to perform high-level research at U.S. universities, many talented individuals would not take or seek faculty positions, leaving U.S. schools far weaker and unable to educate U.S. students in important fields. Graduate students also directly support the educational mission for undergraduates by serving as teaching

[6] Interview, via email with, Christopher Raphael. See Stuart Anderson, *The Importance of International Students to America*, NFAP Policy Brief, National Foundation for American Policy, July 2013.
[7] Ibid.
[8] National Science Foundation, Survey of Graduate Students and Postdoctorates, NFAP calculations. Data for other universities in this report are derived from the same source.
[9] Interview with Stuart Cooper. Stuart Anderson, *The Importance of International Students to America.*

assistants. Their duties include conducting study sessions and grading, which "takes some of the burden off the faculty" to focus on teaching, according to Professor Cooper.[10]

International students at the graduate level are key to supporting research at many U.S. universities. 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.

PROCLAMATION BLOCKS CHINESE GRADUATE STUDENTS

In May 2020, the Trump administration issued presidential proclamation 10043 (PP10043) on the "Suspension of Entry as Nonimmigrants of Certain Students and Researchers from the People's Republic of China." The proclamation resulted in the State Department revoking many existing visas and denying other visas. 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.[11]

The policy is likely to block at least 3,000 to 5,000 Chinese graduate students a year, according to the Center for Security and Emerging Technology at Georgetown University. This estimate may be low, depending how strictly the visa policy is enforced, and does not include individuals who choose to study in other countries in reaction to the proclamation.

For every 1,000 entering doctoral students blocked annually for 10 years, implies lost tuition for United States graduate programs of nearly $1 billion using the National Center for Education Statistics average for 2018.[12] This assumes average completion rate of doctoral students at Stanford (83%) and the average time to degree for doctoral students reported by the National Science Foundation (5.8 years), implying around 50,000 fewer years of

[10] Ibid.
[11] See Stuart Anderson, "Biden Keeps Costly Trump Visa Policy Denying Chinese Grad Students," *Forbes*, August 10, 2021.
[12] NCES estimated an average graduate tuition of $19,314 in 2018. https://nces.ed.gov/programs/digest/d19/tables/xls/tabn330.50.xls. When multiplied by the estimated lost enrollment of 49,840 this suggests $962.6 million in lost tuition.

attendance in U.S. graduate programs.[13] Most foreign students are not eligible for financial aid program and pay full tuition rates. Rather than displace U.S. students, foreign students provide crucial support for the survival of many graduate program, actually increase the educational options for Americans seeking graduate training.[14] When Ph.D. students earn tuition waivers in return for their labor as research assistants it is beneficial to both the student, who gains practical experience, and for universities and research funders.

The cost to the United States of losing the contributions of these graduate students to research is likely to dwarf lost tuition. While the economic gains to research are widely spread through the whole economy, one concrete measure is patenting by universities. AUTM (formerly known as the Association of University Technology Managers) estimates that the more than 117,000 patents issued since 1996 are associated with an additional $865 billion in GDP—an average of $7.4 million per patent.[15] A 2008 study (Chellaraj, et.al., 2008) found that each additional foreign student increased patents by 0.57. Taken together, this suggests an economic loss of $210 billion for every 1,000 Ph.D. students blocked annually over a ten-year period.[16]

These numbers do not include nearly 7,000 fewer Ph.D. scientist and engineers working in the U.S. labor force and innovations and patents created outside the university setting.

