

Sustaining the Talent Pipeline

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Converging Trends Impacting the University STEM Talent Pipeline

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Three Converging Trends

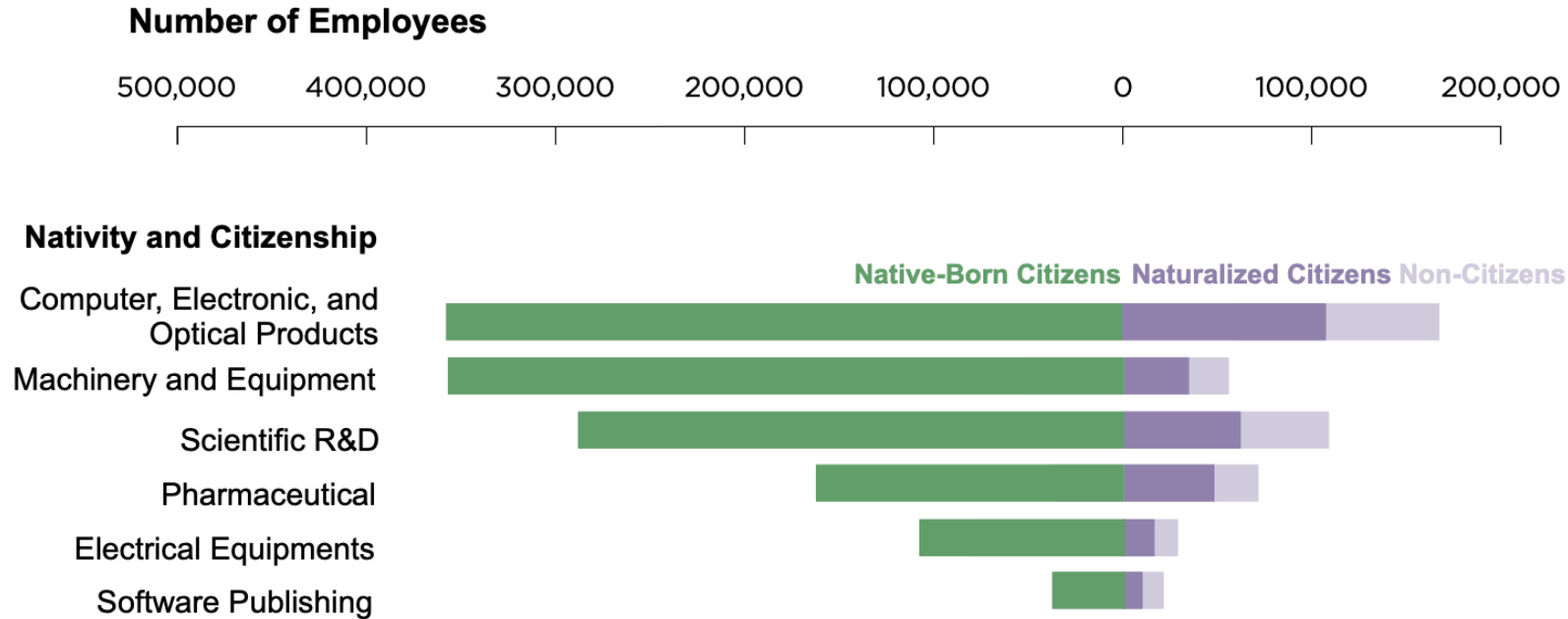
1. **Change in where international students come from.** Major shifts in countries of origins for international students
2. **A shrinking pipeline?** Decreases in domestic and international student enrollments
3. **Expanding the pipeline.** Pressure to produce more talent

Pressure to Produce Talent

- In the past decade, high-skilled job vacancies (professional, scientific, and technical services) have **tripled**
- By 2031, **10.8%** anticipated growth in STEM jobs (twice the growth rate as in non-STEM jobs)

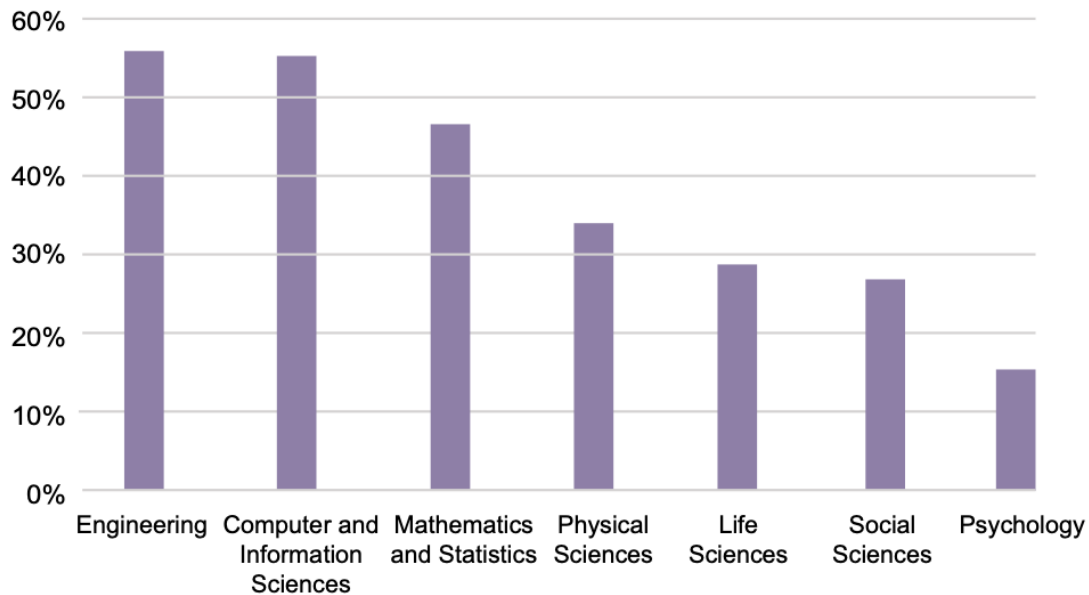
Source: Bureau of Labor Statistics

Foreign-Born Individuals Make Up a Large Fraction of Knowledge- and Technology-Intensive Industry Workforce