POSTDOCS

Postdoctoral research appointments, better known as "postdocs," are temporary research positions for recent Ph.D. recipients, typically lasting two to five years, where they work under more senior scientists who have research funding. Postdocs are an important part of scientific research in the United States—over 100,000 workers that are already experienced in advanced research, they provide much of the labor, ideas, and innovation in many labs[17]

In the Fall of 2019, the National Science Foundation counted 36,795 temporary visa holders in postdoc positions within graduate science and engineering departments at American universities (56% of the total). Around two-

[13] Even assuming all students not completing their doctorates dropped out of the program after their first year, these numbers imply a loss of 49,840 graduate student years. Stanford's completion rate for doctorate students is reported at https://irds.stanford.edu/data-findings/doctoral-degree-programs-completion-and-time-degree and represents the completion rate of the 2012/2013 entering cohort. The National Science Foundation estimate of 5.8 years is the time since entering the doctoral program for recipients of new U.S. Ph.D.'s in 2019 reported in National Center for Science and Engineering Statistics (NCSES). 2020. Doctorate Recipients from U.S. Universities: 2019. NSF 21-308. Alexandria, VA: National Science Foundation. Available at https://ncses.nsf.gov/pubs/nsf21308/.
[14] Kevin Shih.
[15] https://autm.net/AUTM/media/Surveys-Tools/Documents/FY20-Infographic.pdf.
[16] Gnanaraj Chellaraj, Keith E. Maskus and Aaditya Mattoo, *The Contribution of International Graduate Students to U.S. Innovation*, Review of International Economics, 16(3), 444-462, 2008.
[17] There is no comprehensive source of data on postdocs working in the United States. In *Science and Engineering Indicators 2008*, NSF estimated that only around half of postdocs were in the graduate departments covered by it's survey. Other postdocs are at academic research institutes, government labs, and private industry. Since that same survey reported more than 66,000 postdocs in academic departments in 2019, "somewhere over 100,000" is a conservative estimate.

thirds of this total (22,349) were in the biological and medical sciences. There is also a large presence of foreign postdocs in engineering (5,577) and the physical sciences (4,520).

Table 5
Postdocs Working in U.S. Science and Engineering Graduate Departments by Field (2019)

Postdocs	Percent Temporary Visa	Number Working on Temporary Visa	U.S. Citizens and Permanent Residents
Total	55.5%	36,795	29,452

Source: National Foundation for American Policy tabulation of National Science Foundation Survey of Graduate Students and Postdoctorates in Science and Engineering, Public Use Microdata files

A separate NSF data source (the *Survey of Doctorate Recipients*) shows only 6,500 holders of Ph.D.'s from U.S. universities with temporary visas in academic postdoc positions, which means the vast majority of these 36,795 foreign postdocs have received their Ph.D.'s from universities outside the United States.[18] This provides the United States with direct connections to research recently performed at universities around the world. It also provides a gateway for foreign-trained scientists to enter the United States.

Table 6
Postdocs Working in U.S. Science and Engineering Graduate Departments by Field (2019)

Field	Percent Temporary Visa	Number Working on Temporary Visa	U.S. Citizens and Permanent Residents
Petroleum engineering	81.9%	59	13
Nanotechnology	76.8%	116	35
Engineering mechanics, physics, and science	76.7%	138	42
Aerospace, aeronautical, and astronautical engineering	73.6%	167	60
Electrical, electronics, and communications engineering	73.1%	954	351
Ophthalmology	72.7%	380	143
Metallurgical and materials engineering	71.8%	461	181
Biological and biosystems engineering	71.3%	62	25
Nuclear engineering	71.3%	57	23
Biotechnology	70.1%	61	26

[18] NFAP calculation using the National Science Foundation 2019 Public Use File of the Survey of Doctorate Recipients. Some of these academic postdocs will be in research institutes not counted in NSF's GSS survey.