Source: National Science Board

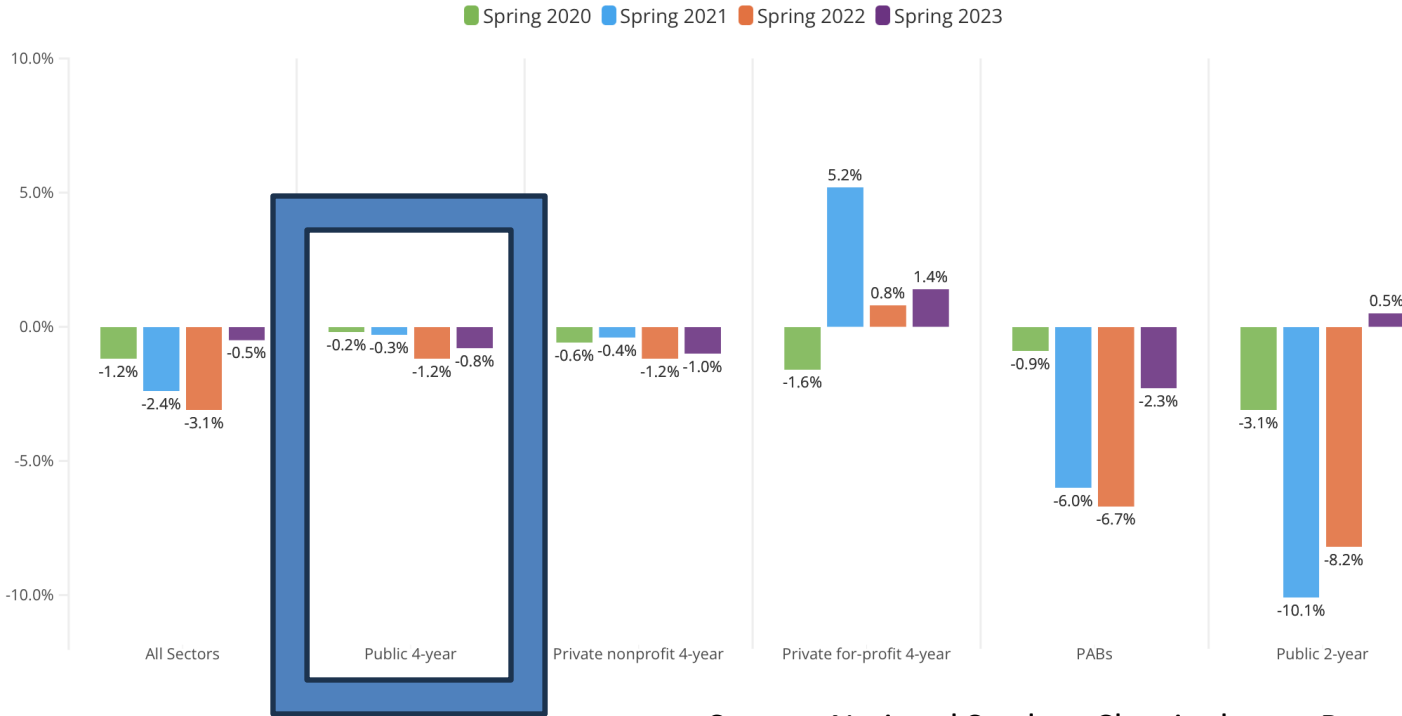
Over Half of Doctorate Holders Employed in Academic Engineering and Computer and Information Sciences are Foreign-Born



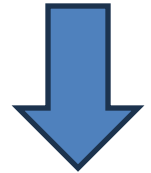
Source: Nat'l Science Board

Percent Change in Enrollment from Previous Year by Institutional Sector: 2019 to 2023

A Drying Pipeline?



2.2%
decline in
graduate
enrollment in
past year



Source: National Student Clearinghouse Research Center, May 2023

Undergraduate Enrollment Changes From Pre-Pandemic Levels

Foreign Language: **-18.5%**

Physical Sciences: **-16.4%**

Liberal Arts & Sciences: **-16.2%**

Math & Statistics: **-14.4%**

Engineering: **-8.9%**

Health Professions/Clinical Sciences: **-5.4%**

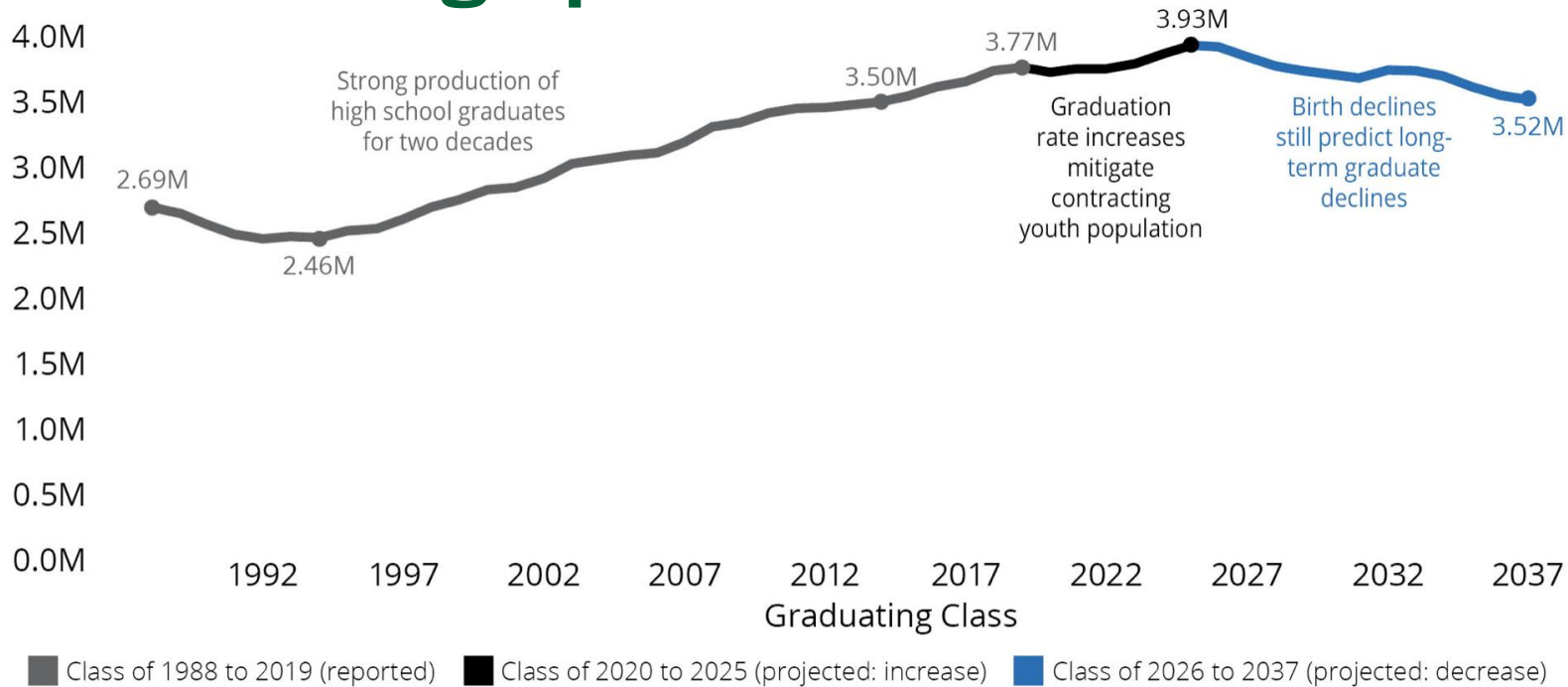
Biological/Biomedical Sciences: **-4.2%**

Business Management: **-2.6%**

Computer & Informational Sciences: **+30.8%**

Source: National Student Clearinghouse Research Center, May 2023

The Demographic Cliff



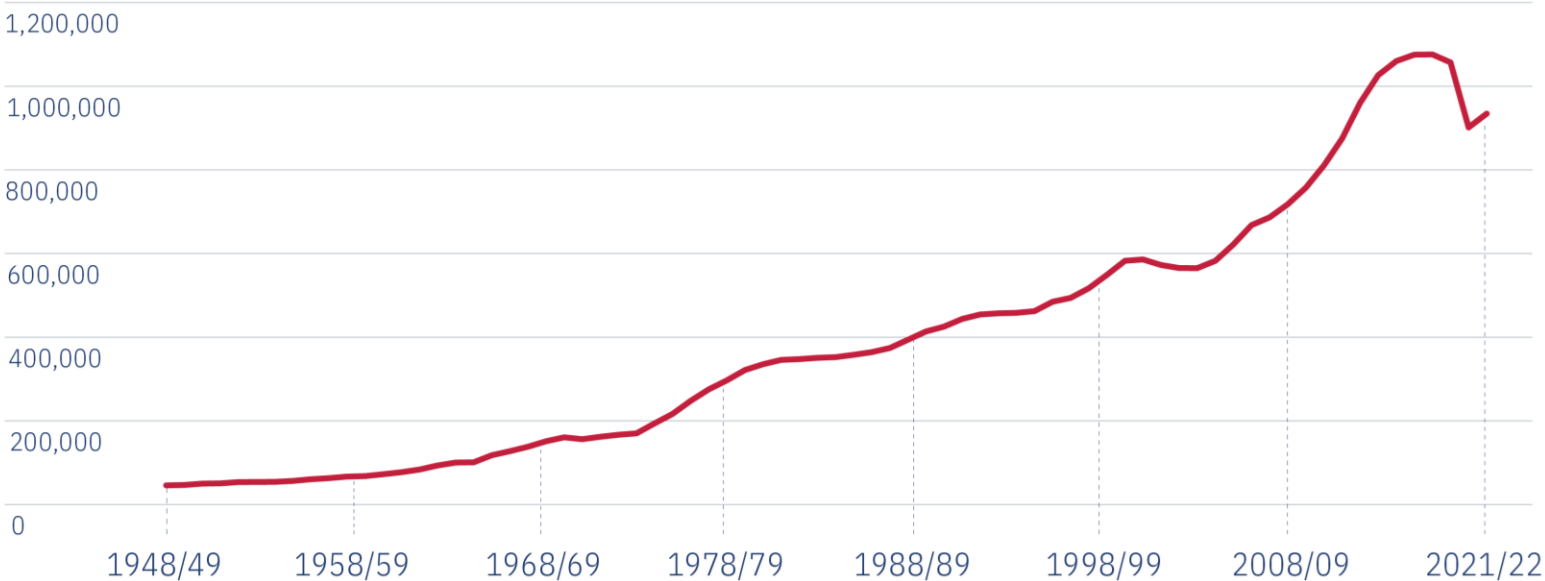
10%
decline in
domestic
students by
2037



Source: Western Interstate Commission for Higher Education, *Knocking at the College Door*, 10th edition, 2020. See [Technical Appendix](#) for detailed sources of data through the Class of 2019; WICHE projections, Class of 2020 through 2037. ([View states or regions](#))