Mechanical engineering	69.3%	791	351
Materials sciences	69.1%	179	80
Endocrinology	69.0%	238	107
Industrial and manufacturing engineering	68.9%	115	52
Biophysics	68.3%	112	52
Chemical engineering	68.1%	788	369
Biomedical sciences	67.8%	1317	625
Computer science	67.4%	328	159
Statistics	66.9%	119	59
Agricultural engineering	66.1%	74	38
Oncology and cancer research	65.7%	1202	628
Physics	65.6%	1785	936
Civil engineering	65.5%	567	298
Radiological sciences	65.4%	753	399
Molecular biology	64.7%	369	201
Hematology	64.3%	279	155
Computer and information sciences, general	64.3%	169	94
Engineering	64.1%	347	194
Otorhinolaryngology	64.0%	176	99
Dental sciences	63.3%	200	116
Chemistry	63.1%	2134	1249
Mining engineering	60.9%	14	9
Biochemistry	60.7%	1161	751
Agricultural sciences	59.3%	640	439
Biostatistics and bioinformatics	58.8%	424	297
Pathology and experimental pathology	58.6%	763	539
Pharmacology and toxicology	58.6%	598	423
Cell, cellular biology, and anatomical sciences	58.3%	1041	744
Pharmaceutical sciences	58.1%	634	457
Bioengineering and biomedical engineering	57.2%	867	648
Microbiological sciences and immunology	56.6%	1123	862
Physiology	56.5%	927	713
Biological and biomedical sciences	56.4%	487	376
Cardiology	55.7%	439	349
Genetics	55.6%	819	653
Atmospheric sciences and meteorology	54.6%	136	113
Geological and earth sciences	54.2%	458	387
Economics (except agricultural)	53.8%	71	61
Anesthesiology	53.6%	265	229

Neurobiology and neuroscience	53.2%	1179	1037
Computer and information sciences	53.1%	68	60
Astronomy and astrophysics	53.1%	303	268
Physical sciences	52.9%	119	106
Mathematics and applied mathematics	52.8%	471	421
Gastroenterology	52.6%	151	136
Botany and plant biology	51.9%	346	321
Surgery	51.5%	708	668
Neurology	50.5%	741	725
Obstetrics and gynecology	49.4%	154	158
Clinical medicine	49.0%	1951	2031
Pediatrics	48.7%	616	648
History and philosophy of science	47.6%	10	11
Multidisciplinary and interdisciplinary studies	47.3%	460	512
Biology	47.3%	1041	1162
Geosciences, atmospheric sciences, and ocean sciences	46.4%	135	156
Nutrition science	46.4%	89	103
Zoology and animal biology	46.1%	187	219
Ocean and marine sciences	45.3%	178	215
Geography and cartography	44.5%	57	71
Environmental science and studies	39.7%	110	167
Agricultural economics	38.5%	20	32
Linguistics	38.5%	15	24
Epidemiology	38.2%	109	176
Other health	38.2%	209	338
Research and experimental psychology	36.8%	92	158
Public health	36.7%	309	534
Public policy analysis	35.0%	77	143
Forestry, natural resources, and conservation	34.4%	182	347
Veterinary biomedical and clinical sciences	34.3%	233	446
Ecology and population biology	33.1%	137	277
Communication disorders sciences	32.0%	24	51
Social sciences	31.9%	139	297
Pulmonary disease	31.3%	86	189
Political science and government	31.2%	53	117
Clinical psychology	29.2%	21	51
Psychiatry	28.5%	286	718
Psychology, general	28.1%	186	477

Sociology	25.8%	41	118
Anthropology	24.3%	36	112
International relations and national security studies	23.5%	20	65
Nursing science	20.8%	25	95
Counseling and applied psychology	19.8%	33	134
Criminal justice and safety studies	18.8%	3	13
Human development	13.5%	21	135

Source: National Foundation for American Policy tabulation of National Science Foundation Survey of Graduate Students and Postdoctorates in Science and Engineering, Public Use Microdata files

CONCLUSION

International students play an essential role preserving America's position as a center of scientific and technological innovation. For international students to continue playing that role, it is necessary for the United States to maintain reasonable visa policies for international students and to make it easier for students to work after graduation, including preserving STEM OPT and improved policies on H-1B visas, per-country limits and employment-based green cards. In the long term, continuing a U.S. visa policy that blocks many Chinese graduate students from attending U.S. universities might deal a significant blow to innovation and scientific research in America.

ABOUT THE NATIONAL FOUNDATION FOR AMERICAN POLICY

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