International Enrollment: A Declining Trend

INTERNATIONAL STUDENTS, 1948/49 – 2021/22

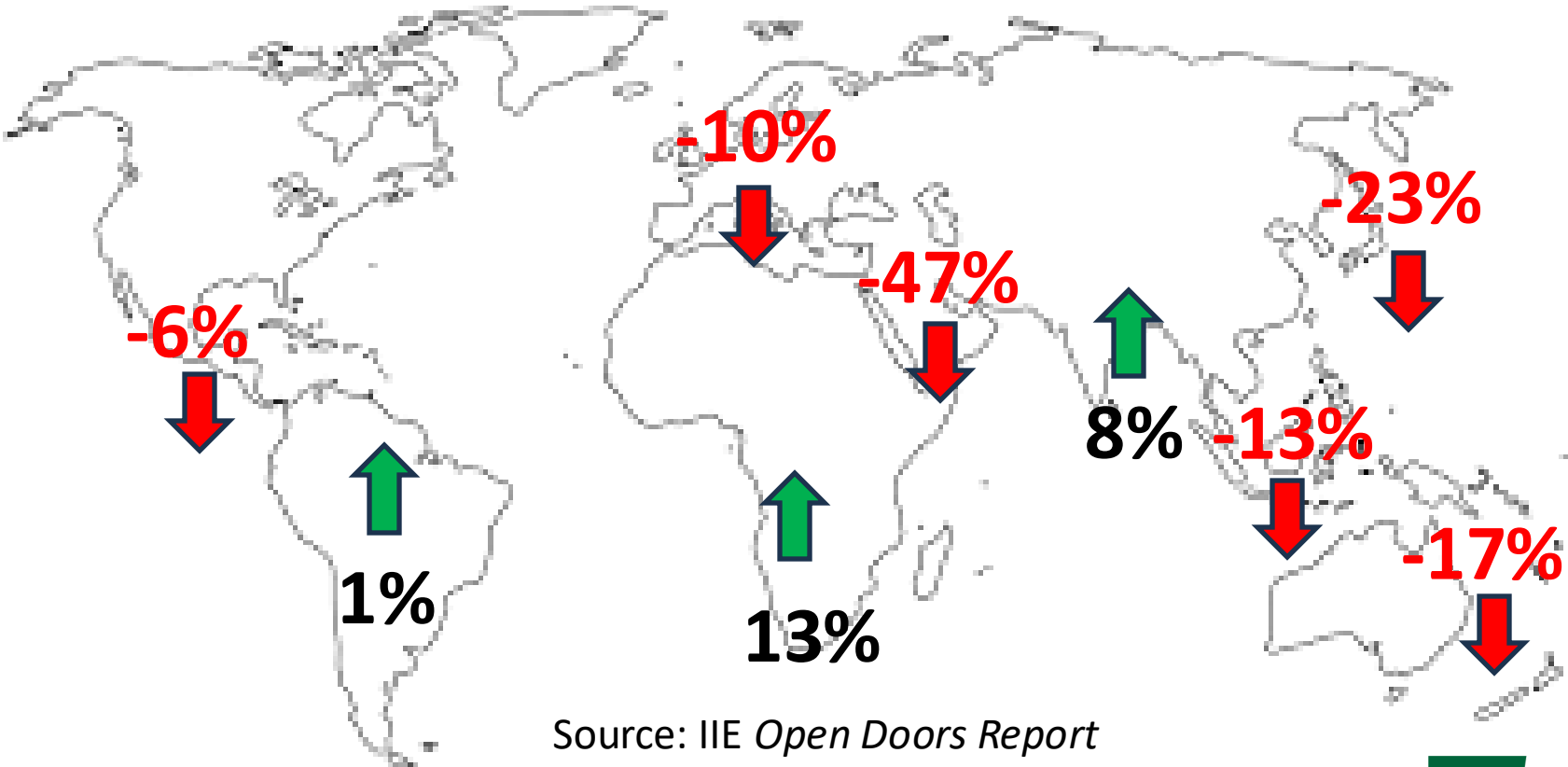


12%
decline in last
5 years



Source: IIE *Open Doors Report*

Five-Year Change in Where Students Come From



Source: IIE *Open Doors Report*

Change in Where Students Come From

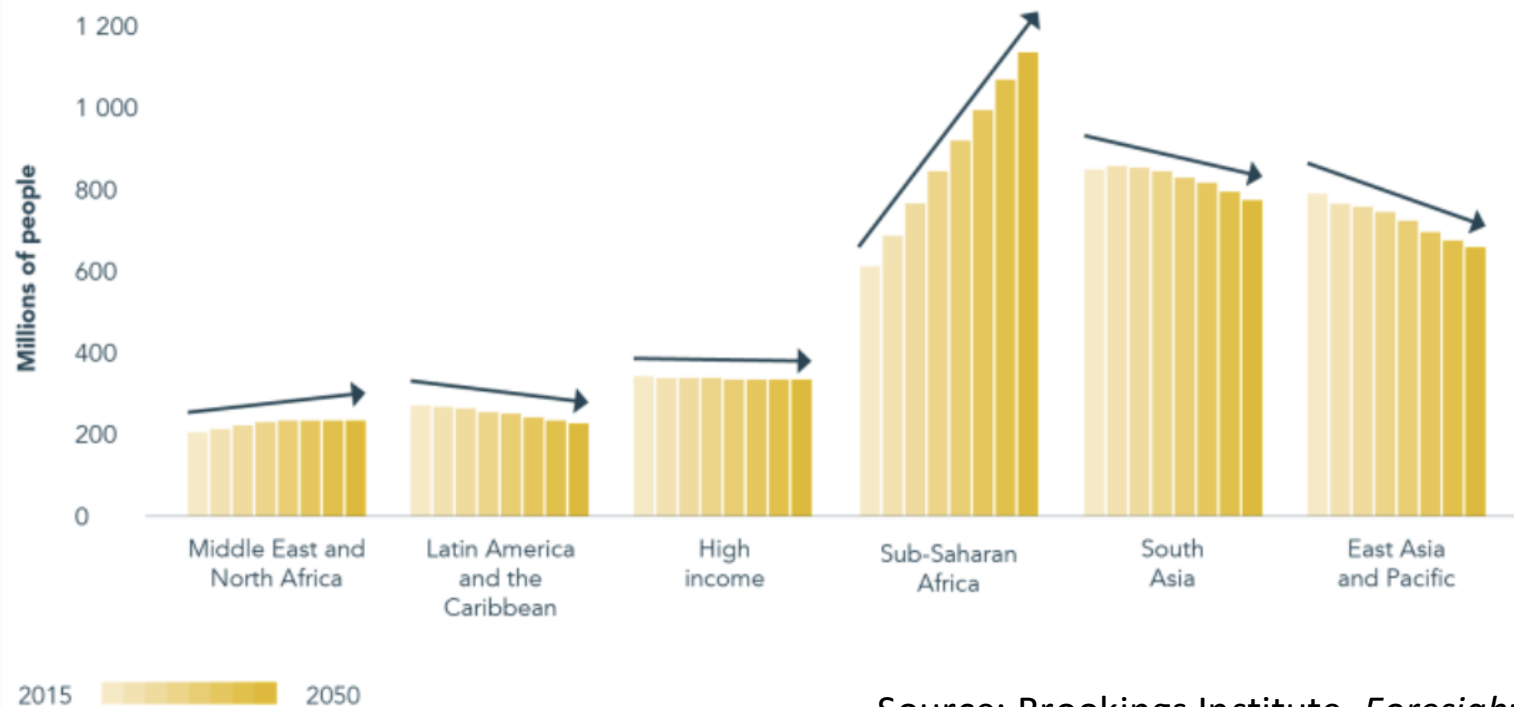
	2016/17	2021/22	+/- %
1. East Asia	459,284	372,378	-19%
2. South Asia	218,937	237,500	8%
3. Europe	92,820	83,240	-10%
4. MENA	100,014	53,104	-47%
5. SE Asia	56,088	48,791	-13%
6. S. America	43,146	43,655	1%
7. Africa	37,735	42,518	13%
8. Mexico/C.A.	25,158	23,525	-6%
9. Oceania	7,222	5,994	-17%

Trend Projection by 2026/27

1. East Asia	301,916
2. South Asia	257,637
3. Europe	74,649
4. Africa	47,907
5. S. America	44,170
6. SE Asia	42,443
7. MENA	28,196
8. Mexico/C.A.	21,998
9. Oceania	4,975

Source: IIE *Open Doors Report*

Shifting Demographics: Population in 2050



Source: Brookings Institute, *Foresight Africa Report*, 2019

Shifting Geography: Rise of Africa

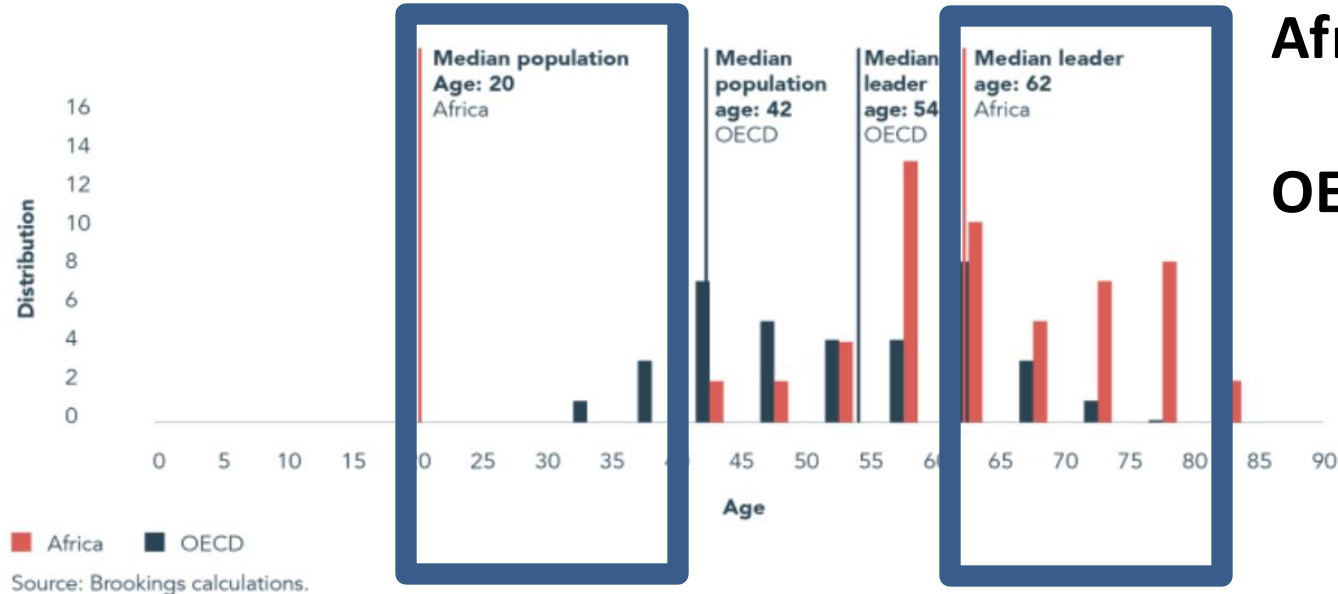
- Sub Saharan African population growth **expected to double** by 2050
- By 2050, **1 in 4** people will live in Sub Saharan Africa
- Need to create **18 million** jobs annually until 2035 to meet new entrants into workforce
- World Bank projects **100,000** more African PhDs will be needed over the next 10 years

Sources: World Bank, Brookings Institute

Shifting Geography: Rise of Africa (cont.)

Figure 1.4 Old leaders, young population

Africa has the youngest population globally but some of the world's oldest leaders. The median African leader at 62 years old is 8 years older than the median OECD leader. Furthermore, the age gap between the region's population and leaders is 42 years compared to only 12 for the OECD.



Africa: 42-year age gap

OECD: 12-year age gap

Sources: World Bank, Brookings Institute

Challenges for Universities

- Pressure to **EXPAND** the talent pipeline
- Entering an era of **DECLINE** – both domestic and international enrollments are declining.
- **SHIFT** in international students from East Asia/Middle East/Europe to Africa/South Asia/South America
- Potential of Africa for future **GROWTH**

Fulbright has served as a critical pipeline for international research talent for over 75 years

- Of the **63 Fulbright alumni** who are **Nobel Prize recipients**, 25 came to the U.S. as Fulbright Foreign Students or Visiting Scholars
- Many stayed after their fellowship or returned to the U.S. later in their careers



Terrance Tao, UCLA Professor of Mathematics
Fulbright Foreign Student from Australia

Fulbright “in-bound” Programs

Fulbright is an international exchange program, funded by Congress and 140 partner countries and host institutions

- Brings over **4,000 foreign students annually** to the U.S. for research or graduate study
- Brings over **900 Visiting Scholars** primarily for research, but also teaching opportunities
- Any potential threats to the influx of students and scholars is a concern
- Example: Keeping an eye on campus reactions to **unionization**

Will unionization result in less funding for graduate package “matches”? Might states pressure institutions to reserve more graduate funding for in-state students?

Supporting International Exchange, cont.

2. Support Your Faculty Going Abroad

- Fulbright U.S. Scholar is the largest fellowship program for U.S. faculty = **800+ awards** annually
- Fulbright is a **public diplomacy program** whose mission is forge long-lasting connections
- The U.S. State Department considers selectees to be diplomats representing their lived American experiences AND their **home institutions**



Supporting International Exchange, cont.

2. Support your faculty going abroad, cont.

- Allow leaves between sabbaticals and provide supplemental salary
- Equip scholars to represent your institution and help recruit students and explore longer-term partnerships
- Encourage them to invite faculty to your campus to continue collaborations

International exchange is the foundation on which international research and talent pipelines are built



Public Research for Public Good



UMBC

OFFICE OF RESEARCH &
CREATIVE ACHIEVEMENT

APLU-COR & CII Summer Meeting
Halifax, NS – June 27, 2023

Some Introductory Comments

- Thanks to the organizers of this year's Summer Meeting for encouraging – and challenging – us to get to know each other better.
- I arrived as a visiting exchange student from Germany several decades ago, and I made the decision to stay – based on my positive experience during the first six months.
- At our commencement & graduation exercises the president frequently asks the undergrads, whether at least one of their parents is a first-generation immigrant – and over half of them stand up.



APLU Gold Award for Internationalization

The Association of Public Land-Grant Universities (APLU) has honored UMBC with its **2021 Gold Award in Leadership and Pervasiveness for Internationalization**.

UMBC is the only North American university to receive this prestigious Gold Award. This honor affirms the collective, intentional work behind UMBC's global engagement strategy.

The award reflects two years of work engaging over 400 members of the UMBC community, who together envisioned the future of UMBC's global interconnections.

In addition to faculty, staff, and other stakeholders in the UMBC community, contributors also include UMBC students.



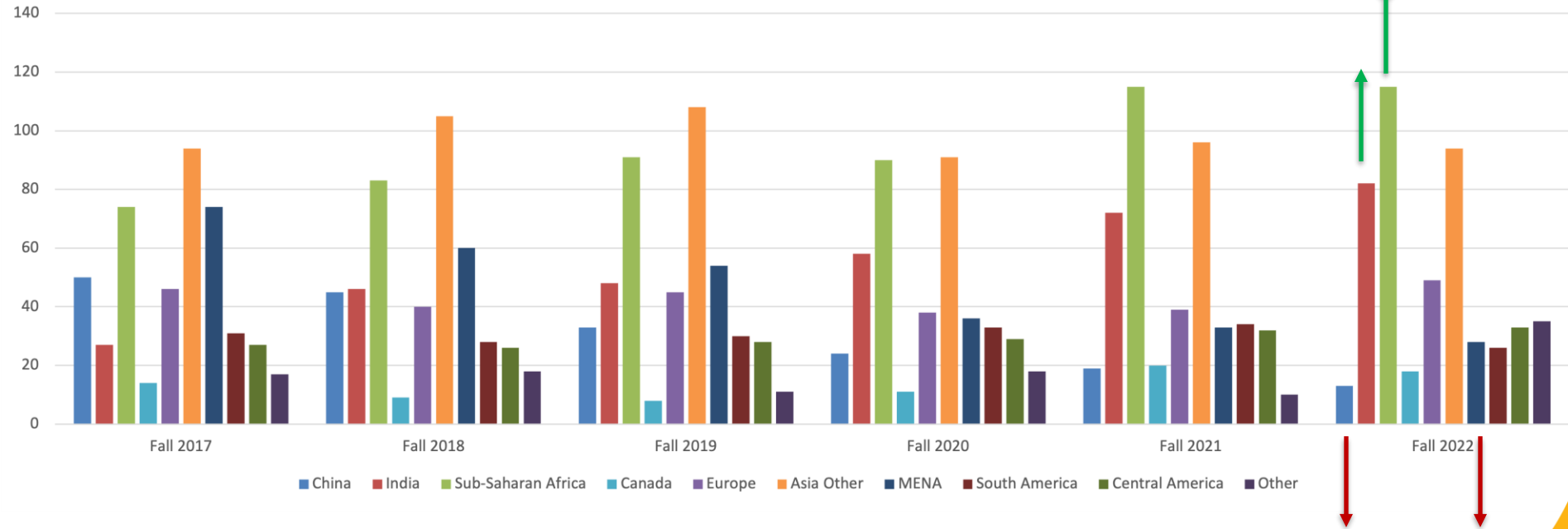
UMBC Internationalization Strategy

- Our **Center for Global Engagement** has been leading our efforts to increase our international profile.
- In 2018, UMBC embarked on a formal comprehensive internationalization initiative and joined the American Council of Education's (ACE) Internationalization Laboratory.
- Upon completion of this ACE Lab process UMBC has shifted to implementing multiple new projects, programs, and services.
- We envision comprehensive internationalization as a strategy for enhancing the global engagement of our students, employees, and other community members as they participate in teaching and learning, research, and career development.



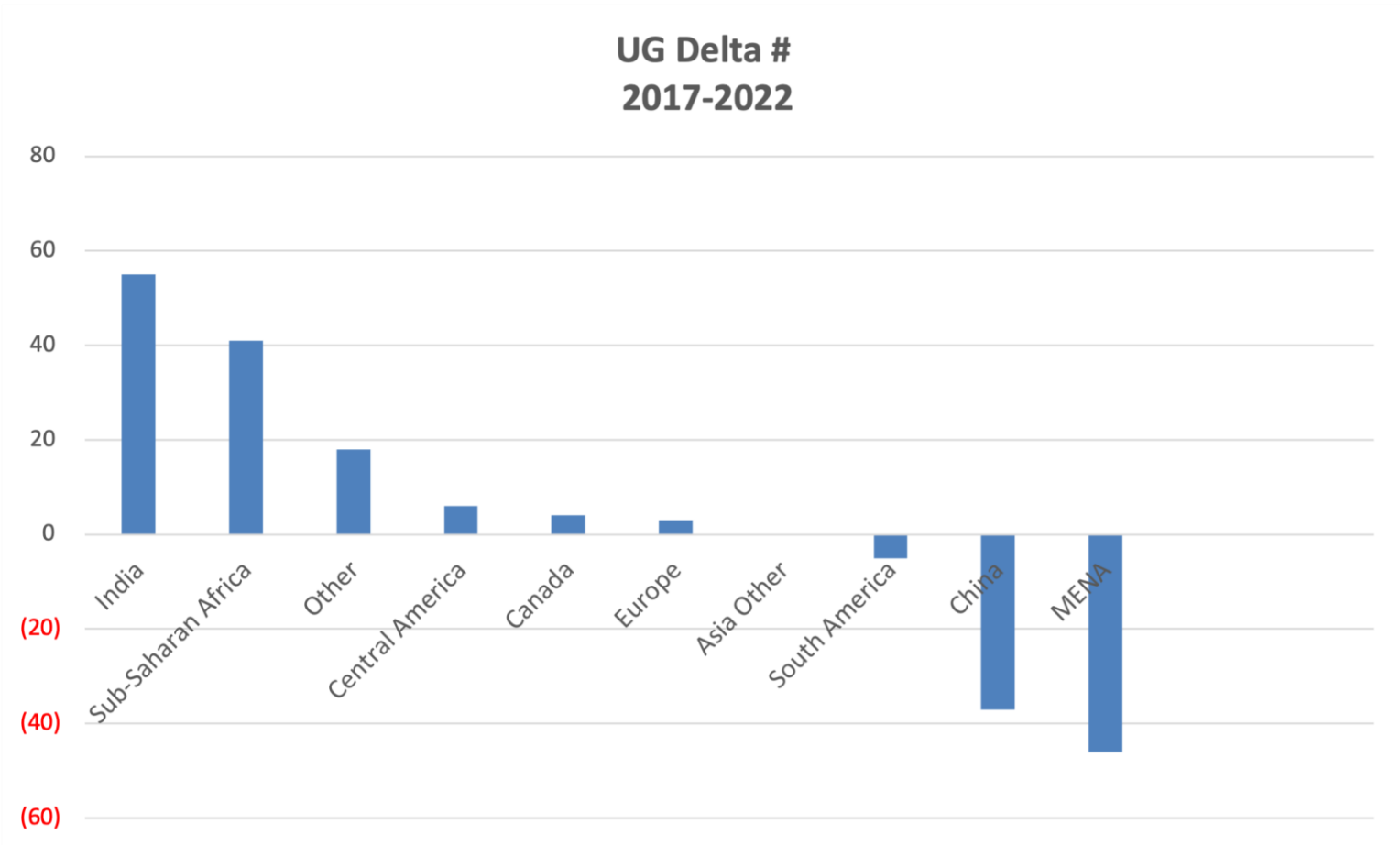
UMBC Undergrad Trends by Nationality

UMBC Undergraduate Nationalities



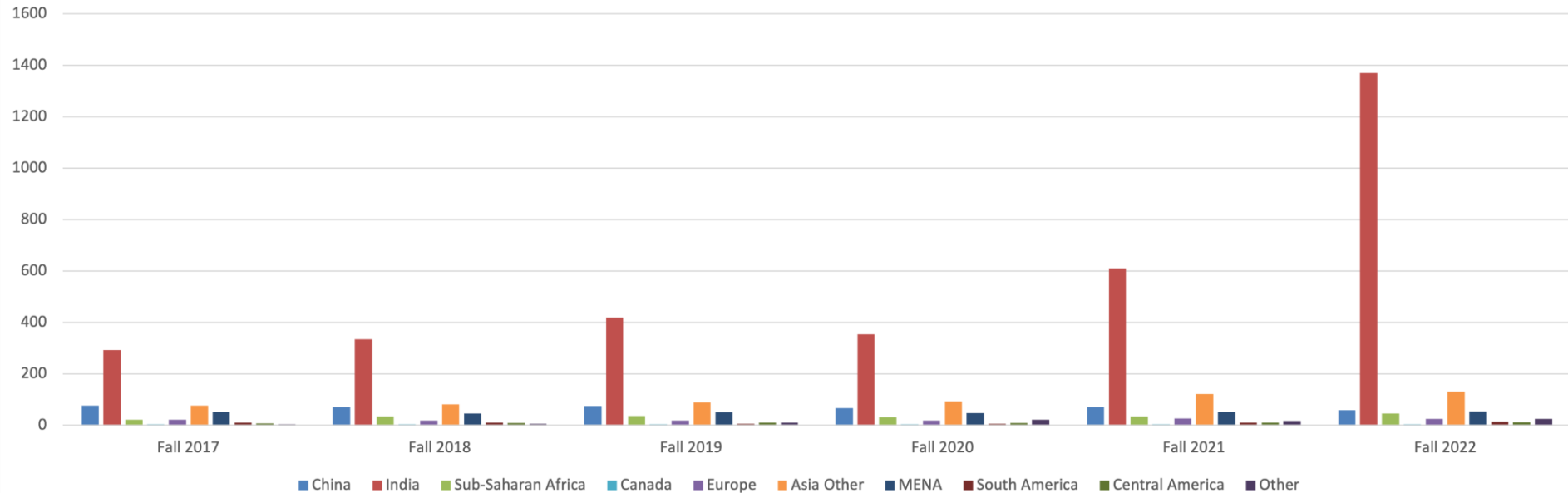
493 among 10,225 UGs in Fall 2022

Change in Undergrads 2017-2022



Grad Student Trends by Nationality

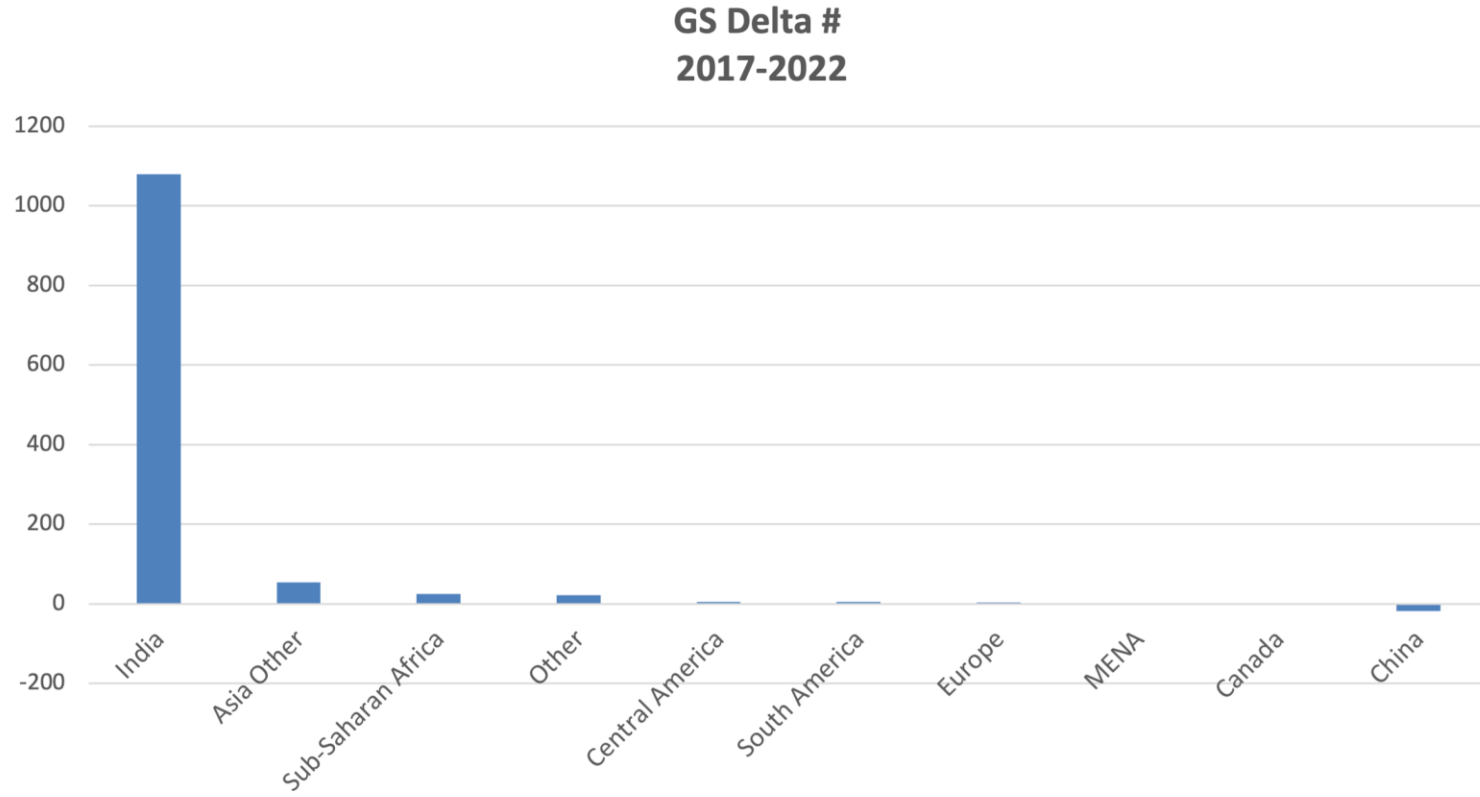
UMBC Grad Student Nationalities



↑ Grad Students from India:
Double 2017-2021
Double 2021-2022

1,738 among 3,366 GS in Fall 2022

Change in Grad Students 2017-2022



Research & Creative Achievement Excellence

Data Sciences, AI, and National Security

- Cybersecurity
- Artificial Intelligence and Autonomy
- Cognitive Computing & Big Data Analytics

Climate, Environmental, and Space Sciences

- Atmospheric Physics & Remote Sensing
- Impact of Climate Change on Polar Regions
- Earth & Space Sciences
- Ecology & Remediation

Health and Life Sciences

- Bio Sciences & Engineering
- Marine Biotechnology & Aquaculture

Community, Equity, and Social Justice

- Health Equity
- Public Policy

History, Identity, and Society

- Archival Research
- Culture & History

Creative Engagement

- Intercultural Communication
- Public Humanities & Arts



- International students contributed \$45 Billion to the U.S. economy in 2018, according to the U.S. Department of Commerce.
 - In 2021/22 that number has shrunk to \$34 Billion.
- In 2021-22 there were 948,000 international students enrolled in higher education in the U.S. – about 4.8% of the nearly 20 million college students in the U.S..
 - 16% of UMBC students (UG and GS) have international origin.
- International students received 117,000 Master's and Doctoral STEM degrees in 2019, almost half of all postgraduate degrees awarded.

- The Optional Practical Training (OPT) program enables U.S. employers to hire international students, often filling critical R&D positions at home rather than having to look for talent, and possibly relocate jobs, abroad.
 - STEM OPT is contributing a growing case load to our *Center for Global Engagement*, including the need to support them up to three years post graduation.
- According to NSF, 77% of international students expressed intent to remain in the United States and work after the conclusion of their OPT. However, only 46% were able to do so.
 - The study also found a significant level of concern among students about their ability to get an internship and a job in the US.

Challenges

- Most of our international graduate students are master's students – most of them are not involved in the research efforts on campus. This is a missed opportunity.
- Research Security, Foreign Influence, Export Control Policies, rapidly changing federal regulations impact areas in a growing area of research focus.
 - This is limiting the labs that foreign students can freely interact with.
- Some of the inherent challenges include:
 - Language Barriers
 - Discrimination
 - Social and Cultural Differences
 - Financial Difficulties
 - Access to Campus IT Authentication (DUO, etc.) during summer or home visits
- We are working hard to integrate our international students into the campus community.
 - We have observed growth in student applications once earlier cohorts report back about their positive experiences.
- **Diversification of our international portfolio will be critical in the years ahead.**

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